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OPTIMIZING ANESTHESIA PROVIDERS' TIMING OF ADMINISTRATION OF
DEXAMETHASONE FOR THE PREVENTION OF POST-OPERATIVE
NAUSEA AND VOMITING: TRANSLATING CLINICAL
GUIDELINES INTO PRACTICE

by

Tanner Young Mixon

A Capstone Project
Submitted to the Graduate School
and the Department of Advanced Practice
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Nursing Practice

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ABSTRACT

OPTIMIZING ANESTHESIA PROVIDERS' TIMING OF ADMINISTRATION OF DEXAMETHASONE FOR THE PREVENTION OF POST-OPERATIVE NAUSEA AND VOMITING: TRANSLATING CLINICAL GUIDELINES INTO PRACTICE

by Tanner Young Mixon

December 2016

Research has shown that post-operative nausea and vomiting (PONV) is a significant contributing factor to extended recovery times and unwanted hospital admissions following ambulatory surgery. The purpose of this DNP project was to assess current practice regarding administration of dexamethasone for the prevention of PONV, provide information based on best practice guidelines, and assess willingness to change practice based on the guidelines set forth by the Society for Ambulatory Anesthesia (SAMBA). Administration of dexamethasone is aimed at decreasing the incidence of PONV, optimizing PACU times, and increasing patient satisfaction regarding perioperative care.

An electronic presentation and survey were emailed to members of the Mississippi Association of Nurse Anesthetists (MANA) for the purpose of educating anesthesia providers about current evidence guiding PONV prevention as well as assess current practice of members. Results were analyzed using descriptive statistics. The majority of CRNAs surveyed were found to administer dexamethasone in accordance with the guidelines set forth by SAMBA. It was also found that the CRNAs surveyed

displayed a willingness to change their current practice when provided with an evidence-based alternative aimed at optimizing patient outcomes.

The results in combination with the guidelines set forth by the Society for Ambulatory Anesthesia were used to make recommendations meant to improve patient outcomes following surgery. These recommendations were disseminated to members of The Mississippi Association of Nurse Anesthetists (MANA) through email as well as the MANA website.

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LIST OF ABBREVIATIONS

CRNA	Certified Registered Nurse Anesthetist
DNP	Doctor of Nursing Practice
HCAHPS	Hospital Consumer Assessment of Healthcare Providers and Systems
IRB	Institutional Review Board
MANA	Mississippi Association of Nurse Anesthetists
PACU	Post-anesthesia care unit
PDNV	Post-discharge nausea and vomiting
PONV	Post-operative nausea and vomiting
SAMBA	The Society for Ambulatory Anesthesia
USM	The University of Southern Mississippi

CHAPTER I – INTRODUCTION

Statement of Problem

Post-operative nausea and vomiting (PONV) is a very real concern for both patients and healthcare providers in the ambulatory surgical setting. According to Butterworth, Mackey, and Wasnick (2013), 1 in every 4 patients will develop post-operative nausea and vomiting (PONV) if not prophylactically treated with an anti-emetic. Multiple studies have shown the significant role PONV plays in recovery from surgery. Researchers found that PONV is a significant contributing factor to extended recovery times and unwanted hospital admissions following ambulatory surgery (Fortier, Chung, & Su, 1998). A follow up study in 2013 found similar results linking PONV to unwanted hospital admissions following day surgery (Whippey et al., 2013). Research has shown that avoiding PONV outranks even pain among patients asked about their concerns following surgery (Eberhart, Morin, Wulf, & Geldner, 2002; Gan & Habib, 2016; Lee, Gin, Lau, Dip, & Ng, 2004). PONV is stressful and disruptive to the patient on a personal level, as well as costly to both the patient and facility. According to Gan and Habib (2016), patients are willing to spend between \$73 and \$100 of their own money to avoid PONV.

Statement of Purpose

While there are a number of clinical tools and guidelines available to assess the risk and guide treatment of post-operative nausea and vomiting, research suggests varying practices amongst anesthesia providers in relation to pretreating a patient at risk for post-operative nausea and vomiting (Smith, Smith, & Smith, 2012). Further, it has

been demonstrated that the timing of administration of dexamethasone can play a significant role in preventing PONV (Zou, Jiang, Xiao, & Zhou, 2014).

The purpose of this DNP project was to assess current practice regarding administration of dexamethasone for the prevention of PONV, provide information based on best practice guidelines, and assess willingness to change practice based on the guidelines set forth by The Society for Ambulatory Anesthesia (SAMBA). The results in combination with the guidelines set forth by SAMBA (Gan et al., 2014) were used to make recommendations meant to improve patient outcomes following surgery. Administration of dexamethasone is aimed at decreasing the incidence of PONV postoperatively, optimizing PACU times and increasing patient satisfaction regarding perioperative care.

CHAPTER II – REVIEW OF LITERATURE

Current Guidelines

Gan et al. (2014) formed a multidisciplinary panel under the guidance of The Society for Ambulatory Anesthesia for the purpose of setting general guidelines directing the use of antiemetics for the prevention of PONV. The panel determined a single 4 to 5mg dose of dexamethasone at or before induction effectively reduces PONV as well as increases the quality of recovery after being discharged (Gan et al., 2014). In addition to directing the administration of dexamethasone, the guidelines suggest a set of patient-specific risk factors to help determine which patients are best suited for prophylactic treatment of PONV. Significant individual risk factors include being female, less than 50 years old, a history of PONV or motion sickness, and being a non-smoker as can be found in Table 1. The presence of one or more risk factors increases the risk of PONV (Gan et al., 2014).

Table 1 *PONV Risk Factors*

Clinically Significant Risk Factors Contributing to PONV
<ul style="list-style-type: none">• Female• History of PONV or motion sickness• Nonsmoker• Age less than 50 years old• General anesthesia versus regional block• Use of anesthetic gas (volatile and nitrous oxide)• Use of opioids for postoperative pain control• Duration of anesthetic• Type of surgery (abdominal and gynecological)

Adapted from the guidelines set forth by Gan et al. (2014)

Gan and Habib (2016), who helped author the consensus guidelines published in 2014, recently published a book guiding the treatment of PONV. The authors continue to recommend the administration of a single 4-5mg dose of dexamethasone before or immediately after induction. It is noted that perineal burning, a well-known side effect of IV dexamethasone, limits its use pre-induction. Gan and Habib (2016) suggest the same level of PONV prophylaxis exists if dexamethasone is given immediately after induction. Dexamethasone induced hyperglycemia is seen as one of the only possible sources of postoperative complications, due to an increased risk for post-operative infection and delayed wound healing. The authors offer that a single dose approach, and using the suggested 4-5mg versus the popular dose of 8mg mitigates the risk of these complications (Gan & Habib, 2016).

