Maintaining the Vision in the Intensive Care Unit

Camille Leadingham

Wright State University - Main Campus

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MAINTAINING THE VISION IN THE INTENSIVE CARE UNIT

A doctoral project submitted in partial fulfillment of the requirements for the degree of Doctor of Nursing Practice

By

CAMILLE LEADINGHAM
Wright State University, 2014

Wright State University
University of Toledo Consortium
WRIGHT STATE UNIVERSITY
April 8, 2014

I HEREBY RECOMMEND THAT THE DOCTORAL PROJECT PREPARED UNDER MY SUPERVISION BY Camille Leadingham ENTITLED Maintaining the Vision in the Intensive Care Unit BE ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF Doctor of Nursing Practice

Rosalie Mainous, PhD, APRN
Doctoral Project Chair

Rosalie Mainous, PhD, APRN
Dean, College of Nursing and Health

Committee on Final Examination

Rosalie Mainous, PhD, APRN

Tracy Szirony, PhD

Joyce Zumehly, PhD, DNP
ABSTRACT

Leadingham, Camille DNP, Doctor of Nursing Practice, Wright State University, 2014. Maintaining the Vision in the Intensive Care Unit.

Background: Intensive care patients receiving mechanical ventilation have an increased chance for eye complications due to the inability to operate their own protective mechanisms resulting in dry eye.

Purpose: Develop and test an eye care protocol utilizing the evidence to prevent dry eye.

Method: In phase 1 retrospective data was collected on sedated and mechanically ventilated patients in the ICU (n=30) to determine baseline eye care practices and outcomes. Then the DEPP was developed based on the evidence. Finally data were collected prospectively (n=30) in the same patient population.

Results: From Phase 1 to Phase 2, eye crust cases diminished by 83.3%, redness by 80% and corneal hazing by 53%. A chi-square test of independence indicated that significant differences existed for patient outcomes when comparing Phase 1 patients to Phase 2 patients (X² = 6.70, p = .035).

Conclusion: The implementation of the DEPP reduced the occurrence of dry eye.
# TABLE OF CONTENTS

I. BACKGROUND ......................................................................................................................... 1
   Significance of the Problem ...................................................................................................... 1
   Project goals ............................................................................................................................ 2
   PICOT Question ....................................................................................................................... 2
   IOWA Model of Evidence Based Practice ............................................................................. 3

II. LITERATURE SEARCH ........................................................................................................... 5
   PICOT Key Words .................................................................................................................... 5
   Database Searches .................................................................................................................. 5

III. EVIDENCE SYNTHESIS ....................................................................................................... 6
   Practice Recommendations .................................................................................................... 8

IV. METHODS ............................................................................................................................ 9
   Problem Identification ............................................................................................................. 9
   QI team Formation .................................................................................................................. 10

V. LITERATURE REVIEW & ANALYSIS .................................................................................... 11
   Practice Change ..................................................................................................................... 12
   Procedure ............................................................................................................................... 12
   Statistical Analysis ................................................................................................................. 14

VI. OUTCOMES OF PROJECT .................................................................................................... 14
   Results ..................................................................................................................................... 14

VII. DISCUSSION ....................................................................................................................... 15
   Interpretation of findings ....................................................................................................... 15

VII. FUTURE RECOMMENDATIONS & CONCLUSIONS ............................................................. 16
   Strengths & Limitations ........................................................................................................... 16
   Next Steps ............................................................................................................................... 17
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Databases Searched &amp; Data Extraction</td>
<td>22</td>
</tr>
<tr>
<td>2. Summary of Research Literature</td>
<td>23</td>
</tr>
<tr>
<td>3. Practice Recommendations</td>
<td>26</td>
</tr>
<tr>
<td>4. Demographic Characteristics of Patients</td>
<td>27</td>
</tr>
</tbody>
</table>
ACKNOWLEDGEMENTS

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DEDICATION

I dedicate this to my husband Rick and sons Chase and Lance for their continued support of my academic and clinical pursuits. To all of the nurses who dedicate themselves to delivering the best care to our patients through the utilization of evidence-based practice, I salute you.
MAINTAINING THE VISION IN THE INTENSIVE CARE UNIT