Tarantino et al. (2015) performed a randomized, double-blind, placebo-controlled trial over two years. Patients were assessed for the presence of PONV for 48 hours following surgery. The researchers found there to be a 28% reduction in absolute risk of PONV when patients were given a single 8mg dose of dexamethasone preoperatively compared to a placebo. Though the 8mg dose is associated with an increased blood glucose level post-operatively, a recent study (Doyle, 2015) suggests 4mg to be as effective at preventing PONV while allowing for the possibility of a dose dependent decrease in the hyperglycemic response. In a similar study, Azeem, Ullha, Nasim, and Cheema (2015) considered patients undergoing laparoscopic cholecystectomy. Patients were monitored 24 hours following surgery for the presence of PONV. Results showed PONV in 17% of those receiving dexamethasone and 53% of those receiving a placebo. It was noted that no adverse effects were observed. Eftekharian and Roozbahany (2011)

and Zou et al. (2014) both reported similar findings, noting dexamethasone was most affective at reducing the incidence of PONV when given at or before induction of anesthesia.

Patient Significance

PONV is a significant factor contributing to unwanted hospital admissions following what were scheduled as ambulatory surgeries (Fortier et al., 1998; Whippey et al., 2013). Gan and Habib (2016) also point to PONV as a significant contributor to extended post anesthesia care unit (PACU) stays as well as unwanted hospital admissions, noting that each occurrence of emesis adds an estimated 20 minutes to the PACU stay. While an exact number is hard to calculate, it is estimated that extra costs related to PONV and post-discharge nausea and vomiting (PDNV) amount to several million US dollars annually (Gan & Habib, 2016). Unexpected overnight admissions to the hospital can lead to further disruption for the patient in regards to their time and recovery. Each extra day spent in the hospital increases the chance of infection by up to 1.37% (Hassan, Tuckman, Patrick, Kountz, & Kohn, 2010). According to a study by De Lissovoy et al. (2009) looking at 723,490 patients hospitalized due to surgery, a single surgical site infection extended the length of hospital stay by an average of 9.7 days. Extended recovery times and increased risk of unwanted hospital admission following ambulatory surgery can mean time away from work and lost wages. This also increases the time it takes a patient to return to their normal level of activity (Gan & Habib, 2016). While unexpected admissions and infection rates are straightforward to measure, patient satisfaction is more subjective in nature.

Odom-Forren et al. (2014) reported in a 2014 study that patients exhibiting PONV and PDNV reported a decreased quality of life until symptoms resolved. The authors also found PONV and PDNV to affect the patient's ability to eat and drink, perform normal daily activities, and sleep for up to a week after discharge following ambulatory surgery. Patient satisfaction with their treatment was found to be negatively affected by the presence of PONV and PDNV (Odom-Forren et al., 2014). White et al. (2008) also reported that PONV interfered with a patient's level of function in regards to their appetite and ability to sleep, both of which play a vital role in a patient's recovery from surgery. In a study by Eberhart et al. (2002), patients were asked questions related to their concerns regarding recovery from surgery. The authors concluded PONV ranked highest, even outranking pain, when it came to what the patients were most worried about in the immediate postoperative period (Eberhart et al., 2002). Gan and Habib (2016) report similar findings, stating patients fear PONV at a higher rate than pain and shivering.

Facility Significance

Fortier et al. (1998) determined PONV to be a significant factor contributing to 14.4% of unwanted hospital admissions following ambulatory surgery. A more recent study (Whippey et al., 2013) found similar results further pointing to PONV as an important and modifiable risk factor relating to delayed recovery from surgery. As stated before, each occurrence of emesis can increase PACU stay times by about 20 minutes (Gan & Habib, 2016). According to Raft, Millet, and Meistelman (2014), in 2012 the average cost for a stay in the PACU was estimated to be \$12 per minute, which would equal \$240 per episode of emesis. Another study conducted by Habib, Chen, Taquchi, Hu, and Gan (2006) linked emesis to significantly increased use of resources, requiring

the nurse's full attention and the use of rescue anti-emetics, as well as increased PACU times up to 25 minutes per episode and associated costs of \$138. In contrast, the pharmacy at a trauma center located in Mississippi indicated that the cost of a single 4mg vial of dexamethasone cost around \$2.50. Unexpected hospital admissions can also contribute significantly to cost for facilities considering that as of 2014, the average cost of one inpatient day at a hospital in Mississippi was \$1351 (The Henry J. Kaiser Family Foundation, n.d.). According to Zimlichman et al. (2013), the cost of a single surgical site infection in 2012 was around \$20,000 and totaled \$3.3 billion in the US for the year, reflecting what De Lissovoy et al. (2009) found in an earlier study looking at how surgical site infections affect the cost of healthcare.

Patient satisfaction scores can be factored into reimbursement rates, showing the importance of optimizing a patient's perioperative experience. Hocking, Weightman, Smith, Gibbs, and Sherrard (2013) reported PONV as the source of 9% of the variance in patient's perceptions of the quality of anesthesia provided to them. In a study analyzing perioperative factors affecting HCAHPS responses of 2,758 surgical patients, Maher et al. (2015) found pre-operative and post-operative experiences to be the largest contributing factors to how patients ranked their encounter, lending to the importance of the post-operative experience and its effect on patient satisfaction scores. Eberhart et al. (2002) determined PONV to be the most significant concern for patients in the immediate postoperative period, suggesting anesthesia providers pay close attention to the prevention of PONV. White, O'Hara, Roberson, Wender, and Candiotti (2008) found PONV led to a reduction in appetite as well as sleep following surgery, further pointing

to the importance of preventing PONV in relation to patient outcomes and patient satisfaction scores as determinants of reimbursement.