SIGNIFICANCE OF THE PROBLEM

Intensive care patients receiving mechanical ventilation, sedation, and/or paralytic medications have an increased chance for contracting a nosocomial ocular infection from healthcare providers due to their impaired natural eye protection mechanisms (Cunningham & Gould, 1998; Grixti, Sadri, & Datta, 2012). The eyes have a naturally occurring blink reflex which facilitates flushing microorganisms out and aids in spreading tears to lubricate the ocular surface. Unfortunately, patients on mechanical ventilation are typically more vulnerable to ocular infection because sedation and the usage of muscle relaxants alter the patient’s orbicular muscles of the eye causing incomplete eyelid closure, decreased blinking, or the loss of the blinking reflex which can result in drying of the ocular surface (Rosenberg, Lewis, & Eisen, 2008; Feroz, Faisal, & Alzeer, 2013). In addition, incomplete eyelid closure exposes the patient to permanent ocular injury and infection (Laight, 1996; Dawson, 2005). Therefore, these potentially negative outcomes can obviously affect the patient’s quality of life resulting in permanent eye damage that could potentially lead to blindness. Nurses in the Intensive Care Unit (ICU) found that sedated and mechanically ventilated patients lack the ability to mechanically and physically protect their eyes, which led to negative outcomes and possible long term complications (Joyce, 2002).
Project Goals

This quality improvement project was selected because eye care has often been overlooked due to the more acute cardiac, respiratory, and hemodynamic instability of the patients within the intensive care unit. Due to these high acuity needs, nurses were often unaware that eye damage was occurring. A review of current practice revealed the need for a more uniform approach to eye care assessment and routine care by nurses and other healthcare providers.

The purpose of this quality improvement (QI) project was to develop an eye care protocol utilizing current evidence to facilitate a positive practice change for nurses and to prevent the occurrence of dry eye. The goal is to prevent dry eye in patients who are unconscious, sedated and mechanically ventilated, with an ultimate improvement in the patient condition. Nurses have an ethical obligation to integrate evidence-based practice recommendations into their practice. This is completed in collaboration with patient preference and the healthcare provider expertise. The following PICOT question was developed to accomplish the quality improvement project goal.

PICOT Question

For unconscious, sedated, and mechanically ventilated patients in the Intensive Care Unit (P) does implementation of an evidence-based eye care protocol (I) compared to current standard eye treatment (C) decrease the incidence of dry eye, which includes redness, crust, and corneal hazing over total number of ventilator days?
IOWA Model of Evidence Based Practice

The utilization of the Iowa Model of Evidence-Based Practice (EBP) was chosen as a framework for this quality improvement project. The Iowa model outlines a systematic process of steps to assess and use research findings to facilitate safe and effective evidence-based nursing practice (Titler et al., 2001). This model provided the framework to guide development and implementation of a new eye care protocol based on research in the ICU setting. The Iowa model of EBP was originally designed to serve as a guide for the University of Iowa hospitals as they underwent revisions to their existing quality processes. Today, the Iowa model has been fully transformed into a methodology by which to identify either problem-focused or knowledge-focused triggers to base clinical changes on the best evidence. The steps in the model includes: 1) problem identification, 2) form a quality improvement team 3) conduct a literature review and analysis, 4) implement a practice change, and 5) dissemination of the project findings (Titler et al., 2001)

The first step is to identify the problem or practice trigger that indicates a need for a change. Practice issues can be identified from several organizational sources, such as quality indicators, infection control, risk management issues, utilization review, practice standards, or knowledge issues related to a specific procedure or topic. In the Iowa Model it is important once the problem is identified to assess the level of priority for the organization. Once a problem has been identified and prioritized, a multidisciplinary QI team needs to be assembled. The QI team members should be stakeholders and represent current knowledge and/or clinical experience with the identified problem. Once the QI team has been identified and focused on the affected organizational population, they begin framing a clinical question. One method used to frame the question is called the
“PICOT” model. The PICOT model focuses on P-patient population, I-Intervention, C-Comparison or Control, O-Outcome, and T-Timeline. Each of these components supports the evidence and population of interest to assist in narrowing the search.

The QI team conducts a search reviewing and critiquing relevant literature utilizing a variety of search strategies to obtain best evidence-based practice. The review process requires an in-depth analysis to interpret level of significance and relevance to the problem. The preferred standard for evidence is systematic or meta-analysis review of the research literature. However, additional relevant clinical studies, practice guidelines, and policies, should also be considered.

The QI team needs to consider each component of the PICOT and use standardized review forms to determine if sufficient evidence exists to move forward with a practice change. The QI team makes the final decision about the strength of the literature and decides if it supports moving forward with a practice change recommendation project. If the QI team agrees that enough evidence exists, then a pilot project is initiated.

Upon completion of the quality improvement project, the QI team evaluates if a new change in policy or practice is warranted. If a new practice change is recommended, the QI team develops an implementation plan, revises protocols using the project data, provides staff education, and sets forth additional long-term outcomes to measure the continued success of the change. Internal dissemination of findings takes place at both a unit and organizational level. The QI team is recognized by leadership for improving patient care and outcomes.
Literature Search

Keywords selected included: intensive care; prevention; eye; eye care; kerato­pathy, dry eye, and guidelines. These terms were used alone and in combination uti­lizing Boolean and truncation processes. Synonyms used included: ocular, ocular hy­giene, and ICU.

Database Searches

The bibliographic databases Cochrane Library, The Cumulative Index of Nursing and Allied Health Literature (CINAHL), and PubMed were searched beginning with the Cochrane database. The Cochrane database was selected first because it is the “Gold Standard” for systematic reviews. This database provided access to higher quality evi­dence. CINAHL was selected second and PubMed was searched third. Controlled vo­cabulary options were utilized with CINAHL and PubMed searches. In addition, a rele­vant articles reference list provided additional studies for review. Table 1 summarizes the database searches.

All databases were searched for all types of articles with abstract, adult human subjects, English language and no limit to year of publication. Text archives were searched revealing no hits related to keywords. The Joanna Briggs Institute for Evidence Based Nursing and Midwifery was also searched revealing a systematic review of eye care for the Intensive Care Unit Patient (Joyce, 2002). Each paper was reviewed for rele­vance to the PICOT question. Unfortunately, there was limited reliable evidence of nurs­ing care interventions and a lack of a nursing standard of care in the area of eye practices in the ICU.
Evidence Synthesis

Nurses working in the Intensive Care Unit providing care to high acuity mechanically ventilated patients should be using evidence-based eye care practices to prevent dry eye, incomplete eyelid closure, and nosocomial eye infections (Cortese, Capp, & McKinley, 1995). The Joanna Briggs Institute (2002) published a systematic review on eye care using a four-category outline: eye hygiene regimes, prevention of dry eyes, eyelid closure and a program of eye care. The review recommended that eye care should be part of the care provided to all patients in the ICU and ointments and drops are more effective at reducing the incidence of corneal abrasions than no eye instillations. The information of contained in a few randomized controlled trials (RCT) revealed that ICU nurses should perform a focused eye assessment to evaluate for eyelid swelling, conjunctiva redness, corneal hazing and discharge or crusting of the eyelid margins (Joyce, 2002; Werli-Alvarenga, Ercole, Herdman, & Chianca, 2013; Ezra, Chan, Solebo, Marshall et al., 2008). These are the early signs of dry eye that can advance rapidly to an eye infection (Rosenburg, Lewis & Eisen, 2008; Lloyd, 1990). Meticulous hand hygiene is warranted when maintaining eye closure and care (Joyce, 2002; Douglas & Berry, 2011).

Ezra et al. (2009) conducted a randomized controlled trial in 40 Intensive Care Unit (ICU) patients. The study compared the effectiveness of ocular lubricant (Lacrilube) to the effectiveness of polyacrylamide hydrogel dressing (Geliperm) in the prevention of non-inflammatory disease of the cornea (keratopathy). The findings showed no statistical difference between these treatments for the prevention of keratopathy.

Hernandez and Mannis (1997) examined 50 randomly selected intensive care patients receiving mechanical ventilation for the presence of superficial keratopathy via a
portable slit lamp. The findings revealed positive superficial keratopathy results in twenty (40%) of the patients. Bates, Dwyer, O'Toole, O'Hegarty and Logan (2004) performed standard eye care in one eye and randomly applied tape or a gel membrane to the opposite eye in thirty-one critically ill, ventilated patients. Keratopathy developed in 14% of eyes treated with standard care as compared to 7% of eyes treated with a gel membrane.