Summation of the Literature

Based on the review of current literature, there exists a large body of evidence in support of using dexamethasone as an antiemetic. Consensus guidelines (Gan et al., 2014) point to dexamethasone as an effective and inexpensive prophylactic treatment for PONV. Further, it is a medication with few side effects which can be minimized through optimal dosage and timing of administration (Gan & Habib, 2016).

PONV is an important factor related to patient recovery. Both White et al. (2008) and Odom-Forren et al. (2014) found PONV and PDNV to negatively affect a patient's post-operative experience and delay the return to normal day-to-day activities, pointing to prevention of PONV as an important part of recovery from surgery. Post-operative experience and PONV also plays an important role in patient satisfaction scores (Maher et al., 2015), which can negatively affect reimbursement based on patients' perception of the quality of anesthesia provided (Hocking et al., 2013). PONV can also directly affect cost of care through increased PACU times (Gan & Habib, 2016) and increased resource usage (Habib et al., 2006). Each episode of emesis from PONV in the PACU has been estimated to cost up to \$240 dollars (Raft et al., 2014).

Conclusion

While each of the studies above presents different levels of effectiveness and significance, they all suggest that there is potential value in the use of dexamethasone as a cost effective, safe, and reliable prophylactic treatment for post-operative nausea and vomiting aimed at improving patient outcomes. More importantly, the aforementioned

studies support the current guidelines set forth by the Society for Ambulatory Anesthesia (Gan et al., 2014).

CHAPTER III - METHODOLOGY

Target Outcomes

The planned outcomes of this DNP project were to:

1. Assess current practice among CRNAs related to the use of dexamethasone for preventing PONV and
2. Provide an educational presentation of the guidelines set forth by the Society for Ambulatory Anesthesia and supporting evidence regarding the prevention of PONV using dexamethasone and
3. Assess CRNA willingness to change current practice based on the evidence presented.

Theoretical Framework

The focus of this project follows the goals outlined by the Model for Change to Evidence-Based Practice as proposed by Rosswurm and Larrabee (1999). This theoretical framework describes a process that calls for assessing whether there is a need for a change in practice, linking the need with specific interventions and patient outcomes, compiling evidence, creating a plan for changing the current practice, implementing and evaluating the change, then merging the change with current standards so as to maintain the new standard as proposed by the findings of the study (Rosswurm & Larrabee, 1999). The proposed theoretical framework provides a tested and trusted guide for evaluating and implementing change in practice if indicated. It also provides for the future implementation of the aforementioned guidelines if indicated by the findings of this DNP project. Due to the limited time frame available, this capstone project utilized the first four steps outlined by Rosswurm and Larrabee (1999): assessing the need for change,

linking the need with specific interventions and outcomes, compiling the evidence, and creating a plan for changing the current practice.

Target Population

The target population was practicing CRNAs that are current members of the Mississippi Association of Nurse Anesthetists (MANA). MANA members include 500-600 CRNAs working in a variety of different clinical settings throughout the state of Mississippi. Inclusion criteria was limited to licensed CRNAs currently practicing in the perioperative setting in Mississippi and participants must be at least 18 years of age. All other survey participants were excluded.

Setting

The DNP project utilized MANA membership. Data was collected from CRNAs licensed and working in the state of Mississippi, and results from the project were disseminated to the association for the purpose of improving patient outcomes. The MANA membership reflects CRNAs working in settings covering the full spectrum of clinical practice, including rural hospitals, ambulatory surgery centers, office based practice, as well as trauma centers throughout Mississippi.

Design

The DNP project assessed the current practice of CRNAs using dexamethasone for the prevention of PONV. MANA members were sent a short presentation outlining current guidelines set forth by the Society for Ambulatory Anesthesia (Gan et al., 2014) as well as supporting evidence-based on the review of literature. The educational presentation can be found in Appendix C. In addition, a link to a short survey was provided. Questions covered familiarity with the current guidelines set forth by the

Society for Ambulatory Anesthesia, preferred dosage (4mg, 8mg, other), preferred timing of administration (pre-induction, during or immediately after induction, immediately before emergence), whether they felt their current practice is effective, and willingness to change current practice if provided with an evidence-based alternative. Demographic data including sex, age, and years of practice was also gathered. The survey tool can be found in Appendix D.

Survey data remained completely anonymous, and was only used for study purposes and analysis based on the stated target outcomes. Participation in the survey was completely voluntary and posed no risk to those choosing to do so. In addition, participants were provided with an educational opportunity aimed at optimizing their current practice. Subjects were chosen based on their willingness to participate using a convenience sample, this type of sampling allowed for access to a large number of practicing CRNAs in Mississippi and helped to maximize survey participation. Survey responses were collected using a password protected account provided by the online survey tool Qualtrics. Survey data was stored on a personal computer for the purposes of analysis and interpretation. The personal computer and its contents were password protected for the duration of the study, after which survey data was removed. At no time was identifiable information collected or stored for the purposes of the DNP project.

Following data analysis, MANA was presented with findings and recommendations based on current guidelines set forth by SAMBA and supporting evidence to help improve patient outcomes if indicated by the results of the survey.

Procedure

Following University of Southern Mississippi (USM) Institutional Review Board (IRB) approval, an electronic survey developed using the online tool Qualtrics provided by USM, and an electronic presentation outlining the current guidelines set forth by SAMBA (Gan et al., 2014) and supporting evidence was emailed to members of MANA. Procedures for data collection were as follows:

1. An email containing two anonymous links was sent to all MANA members through MANA's membership email list. The first link allowed participants to view the electronic presentation outlining current literature and guidelines. The second link provided access to the electronic survey administered through the online survey tool Qualtrics.
2. Participants were then asked to review the electronic presentation first, followed by completion of the electronic survey. Participants were given two weeks to complete the survey starting from the date the email was delivered. A reminder email was sent when one week remained in the survey period.
3. After the survey period of two weeks had passed, the survey was closed.
4. Data was then compiled and analyzed.

Data Analysis

Results were analyzed using descriptive statistics utilizing frequency tables for the purpose of determining if and how CRNAs within MANA were using dexamethasone for the purpose of preventing PONV. Knowing how CRNAs administer dexamethasone can help to guide future efforts aimed at educating CRNAs on preventing PONV. Results were compared to the most recent guidelines set forth by SAMBA and the supporting

evidence found within the review of literature for the purpose of guiding recommendations for future practice.