Koroloff, Boots, Lipman, Thomas, Richard and Coyer (2004) compared Lacrilube and polyethylene/Gladwrap covers to 110 randomly assigned patients with reduced or absent blink reflex. The findings of 50 patients who were treated with polyethylene as compared to the 60 patients treated with Lacrilube indicated that they both provided effective reduction of corneal damage or eye complications. So et al., (2008) compared the effectiveness of polyethylene covers (Gladwrap) with lanolin (Duratears) eye ointment in the prevention of corneal abrasions in critically ill patients. One hundred and twenty ventilated patients admitted to the intensive care unit were randomly assigned to receive eye covers or the ointment. The findings revealed that both were equally effective in preventing corneal abrasions. Sivasankar et al. (2006) compared using a combination of eye lubricants and tape versus the use of swimming goggles and regular eyelid moistening with sterile water soaked gauze. The findings showed that swimming goggles and sterile water soaked gauze were more effective in preventing corneal breakdown versus eye lubricants and tape.

The overall evidence presented by these studies indicates that critically ill patients within the intensive care unit should be assessed for risk factors related to the potential for developing eye complications. These factors include: loss of the blink reflex, incom-
plete eyelid closure, decreased tear production, decreased consciousness and heavily sedated patients, and mechanically intubated patients. The evidence also suggests that the lack of the patient’s ability to actively maintain eyelid closure should result in the instillation of some type of eye lubricant and possibly application of an eye protective device. The studies validate a variety of options for mechanical closure. Table 3 shows a summary of the research literature.

**Practice Recommendations** (See Table 3)

- Hernandez and Mannis (1997), and Bates et al. (2004) describe the importance of assessing the unconsciousness, heavily sedated mechanically intubated patients, once every 8 hours for loss of blink reflex, and the inability to maintain active eyelid closure.
- Based on the evidence, an every shift patient assessment for the ability to maintain eyelid closure should be performed. Patient’s inability to actively maintain appropriate eyelid alignment and closure places the patient at an increased risk for eye complications (Sivasankar et al., 2006; Suresh, Mercieca, Morton, & Tullo, 2000).
- Based on the evidence, a mechanical eye closure application should be applied if eyelid closure cannot be passively maintained. Patients who demonstrate an inability to maintain an active eyelid closure are at risk for eye complications. The application of a mechanical eye closure device prevents eye complications (dry eye, infection and corneal abrasion) (Bates et al., 2004; Koroloff et al., 2004).
- Unconscious, heavily sedated patients who cannot maintain complete eye closure should receive routine eye care. Basic eye care should be provided by nurses to maintain cleanliness and prevent eye infections. Patients who demonstrate the inability to reflex blink and maintain independent eyelid closure should receive routine eye care in the form
of saline soaked gauze and the instillation of a lubricant (Bates et al., 2004; Hernandez & Mannis, 1997; Laight, 1996) (see Table 3). Upon completion of the literature synthesis, a practice recommendation to develop a dry eye prevention protocol was implemented. Justification for the development of an eye protocol stems from the at risk patient population in the ICU.

Methods

Problem Identification

Dry eye for the mechanically ventilated patient was identified during daily rounds within the ICU and served as a practice trigger. There was an apparent lack of awareness because no standardized eye care policy existed for these patients at high risk for preventable eye complications. The literature indicated an increase in the use of nursing service time, also known as hours per patient day, to care for dry eye patients who have a 50% higher utilization of health care services than patients without dry eye (Werli-Alvarenga, Ercole, Herdman, & Chianca, 2013). This dry eye quality improvement project was acknowledged by the organization as an area ripe for change within the ICU.

The retrospective data audit was collected on a random sample (N=30) of qualifying patients to ascertain the current eye care practice and occurrence of eye crust, eye redness, and corneal hazing over a one month period, two months prior to the implementation of the new protocol.

A computer generated list of all mechanically ventilated patients admitted to the ICU over a thirty day period was obtained. This yielded a list of 86 patients, of those qualified, 30 were randomly audited. The electronic medical record ICU nurse flow sheet and narrative charting were reviewed. The retrospective data obtained from the
The initial project idea was presented to the ICU committee by this project team leader and approval was received to move forward. A QI team was formed to improve eye care. Additional stakeholders for the project included (internal) the department of medicine and surgical medicine committees, due to the fact that these physicians hold admitting privileges to the closed ICU and this practice change positively impacts the care of their patient’s. The QI team consisted of members who worked daily in the ICU and were stakeholders in the delivery of care. Since this project addressed care practices of the bedside nurses, ICU nurses were e-mailed an invitation to volunteer to serve on the QI team and be a resource for other nurses during the implementation of this quality project. A nurse from day and night shift accepted the invitation to participate. The Infection Control Coordinator provided expertise in nosocomial infection monitoring and consulted on the project. The ICU clinical educator provided the staff nurse education and assisted with protocol development and project implementation. The ICU Unit Manager assisted with staff communication, protocol development and facilitated staff schedules for attendance at meetings. The ICU staff nurses, those involved with the direct patient care collaborated with the QI team to facilitate the practice change. An information technology assistant facilitated retrieval of chart review data and an ad hoc Pulmonologist served as clinical expert along with the staff nurses.

All QI team members were responsible for the development, implementation and evaluation of the project with this student as the lead. Barriers such as time management
for the nurses to attend some meetings were handled by scheduling an additional staff member on meeting days to cover for the nurses on the unit so they could attend meetings. Additional barriers included some QI team member's lack of overall experience with computer search techniques and comfort level with appraising the research. These barriers were overcome by having the information technology member present an overview of common search engines and databases to for inclusion.

**Literature Review & Analysis**

The Iowa model recommended that all team members review the evidence together so a shared process of role modeling, critiquing and article analysis can be demonstrated and shared to enhance novice members understanding. In total, seventeen articles were obtained and consisted of a systematic review, a meta-analysis, interventional studies and clinical practice guidelines.

Once the evidence was reviewed, the QI team agreed that mechanically ventilated patients were at high risk for eye complications if basic eye care was omitted from their plan of care. After synthesis of the data, a dry eye prevention protocol (DEPP) was developed. The goal was to decrease the incidence of “dry eye” in the sedated mechanically ventilated patient by initiating a practice change for RN’s in the ICU following implementation of an evidence-based practice clinical protocol.
Practice Change

The Dry Eye Prevention Protocol (DEPP) was developed by this author and describes appropriate nursing assessment, cleaning, and documentation of eye care to prevent the incidence of dry eye from occurring. Specifics of dry eye prevention include using a saline solution and gently wiping each eye from inner to outer canthus at least every 2 hours and instilling the prescribed lubricant (Bates et al, 2004; Hernandez & Mannes, 1997).

Implementation of the protocol was performed in a 12-bed mixed medical/surgical ICU within a 248 in patient community hospital in the mid-western United States. This hospital ICU averages approximately 1100 patients per year whom require life sustaining intubated mechanical ventilation. The inclusion criteria included unconscious adult patients in the ICU receiving sedation and mechanical ventilation for ≥ 24 hours. Exclusion criteria included patients who had eye trauma or an existing eye infection. Demographic characteristics, reason for ICU admission, and length of ventilation were recorded (see table 4).

Procedure

Based on retrospective data collection of eye care performance and occurrences of dry eye which is defined as having one or more the following eye crust, redness, or corneal haziness in randomly selected, sedated mechanically ventilated patients (n=30), a baseline of outcomes for current practice was assessed. Next, the design of an EBP eye care protocol (DEPP) was developed. This author utilized the practice recommendations from the evidence to develop the protocol. The protocol procedure included eye assessment for evidence of dry eye first. If any of these conditions were present then the use of
normal saline soaked gauze, cleaning from inner canthus to outer canthus every 2 hours would be initiated. For unconscious ventilated patients who were sedated with no blink reflex, the nurse would perform an eye cleaning with application of an eye ointment that was ordered by the healthcare provider. Before implementation, the staff nurses were educated on the new protocol.

The ICU educator provided eye care education with the assistance of the QI team staff nurses. The ICU manager mandated that the eye care education be completed. An online Mosby’s Skills® educational unit: Eye Care for the Unconscious Patient was assigned. Nurses received a computer generated notification that the eye care education module had been assigned to them.