Ethics

The electronic questionnaire was completely anonymous and completed on a voluntary basis. Participation in this survey and its findings posed no risk to participants, and analysis of the data focused on optimization of current practice. Any change in practice or patient care related to the findings of this DNP project was determined by the anesthesia providers.

Assumptions

The main assumption was that the anesthesia providers surveyed view PONV as an important and modifiable complication following surgery. It was also assumed that patient outcomes at the facilities staffed by the CRNAs belonging to MANA can be improved with the optimization of dexamethasone administration relating to PONV.

Resource Requirements

Few resources were required for this DNP project. Those required included the University of Southern Mississippi library, access to a computer, access to the internet, and related books.

CHAPTER IV – ANALYSIS OF DATA

Results

During the two week survey period, 36 responses were recorded using the online survey tool Qualtrics. Of those 36 responses, 24 reported they were currently licensed and practicing CRNAs and 12 reported they were not. Assuming a total membership of 600 as reported by MANA, this represents a total response rate of 6%. For the purposes of this project, only the 24 participants indicating they were licensed and practicing CRNAs were used for analysis representing a useable response rate of 4%. 14 of the participants were male (58.33%), while the remaining 10 participants indicated they were female (41.67%). Participants ranged in age from 30 to 60 or greater years old, with the majority of participants (45.83%) reporting between 40 and 49 years old as shown in Table 2. Regarding work experience, the majority of participants (58.34%) reported having worked for 10 years or less as a CRNA as shown in Table 3.

Table 2 *Question 2*

Answer	%	n
18-29	0.00%	0
30-39	33.33%	8
40-49	45.83%	11
50-59	8.33%	2
60 or above	12.50%	3
Total	100%	24

Table 3 *Question 4*

Answer	%	n
0-5	29.17%	7
6-10	29.17%	7
11-15	20.83%	5
16-20	8.33%	2
20 or more	12.50%	3
Total	100%	24

Question 5

When asked about their previous knowledge of the guidelines proposed by SAMBA for the prevention of PONV, all participants reported being at least slightly familiar with the guidelines, with 12 participants (50%) being either *Very familiar* or *Extremely familiar* with the guidelines. Six (25.00%) reported being *Moderately familiar*, while six (25.00%) reported being *Slightly familiar*. No participants reported being *Not familiar at all* with the guidelines.

Table 4 *Question 5*

Answer	%	n
Extremely familiar	16.67%	4
Very familiar	33.33%	8
Moderately familiar	25.00%	6
Slightly familiar	25.00%	6
Not familiar at all	0.00%	0
Total	100%	24

Question 6

When asked how often they administer dexamethasone to prevent PONV, all participants reported administering dexamethasone at least *Sometimes*, with 19 participants (79.17%) saying they administer it either *Most of the time* or *Always* to help prevent PONV. Two (8.33%) reported *About half the time*, and three (12.50%) reported *Sometimes*. No participants reported administering dexamethasone *Never*.

Table 5 *Question 6*

Answer	%	n
Always	29.17%	7
Most of the time	50.00%	12
About half the time	8.33%	2
Sometimes	12.50%	3
Never	0.00%	0
Total	100%	24

Question 7

Participants were asked about their preferred dosage of dexamethasone for the prevention of PONV prior to viewing the presentation. 15 participants (62.50%) reported 4 mg was their preferred dosage, reflecting the guidelines set forth by SAMBA on PONV prevention. Eight participants (33.33%) reported 8 mg was their preferred dosage for preventing PONV. One participant (4.17%) chose *Other*, allowing them to write in their preferred dosage of 12 mg.

Table 6 *Question 7*

Answer	%	n
8mg	33.33%	8
4mg	62.50%	15
Other (mg)	4.17%	1
I don't administer dexamethasone to prevent PONV	0.00%	0
Total	100%	24

Question 8

Participants were asked what their preferred dosage of dexamethasone was after having viewed the provided presentation. 20 participants (83.33%) reported 4 mg would now be their preferred dosage. Three participants (12.50%) reported they would continue to administer 8 mg, and one participant (4.17%) reported they would continue to administer their preferred dosage of 12 mg. This represents an increase of five participants (20.83%) reporting they will now be administering the recommended dosage of 4-5 mg of dexamethasone as outlined in the guidelines set forth by SAMBA. This finding suggests that CRNAs are willing to change their current practice if provided with an evidence-based alternative.

Table 7 *Question 8*

Answer	%	n
8mg	12.50%	3
4mg	83.33%	20
Other (mg)	4.17%	1
I don't administer dexamethasone to prevent PONV	0.00%	0
Total	100%	24

Question 9

When participants were asked during which phase of anesthesia they preferred to administer dexamethasone to prevent PONV, 20 (83.34%) reported either *Pre-induction* or *During or immediately after induction*. This finding reflects the recommendations in the guidelines set forth by SAMBA, suggesting that the majority of CRNAs administer dexamethasone to prevent PONV based on the best evidence currently available. The remaining four participants (16.67%) reported administering dexamethasone *During maintenance of anesthesia* to prevent PONV.

Table 8 *Question 9*

Answer	%	n
Pre-induction	4.17%	1
During or immediately after induction	79.17%	19
During maintenance of anesthesia	16.67%	4
Immediately before or during emergence	0.00%	0
After emergence	0.00%	0
I don't administer dexamethasone to prevent PONV	0.00%	0
Total	100%	24

Question 10

When participants were asked about how effective they feel dexamethasone is at preventing PONV, seven (29.17%) responded that they feel dexamethasone is *Moderately effective*, 13 (54.17%) feel it is *Very effective*, and four (16.67%) feel it is *Extremely effective*. No participants responded that they feel dexamethasone is *Not effective at all* at preventing PONV. This finding suggests that CRNAs trust dexamethasone as an effective preventative treatment for PONV, and administer it for this purpose.

Table 9 Question 10

Answer	%	n
Extremely effective	16.67%	4
Very effective	54.17%	13
Moderately effective	29.17%	7
Slightly effective	0.00%	0
Not effective at all	0.00%	0
Total	100%	24

Question 11

When participants were asked to rate their willingness to administer dexamethasone by using the technique as described in the provided presentation based on the guidelines set forth by SAMBA, 23 (95.83%) responded by saying they were either *Very willing* or *Extremely willing* to do so. One (4.17%) said they were *Moderately willing*, and no participants responded they were *Not willing at all*. This finding suggests either CRNAs were already administering dexamethasone to prevent PONV using the technique as described in the provided presentation, or CRNAs are willing to change their

current practice when provided with an evidence-based alternative aimed at optimizing patient outcomes.

Table 10 *Question 11*

Answer	%	n
Extremely willing	45.83%	11
Very willing	50.00%	12
Moderately willing	4.17%	1
Slightly willing	0.00%	0
Not willing at all	0.00%	0
Total	100%	24

Discussion

Using the target outcomes of this project as a guide, interpretation of the survey results reveals several noteworthy findings. By assessing current practice among CRNAs, it is clear that CRNAs do administer dexamethasone for the purpose of preventing PONV. Question six shows that 19 participants (79.17%) administer dexamethasone either *Most of the time* or *Always* to help prevent PONV. Question seven shows that 15 participants (62.50%) administer 4 mg of dexamethasone when given to prevent PONV. Question nine shows that 20 participants (83.34%) reported either *Pre-induction* or *During or immediately after induction* as their preferred time to administer dexamethasone to prevent PONV. These findings not only suggest that CRNAs administer dexamethasone to prevent PONV, but also that the majority of CRNAs surveyed do so using the technique found in the guidelines set forth by SAMBA, which suggests giving 4 mg of dexamethasone pre-induction, during induction, or immediately after induction of anesthesia.

Further analysis of the survey results gives insight into how willing CRNAs are to change their current practice as well. Question seven and question eight show a difference exists in CRNAs' preferred dosage of dexamethasone when comparing responses prior to viewing the provided presentation and after viewing the presentation. In accordance with the guidelines set forth by SAMBA, 15 participants (62.50%) gave 4 mg of dexamethasone prior to viewing the presentation. After viewing the presentation, 20 participants (83.33%) reported 4 mg would be their preferred dosage of dexamethasone for preventing PONV. This finding shows an increase of 5 participants (20.83%) reporting they will now administer 4 mg of dexamethasone as suggested in the guidelines set forth by SAMBA. Question 11 shows 23 participants (95.83%) were willing to administer dexamethasone following the technique outlined in the presentation and based on the guidelines set forth by SAMBA. The responses to questions seven, eight, and eleven suggest that the majority of CRNAs surveyed are willing to change their current practice when provided with an evidence-based alternative aimed at optimizing patient outcomes.

Limitations

The survey for this project was completed on a voluntary basis, and relied completely on the CRNAs' willingness to do so. As such, it is hard to determine whether the sample is representative of the general population, especially given the small sample size (n=24) and low total response rate of 6%. While the findings of this project offer some insight for current CRNA practice, the results are only applicable to the sample surveyed. Based on the small sample and low response rate, it is also difficult to determine whether a significant level of correlation exists between survey questions when

analyzing responses, allowing only for the use of descriptive statistics. This project also does not take into account how CRNAs use dexamethasone in tandem with other prophylactic anti-nausea treatments, or how dexamethasone administration may be affected by alternative measures or disease processes.

Future Practice

The implications of this project are based on the major findings of the survey results; a majority of CRNAs surveyed administer dexamethasone in accordance with the guidelines set forth by SAMBA, and a majority of CRNAs surveyed are willing to change their current practice if presented with an evidence-based alternative aimed at optimizing patient outcomes. These findings suggest CRNAs are receptive to the most current evidence-based practices, and are willing to integrate new techniques into their own practice when trying to optimize patient outcomes. Each of these attributes is important in ensuring the best possible care is provided to each patient.

While the overall findings are positive, there are several responses indicating a reluctance to change current practice based on the presentation and evidence provided. It is impossible to determine reasons for this with the current data set, but future studies can do so using more in depth surveys as well as sampling from a larger population. By reaching out to other state nurse anesthesia associations, as well as student registered nurse anesthetists, a much larger sample can be surveyed in the hope of creating a more generalizable data set. Future studies should also take into account other aspects of the guidelines set forth by SAMBA, as dexamethasone is only one small piece of the puzzle when trying to prevent PONV.

This capstone project utilized the first four steps outlined by Rosswurm and Larrabee (1999) in their Model for Change to Evidence-Based Practice: assessing the need for change through the literature review and survey, linking the need with specific interventions and outcomes based on the current guidelines, compiling the evidence through analysis of the current literature and survey results, and creating a plan for changing the current practice by providing an educational presentation outlining the current literature and guidelines. Future researchers should aim to utilize the final two steps in Rosswurm and Larrabee's process: implementing and evaluating the change and merging the change with current standards. A retrospective chart review focused on PONV and dexamethasone administration trends within a facility or region would provide valuable information allowing for the evaluation of the change in practice, and whether the current guidelines set forth by SAMBA should be made standard of practice within the population being studied.

Conclusion

A review of the literature has shown that PONV is a significant contributing factor to extended recovery times and unwanted hospital admissions following ambulatory surgery. The findings of this project suggest the majority of CRNAs surveyed are active participants in utilizing the most current evidence-based practice, and are willing to integrate new techniques into their own practice with the goal of optimizing patient outcomes. By continuing to do so, CRNAs are able to play an integral role in expanding clinical knowledge and improving patient outcomes. While the results of this project are encouraging, there is certainly a need for future studies to help improve our

understanding of how CRNAs currently use the resources available to them when trying to prevent PONV.

APPENDIX A – IRB Approval Letter



INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.5997 | Fax: 601.266.4377 | www.usm.edu/research/institutional.review.board

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 16090203

PROJECT TITLE: Optimizing Anesthesia Providers' Timing of Administration of Dexamethasone for the Prevention of Post-Operative Nausea and Vomiting: Translating Clinical Guidelines into Practice

PROJECT TYPE: New Project

RESEARCHER(S): Tanner Mixon

COLLEGE/DIVISION: College of Nursing

DEPARTMENT: Advanced Practice

FUNDING AGENCY/SPONSOR: N/A

IRB COMMITTEE ACTION: Exempt Review Approval

PERIOD OF APPROVAL: 09/07/2016 to 09/06/2017

Lawrence A. Hosman, Ph.D.