The health system utilizes a web-based platform to assign staff education modules and training. In addition, the nurses were informed of the assigned education in staff meetings. The online eye care education included: eye care protocol, skill video, and skill checklist reviewing how to assess for eye complications, how to perform eye care cleaning, assessment for blink reflexes, and documentation of the procedures. Upon completion of the eye care education module, the DEPP was reviewed at staff meetings for a total of 34 nurses. The data collection tool was developed in collaboration with the multidisciplinary QI team and evaluated the completion of an eye assessment for the presence of one or more of crust, redness, and corneal hazing and the completion of an eye cleaning and application of a prescribed eye ointment.

One month following the implementation of the protocol, a convenience sample (n=30) of mechanically ventilated patients were selected to measure frequency of use of DEPP within the ICU setting. Data were extracted from the EMR for a one month
period. The data extracted from the EMR included: presence or absence of assessment for eye crust, redness, corneal hazing, the cleansing, instillation of lubricant, and documentation. This study was conducted as a quality improvement project.

**Statistical Analysis**

The protocol effectiveness for the prevention of dry eye was analyzed with the Statistical Package for Social Sciences, version 16.0 (SPSS Inc., Chicago, IL) using a chi-square test for independence.

**Outcomes of Project**

**Results**

For both groups of patients, the mean age range was greater than 65 years (see Table 4). Among the patients (n=30) that had data collected prior to implementation of the DEPP there were 133 total ventilator days among 260 total patient days. The Phase 1 mean number of ventilator days for all patients was 4.43 (SD=1.32). Among the patients (n=30) during Phase 2, following the implementation of the DEPP there were 121 total ventilator days among 280 total patient days. The Phase 2 mean number of ventilator days was 4.03 (SD=1.22), for a difference of 0.4 days less than Phase 1.

During Phase 1, a total of 64 incidences of dry eye occurred during 133 total ventilator days. Subsequently, during Phase 2, only 16 incidence of dry eye occurred during a total of 121 ventilator days. This is equivalent to decrease in the incidence of dry eye by 48 cases. Specifically, during Phase 1, the total incidence of crust was 25 cases (83.3%) for a rate of 3.60 per 1000 ventilator days. The total incidence of redness was 24 cases (80%) for a rate of 3.75 per 1000 ventilator days. The total incidence of corneal hazing was 16 cases (53%) for a rate of 6.01 per 1000 ventilator days. During Phase 1 the total incidence of dry eye was 13.36 per 1000 ventilator days.
Phase 2 data were collected over 30 days following the implementation of the DEPP. Phase 2 had 30 patients with 121 total ventilator days. In total, during Phase 2, the incidence of eye crust was 11 cases (36%), for a rate of 0.90 per 1000 ventilator days. The total incidence of redness was 5 cases (16%), for a rate of 1.19 per 1000 ventilator days and coronal hazing was 0 (0%). During Phase 2 the total incidence of dry eye was 2.09 per 1000 ventilator days, a decrease in 84.6% as compared to the Phase 1 period.

In the unconscious, sedated, mechanically ventilated patients, those that received eye care based on the eye care protocol had a statistically significant decrease in dry eye when compared to those that did not. A chi-square test of independence indicated significant difference between groups for the presence of dry eye ($X^2 = 6.70$, $p = .035$).

**Discussion**

The incidence of dry eye resulting in severe complications of the mechanically ventilated patient can be attributed to numerous physiologic factors. However, these negative outcomes may be mitigated with the use of an evidence-based protocol such as the DEPP. This quality improvement project supports implementing an evidenced based care protocol to positively affect the occurrence of dry eye in the mechanically ventilated patient. During Phase 2 the dry eye incidence was 2.09 per 1000 ventilator days, a decrease in 84.6% when compared to the Phase 1 period of 13.36 per 1000 ventilator days. Furthermore, following the implementation of the protocol, there were no cases of a coronal hazing at all indicating that an eye care protocol with lubricants contributes to a reduction in the incidence and severity of eye complications.
Future Recommendations & Conclusions

Nurses working in the ICU have a high level of interaction with ventilated patients and therefore are in a unique position to prevent eye complications through the application of evidence-based practice recommendation. Additional best practice techniques based on evidence are needed for eye care in adult ventilated patients in the ICU. A randomized controlled trial would be beneficial to develop standards of care in ventilated patients, including eye hygiene and lubrication. While limited literature was available to provide evidence for the development of a protocol, key findings were implemented resulting in both a statistically and clinically significant impact on patient outcomes.