Institutional Review Board

APPENDIX B – MANA Letter of Support



M [REDACTED] OF NURSE ANESTHETISTS, INC.

July 20, 2016

Re: Project of Doctoral Candidate Tanner Mixon

I am the President of the [REDACTED] of Nurse Anesthetists (MANA). I am pleased to offer this letter of support for SRNA doctoral candidate, Tanner Mixon, in his doctoral project titled: "Optimizing anesthesia provider's timing of administration of dexamethasone for the prevention of post-operative nausea and vomiting: translating clinical guidelines into practice."

I understand that Mr. Mixon is a doctoral candidate in the nurse anesthesia program at the University of Southern Mississippi who is planning to graduate in December of 2016. This letter of support will be included in the University of Southern Mississippi IRB application. I understand that open participation will be presented to anesthesia providers who are members of MANA. There is no compensation for their participation.

I understand the planned dates for his research are from August 1, 2016 to October 1, 2016, after USM IRB approval is received. Mr. Tillman's chair contact information is Dr. Marjorie Geisz-Everson at marjorie.geiszeverson@usm.edu and (601) 266-4017.

I understand that participation is completely anonymous and voluntary. Anesthesia providers within this association may choose not to participate or withdraw from the study at any time there will be no penalty.

I am looking forward to hearing the results of research and its effect on clinical practice.

Sincerely,

A. [REDACTED]

Paul [REDACTED]
President
Mississippi Association of Nurse Anesthetists

[REDACTED]

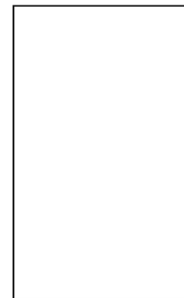
APPENDIX C – Educational Presentation

Tanner Mixon, SRNA & Doctoral Candidate

Optimizing Anesthesia Providers' Timing Of Administration Of Dexamethasone For The Prevention Of Post-operative Nausea And Vomiting: Translating Clinical Guidelines Into Practice

The Problem

- 1 in every 4 patients will develop post-operative nausea and vomiting (PONV) if not prophylactically treated with an anti-emetic (*Butterworth, Mackey, and Wasnick, 2013*)
- PONV has been found to be a significant contributing factor to extended recovery times and unwanted hospital admissions (*Fortier, Chung, and Su, 1998*)



The Problem

PONV outranks pain among patients when asked about their concerns regarding post-operative recovery (*Eberhart, Morin, Wulff, and Geldner, 2002*)

The Problem

- Studies have shown dexamethasone to be effective as a pretreatment to prevent PONV (*Gan and Habib, 2016*)
- Timing of administration of dexamethasone can play a significant role in the prevention of PONV (*Zou, Jiang, Xiao, and Zhou, 2014*)
- Practice varies amongst CRNAs regarding the pretreatment of patients to prevent PONV using dexamethasone (*Smith, Smith, and Smith, 2012*)

Current Guidelines

- Under the guidance of the Society for Ambulatory Anesthesia, in 2014 a multidisciplinary panel formed a set of guidelines directing the use of antiemetics for the prevention of PONV (*Gan et al., 2014*)
- The panel determined that a single 4 to 5 mg dose of IV dexamethasone at or before induction of anesthesia effectively reduces PONV with few risks to the patient (*Gan et al., 2014*)
- Further research has also shown the same level of prophylaxis exists when given immediately after induction, eliminating the discomfort related to perineal burning (*Gan and Habib, 2016*)

Current Guidelines

- Dexamethasone induced hyperglycemia has been noted to occur at higher doses, increasing the risk of post operative infection and delayed wound healing – current research suggests the single 4 to 5 mg dose previously mentioned reduces the hyperglycemic response (*Gan and Habib, 2016*) while providing the same level of effectiveness for preventing PONV (*Doyle, 2015*)
- Dexamethasone has been shown to significantly reduce the risk of PONV when compared to placebo (*Tarantino et al., 2015*) and (*Azeem, Ullha, Nasim, and Cheema, 2015*)

Patient Significance

- ° PONV has been found to significantly contribute to unwanted hospital admissions following ambulatory surgery (*Fortier, Chung, and Su, 1998*) and (*Whippey et al., 2013*)
- ° Each extra day spent in the hospital increases the chance of infection by up to 1.37% (*Hassan, Tuckman, Patrick, Kountz, and Kohn, 2010*)
- ° A single surgical site infection extends the length of hospital stay by an average of 9.7 days (*De Lissovoy et al., 2009*)

Patient Significance

- ° What does this mean for the patient?
 - ° Time away from work and lost wages
 - ° Increases the amount of time for the patient to return to a normal level of activity (*Gan and Habib, 2016*)
- ° Patients experiencing PONV reported a decreased quality of life, as it disrupted their ability to eat, drink, and sleep for up to a week following ambulatory surgery (*Odom-Farren et al., 2014*)

Facility Significance

- * PONV was found to be a significant contributing factor to 14.4% of unwanted hospital admissions following ambulatory surgery (*Fortier, Chung, and Su, 1998*)
- * The average cost of one inpatient day in 2013 in Mississippi was \$1351 (*The Henry J. Kaiser Family Foundation*)
- * It is estimated that each episode of emesis increases time in the PACU by about 20 minutes (*Gan and Habib, 2016*)
- * Average cost for time in the PACU was estimated in 2012 to be \$12 per minute, adding up to around \$240 dollars per episode of emesis (*Raft, Millet, and Meistelman, 2014*)

Facility Significance

- * PONV ranks highest, outranking even pain, when patients were asked what most concerned them in the immediate post-operative period (*Eberhart et al., 2002*)
- * Pre and post-operative experiences were found to be the largest contributing factors affecting HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) responses after surgery (*Maher et al., 2015*)
- * PONV was found to negatively affect patient's perceptions of the quality of anesthesia provided to them (*Hocking, Weightman, Smith, Gibbs, and Sherrard, 2013*)

Summary

- ° Literature has shown that a single 4 to 5 mg dose of IV dexamethasone at, before, or immediately after induction of anesthesia effectively reduces PONV with few risks to the patient (*Gan et al., 2014*) and (*Gan and Habib, 2016*)
- ° PONV outranks pain among patients when asked about their concern regarding post-operative recovery (*Eberhart, Morin, Wulf, and Geldner, 2002*)
- ° PONV has been found to significantly contribute to unwanted hospital admissions following ambulatory surgery as well as increased PACU times (*Fortier, Chung, and Su, 1998*) and (*Whippey et al., 2013*) and (*Gan and Habib, 2016*)

APPENDIX D – Survey Tool

Dexamethasone and PONV

Q1 Are you currently a licensed and practicing Certified Registered Nurse Anesthetist in Mississippi?

- Yes
- No

Q2 Choose the option that best describes your age in years

- 18-29
- 30-39
- 40-49
- 50-59
- 60 or above

Q3 Choose your gender

- Male
- Female

Q4 Choose the option that best describes the number of years you have practiced as a CRNA

- 0-5
- 6-10
- 11-15
- 16-20
- 20 or more

Q5 Prior to viewing the provided presentation, how familiar were you with the current guidelines set forth by the Society for Ambulatory Anesthesia (SAMBA) regarding the administration of IV dexamethasone for the prevention of post-operative nausea and vomiting (PONV)?

- Extremely familiar
- Very familiar
- Moderately familiar
- Slightly familiar
- Not familiar at all

Q6 How often do you administer IV dexamethasone for the prevention of PONV in your current practice?

- Always
- Most of the time
- About half the time
- Sometimes
- Never

Q7 Prior to viewing the provided presentation, what is your current dosage of IV dexamethasone when administered for the prevention of PONV?

- 8mg
- 4mg
- Other (mg) _____
- I don't administer dexamethasone to prevent PONV

Q8 After viewing the provided presentation, what will be your dosage of IV dexamethasone when administered for the prevention of PONV?

- 8mg
- 4mg
- Other (mg) _____
- I don't administer dexamethasone to prevent PONV

Q9 During which phase of anesthesia care do you prefer to administer dexamethasone for the prevention of PONV?

- Pre-induction
- During or immediately after induction
- During maintenance of anesthesia
- Immediately before or during emergence
- After emergence
- I don't administer dexamethasone to prevent PONV

Q10 Based on your current practice, how effective do you feel IV dexamethasone is at producing the desired effect of preventing PONV?

- Extremely effective
- Very effective
- Moderately effective
- Slightly effective
- Not effective at all

Q11 Based on the evidence provided in the presentation, how willing are you to administer dexamethasone for preventing PONV using the technique described in the guidelines set forth by SAMBA?

- Extremely willing
- Very willing
- Moderately willing
- Slightly willing
- Not willing at all

APPENDIX E – DNP Essentials

DNP Essentials	Capstone relation to DNP Essentials
<p>DNP Essentials I – Scientific underpinnings for practice</p>	<p>This DNP project is centered on the most current evidenced based guidelines for using dexamethasone to prevent PONV. These guidelines were created through multidisciplinary collaboration, and are supported by peer-reviewed research.</p>
<p>DNP Essentials II – Organizational and systems leadership for quality improvement and systems thinking</p>	<p>PONV is a frequent and disruptive part of the perioperative experience. This DNP project is aimed at improving patient outcomes through the optimized dosage and timing of dexamethasone administration for preventing PONV and was designed as a quality improvement project.</p>
<p>DNP Essentials III – Clinical scholarship and analytical methods for evidence-based practice</p>	<p>By using Rosswurm and Larrabee’s Model for Change to Evidence-Based Practice, this DNP project uses a framework allowing for its use in different settings for the purpose of assessing</p>

	practice and quality improvement to better anesthesia practice
DNP Essentials IV – Information systems or technology and patient care technology for the improvement and transformation of health care	This DNP project required the use of electronic databases to perform the review of literature. An electronic survey and educational presentation were also created for the purpose of gathering data and educating CRNAs on the most current guidelines set forth by SAMBA
DNP Essentials V – Healthcare policy for advocacy in healthcare	Through its collaboration with MANA and dissemination of results to MANA members, this DNP project has the potential to influence future practice and policy across the state of Mississippi.
DNP Essentials VI – Interprofessional collaboration for improving patient and population health outcomes	Through the education of CRNAs regarding dexamethasone’s use as an anti-emetic, the CRNAs will be better able to share their knowledge of PONV prevention with other healthcare professionals in the perioperative setting. This shared knowledge will allow for a

	more seamless transition of care through the perioperative period.
DNP Essentials VII – Clinical prevention and population health for improving the nation’s health	PONV can cause increased PACU times and delayed recovery following surgical procedures. This DNP project was aimed at using dexamethasone prophylactically to prevent PONV from occurring.
DNP Essentials VIII – Advanced Nursing Practice	This DNP project was ultimately aimed at evaluating one’s current practice and utilizing the most current evidence-based literature to make clinical decisions for the purpose of improving patient outcomes.

REFERENCES

- Azeem, M., Ullha, Z., Nasim, A., & Cheema, M. A. (2015, April 10). PONV; dexamethasone effect on post operative nausea and vomiting in laparoscopic cholecystectomy. *The Professional Medical Journal*, 22, 1232-1236.
<http://dx.doi.org/10.17957/TPMJ/15.3068>
- Butterworth, J., Mackey, D., & Wasnick, J. (2013). *Morgan & Mikhail's clinical anesthesiology* (5th ed.). B. Belval, & H. Lebowitz (Eds.). United States: McGraw-Hill.
- De Lissovoy, G., Fraeman, K., Hutchins, V., Murphy, D., Song, D., & Vaughn, B. B. (2009, April 23). Surgical site infection: Incidence and impact on hospital utilization and treatment costs. *American Journal of Infection Control*, 37, 387-397. <http://dx.doi.org/10.1016/j.ajic.2008.12.010>
- Doyle, S. B. (2015). *Is dexamethasone 4mg a more effective anti-emetic than dexamethasone 8mg for the prevention of early post-operative nausea and vomiting in women undergoing laparoscopic gynecological surgery?* (Doctoral dissertation). Retrieved from http://aquila.usm.edu/dnp_capstone/16
- Eberhart, L., Morin, A. M., Wulf, H., & Geldner, G. (2002, May 24). Patient preferences for immediate postoperative recovery. *British Journal of Anaesthesia*, 89, 760-761. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/12393775>
- Eftekharian, A., & Roozbahany, N. (2011). Use of intravenous steroids at induction of anesthesia for septoplasty to reduce post-operative nausea and vomiting and pain: A double-blind randomized controlled trial. *Indian Journal of Otolaryngology and Head & Neck Surgery*. Retrieved from