Strengths & Limitations

The strength of this QI project includes the collaboration between the multidisciplinary QI team members. QI team members actively participated and shared clinical expertise while formulating the project. The staff nurse engagement with utilizing the protocol to improve patient outcomes and the buy-in from stakeholders was found to be supportive.

The limitations of this project include its retrospective chart review design pre protocol, small sample size, and eye care audit by way of observational form. These issues impact its ability to be generalizable to other unconscious adult ventilated patients in the ICU but add to the importance of utilizing an eye care protocol. Another weakness includes the fact that several authors have suggested a variety of eye care interventions but most interventions lack randomized controlled testing to validate their success. Several eye care regimens lacked the evidence-based consensus on the timeframe for routine eye care.
Next Steps

This quality improvement project has laid a foundation for implementation of an eye care policy for the unconscious patient to patients outside the ICU on general nursing units. In addition, future audits will be performed to validate continued utilization of DEPP for mechanically ventilated patients. The goal of future projects is to build on this work and further describe and provide evidence for how often eye care is performed, which lubricant would be best, and what other protective measures should be part of this protocol.
REFERENCES


<table>
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<td>Bates, J., Dwyer, R., O'Toole, L., Kevin, L., O'Hegarty, N., Logan, P. (2004)</td>
<td>RCT</td>
<td>31 ventilated (24 hrs) patients with loss of blink reflex</td>
<td>Keratopathy was found in 23% (7/31) patients during study. Keratopathy developed in 14% (4/28) of patients with standard eye care, in 7% (1/14) of eyes treated with gel. 0% (0/14) non in patients treated with taping.</td>
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<td>Joyce (2002)</td>
<td>Systematic review</td>
<td>Identified six clinical trials evaluating the effectiveness of eye care interventions.</td>
<td>Polyethylene film was more effective in reducing the incidence of corneal abrasion than any other ointments or eye drops. For a synergic effect, there was a need for eye hygiene and prevention of dry eye.</td>
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<td>Cortese D et al. 1995</td>
<td>RCT</td>
<td>Sixty comatose or semi-comatose patients with poor/absent blink reflex</td>
<td>8 of the 30 patients in the lubricating drop group had positive fluorescein staining indication corneal injury. None of humidity chamber group developed corneal injury.</td>
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<tr>
<td>Study</td>
<td>Study Design</td>
<td>Summary</td>
<td>Conclusion</td>
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<td>Ezra DG, Chan MP, Solebo L, Malik AP, Crane E, Coombes A, Healy M (2009 Mar)</td>
<td>RCT</td>
<td>Forty patients (80 eyes) received Lacrilube in one eye and Geliperm in opposite eye. 16 women, 24 men.</td>
<td>LacriLube and Geliperm showed no statistical difference (P=0.38) Geliperm is just as effective as LacriLube in preventing exposure keratitis.</td>
</tr>
<tr>
<td>Hernandez, EV, Mannis, MJ 1997</td>
<td>Survey</td>
<td>50 randomly selected ICU patients had bedside portable slit lamp exams for keratitis. \nIntubations, Glasgow Coma Scale, and diagnosis and eye care were all assessed.</td>
<td>20 (40%) had corneal abnormalities, 18 (90%) of them with bilateral abnormalities. \nIn the group of 20 patients with corneal abnormalities, 18 (90%) were intubated compared with the 30 patients without corneal abnormalities, of whom only 15 (50%) were intubated.</td>
</tr>
<tr>
<td>Koroloff, N., Boots, R., Lipman, J., Thomas, P., Rickard, C, and Coyer, F. 2004</td>
<td>RCT</td>
<td>110 semiconscious ICU patients with a reduced or absent blink reflex. \nIntervention: All patients received standard eye care every 2 hrs. \nGroup 1 received combo of drops and Lacrilube to each eye every 2 hrs. Group 2 had humidity chamber covers.</td>
<td>Lubrication using eye drops – four patients presented with cornea injuries. No cornea injuries with humidity chamber covers. \nEvaluated using corneal fluorescein stain and slit lamp.</td>
</tr>
<tr>
<td>Rosenberg JB; Eisen LA (2008 Dec)</td>
<td>Narrative review and Meta-analysis</td>
<td>20-42% of patients in the ICU will develop exposure keratopathy. Three RCTs enrolled total of 294 patients. Showed that rates of exposure keratopathy were significantly lower when moisture chambers are used to protect the eye as compared to lubrication ointments.</td>
<td>Eight of 113 patients in the moisture chamber group versus 32 of 151 patients in lubrication group developed exposure keratopathy.</td>
</tr>
<tr>
<td>So HM, Lee CC, Leung AK, Lim JM, Chan CS, Yan WW (2008 Nov)</td>
<td>RCT</td>
<td>One hundred sixteen ventilated ICU patients were randomly assigned to receive either cover or ointment. n= 59 polyethylene Gladwrap n= 57 Duratears ointment</td>
<td>Comparing the effectiveness of polyethylene covers (Gladwrap) with lanolin (Duratears) eye ointment to prevent corneal abrasions in critically ill patients: a randomized controlled study. P=0.519 equally effective. No differences.</td>
</tr>
</tbody>
</table>
Table 3 Practice Recommendations