<http://link.springer.com.lynx.lib.usm.edu/article/10.1007/s12070-011-0324-5/fulltext.html>

Fortier, J., Chung, F., & Su, J. (1998). Unanticipated admission after ambulatory surgery - a prospective study. *Canadian Journal of Anaesthesia*, *45*, 612-619. Retrieved from <http://www.cas.ca/English/Canadian-Journal-of-Anesthesia>

Gan, T., Habib, A., Kovac, A., Kranke, P., Meyer, T., Watcha, M., ... Diemunsch, P. (2014). Consensus guidelines for the management of postoperative nausea and vomiting. *Anesthesia and Analgesia*, *118*, 85-113.

<http://dx.doi.org/10.1213/ANE.0000000000000002>

Gan, T. J., & Habib, A. S. (Eds.). (2016). *Postoperative nausea and vomiting: A practical guide*. Cambridge, UK: Cambridge University Press.

Habib, A. S., Chen, Y. T., Taquchi, A., Hu, X. H., & Gan, T. J. (2006). Postoperative nausea and vomiting following inpatient surgeries in a teaching hospital: a retrospective database analysis. *Current Medical Research and Opinion*, *22*, 1093-1099. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/16846542>

Hassan, M., Tuckman, H. P., Patrick, R. H., Kountz, D. S., & Kohn, J. L. (2010).

Hospital length of stay and probability of acquiring infection. *International Journal of Pharmaceutical and Healthcare Marketing*, *4*, 324-338.

<http://dx.doi.org/10.1108/17506121011095182>

The Henry J. Kaiser Family Foundation. (n.d.). Hospital adjusted expenses per inpatient day. Retrieved from <http://kff.org/other/state-indicator/expenses-per-inpatient-day>

Hocking, G., Weightman, W. M., Smith, C., Gibbs, N. M., & Sherrard, K. (2013, May 29). Measuring the quality of anaesthesia from a patient's perspective:

- development, validation, and implementation of a short questionnaire. *British Journal of Anaesthesia*, *111*, 979-989. <http://dx.doi.org/10.1093/bja/aet284>
- Lee, A., Gin, T., Lau, A., Dip, E., & Ng, F. (2004, July 14). A comparison of patients' and health care professionals' preferences for symptoms during postoperative recovery and the management of postoperative nausea and vomiting. *Anesthesia & Analgesia*, *100*, 87-93.
<http://dx.doi.org/10.1213/01.ANE.0000140782.04973.D9>
- Maher, D. P., Wong, W., Woo, P., Padilla, C., Zhang, X., Shamloo, B., ... Louy, C. (2015). Perioperative factors associated with hcahps responses of 2,758 surgical patients. *Pain Medicine*, *16*, 791-801. <http://dx.doi.org/10.1111/pme.12651>
- Odom-Forren, J., Hooper, V., Moser, D. K., Hall, L. A., Lennie, T. A., Holtman, J., ... Apfel, C. C. (2014, July 23). Postdischarge nausea and vomiting: Management strategies and outcomes over 7 days. *Journal of PeriAnesthesia Nursing*, *29*, 275-284. <http://dx.doi.org/10.1016/j.jopan.2013.12.007>
- Raft, J., Millet, F., & Meistelman, C. (2014, November 10). Example of cost calculations for an operating room and a post-anaesthesia care unit. *Anaesthesia Critical Care & Pain Medicine*, *34*, 211-215. <http://dx.doi.org/10.1016/j.accpm.2014.11.002>
- Rosswurm, M., & Larrabee, J. (1999). A model for change to evidence-based practice. *Journal of Nursing Scholarship*, *31*, 317-322. Retrieved from <http://onlinelibrary.wiley.com/lynx.lib.usm.edu/doi/10.1111/j.1547-5069.1999.tb00510.x/abstract>

- Smith, H., Smith, E., & Smith, B. (2012). Postoperative nausea and vomiting. *Annals of Palliative Medicine*, 2, 94-102. Retrieved from <http://www.amepc.org/apm/article/view/1035/1261#B3>
- Tarantino, I., Warschkow, R., Beutner, U., Kolb, W., Luthi, A., Luthi, C., ... Clerici, T. (2015, January 5). Efficacy of a single preoperative dexamethasone dose to prevent nausea and vomiting after thyroidectomy. *Annals of Surgery*. Retrieved from <http://lynx.lib.usm.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=cmedm&AN=25563879&site=ehost-live>
- Whippey, A., Kostandoff, G., Paul, J., Ma, J., Thebane, L., & Ma, H. K. (2013, April 19). Predictors of unanticipated admission following ambulatory surgery: a retrospective case-control study. *Canadian Journal of Anesthesia*, 60, 675-683. Retrieved from <http://link.springer.com/article/10.1007/s12630-013-9935-5>
- White, P. F., O'Hara, J. F., Roberson, C. R., Wender, R. H., & Candiotti, K. A. (2008). The impact of current antiemetic practices on patient outcomes: a prospective study on high-risk patients. *Anesthesia & Analgesia*, 107, 452-458. <http://dx.doi.org/10.1213/ane.0b013e31817b842c>
- Zimlichman, E., Henderson, D., Tamir, O., Franz, C., Song, P., Yamin, C. K., ... Bates, D. W. (2013). Health care-associated infections: A meta-analysis of costs and financial impact on the US health care system. *JAMA Internal Medicine*, 173, 2039-2046. <http://dx.doi.org/10.1001/jamainternmed.2013.9763>

Zou, Z., Jiang, Y., Xiao, M., & Zhou, R. (2014, October 16). The impact of prophylactic dexamethasone on nausea and vomiting after thyroidectomy: a systematic review and meta-analysis. *PLoS One*, 9. <http://dx.doi.org/10.1371/journal.pone.0109582>