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Intervention</th>
<th>Level Recommendations</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Patient assessment for risk factors related to eye complications completed daily.</td>
<td>Nursing assessment once every 8 hours for loss of blink reflex, incomplete eyelid closure, unconscious or heavily sedated mechanically intubated patients.</td>
<td>Level II</td>
<td>Early detection for potential eye complications</td>
</tr>
<tr>
<td>2. Every shift patient assessment for the ability to maintain eyelid closure</td>
<td>Nursing assessment performed every shift to assess for foreign body debris, and eyelid alignment to ensure complete closure.</td>
<td>Level II</td>
<td>Assessment data will reveal competent eyelid closure to prevent foreign objects and eye complications</td>
</tr>
<tr>
<td>3. Mechanical eye closure application if eyelid closure cannot be passively maintained.</td>
<td>Nurses will apply a mechanical eye closure and alignments device to maintain eye integrity and closure.</td>
<td>Level II</td>
<td>Mechanical eye closure devices will maintain eye integrity and prevent complications.</td>
</tr>
<tr>
<td>4. Unconscious, heavily sedated or patients who cannot maintain complete eye closure should receive eye care</td>
<td>Patients who demonstrate the inability to reflex blink and maintain independent eyelid closure should receive routine eye care in the form of saline soaked gauze and the instillation of a lubricant.</td>
<td>Level II</td>
<td>Application of saline and instillation of lubrication will maintain eye moisture and prevent eye complications.</td>
</tr>
<tr>
<td>Variables</td>
<td>Baseline Phase I</td>
<td>Protocol Phase II</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>------------------</td>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td>Total number of patients</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Age in years &lt; 65</td>
<td>11</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>≥ 65</td>
<td>19</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>sedation</td>
<td>30</td>
<td>30</td>
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</tr>
<tr>
<td>Sepsis</td>
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<td>6</td>
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<tr>
<td>Respiratory disease</td>
<td>9</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Heart failure</td>
<td>7</td>
<td>7</td>
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</tr>
<tr>
<td>Miscellaneous</td>
<td>4</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>
Appendix

Wright State University-Miami Valley College of Nursing and Health

AGENCY PERMISSION FOR CONDUCTING DOCTORAL PROJECT

THE Adena Regional Medical Center GRANTS TO Camille Leadingham, a student enrolled in the joint Doctor of Nursing Practice Program at Wright State University—University of Toledo, the privilege of using its facilities in order to conduct the following project:

"Eye Care for the Sedated Mechanically Ventilated Patient"

"Maintaining the Vision in ICU"

The conditions mutually agreed upon are as follows:

1. The agency (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may not) be identified in the final report.
3. The agency (wants) a conference with the student when the report is completed.
4. Other:

[Blank]

Date: 2-17-14

Signature of Agency Personnel: [Blank]

Student Signature: [Blank]

Project Chair Signature: [Blank]