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Enhancing treatment of corneal abrasions through provider education : a performance improvement project

Wanda Pothier

Enhancing Treatment of Corneal Abrasions through Provider Education: A Performance Improvement Project

by

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A DNP PROJECT

Submitted in partial fulfillment of the requirements for the
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Wanda Pothier	3/26/2019
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DNP PROJECT APPROVAL FORM

Submitted by Wanda Pothier in partial fulfillment of the requirements for the degree of Doctor of Nursing Practice and accepted on behalf of the Faculty of the School of Graduate Studies by the DNP project committee.

We, the undersigned members of the Graduate Faculty of The University of Alabama in Huntsville, certify that we have advised and/or supervised the candidate on the work described in this DNP project. We further certify that we have reviewed the DNP project manuscript and approve it in partial fulfillment of the requirements for the degree of Doctor of Nursing Practice.

3-26-2019 Louise O'Keefe Committee Chair
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ABSTRACT
The School of Graduate Studies
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Degree: Doctor of Nursing Practice College: Nursing

Name of Candidate: Wanda Pothier

Title: Enhancing Treatment of Corneal Abrasions through Provider Education: A Performance Improvement Project

Corneal abrasion is a common condition that is often seen in outpatient clinical settings including emergency departments and urgent care centers. Inexperience and lack of clinical guidelines can lead to health care provider (HCP) anxiety and stress and this often results in less than optimal patient care. This quality improvement project consisted of a review of clinical guidelines for the treatment of corneal abrasions aimed at enhancing health care provider knowledge and confidence and improving patient care.

The PICOT question for this project was as follows: Does the implementation of an educational review of guidelines to providers (I) for the treatment of patients with corneal abrasions (P), compared to no formal review (C), reduce unnecessary referrals to Ophthalmology and improve healthcare provider knowledge and outcomes (O) over 5 weeks (T)?

A convenience sample of 4 health care providers was used for this project. Retrospective and prospective electronic health record reviews were conducted to assess the management of corneal abrasions pre and post intervention. A Power Point presentation was conducted discussing guidelines for the treatment of corneal abrasions that were based on evidence from the literature. The project participants completed an electronic "corneal abrasion confidence survey" both before and after the educational intervention.

A retrospective chart review consisted of 4 months of data and yielded 14 eligible cases. The prospective chart review was conducted for the 5 weeks during project implementation and yielded only 2 cases. Following the educational intervention (review of the guidelines) healthcare provider confidence level was increased by 25% and health care providers had a 25% greater awareness of knowing when to refer a case to the Ophthalmologist. Both pre and post intervention surveys revealed 25% of providers felt confident with using the slit lamp, 25% not confident and 50% were a little confident.

Despite the small number of participants, this project demonstrated that an educational review of clinical guidelines can significantly improve health care provider confidence and knowledge when treating corneal abrasions. The project also identified areas where further educations needs to take place such as in the use of the slit lamp. The electronic health record was a non-contributing factor in the analysis of this project due to the unequal number of charts available for comparison between the pre and post intervention phases.

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Identification of the Problem

A corneal abrasion results from injury to the outer layer of the cornea known as the epithelium (Ross & Deschenes, 2017). The cornea is the outermost lens of the eye and controls most of the functions of the eye (Saccomano & Ferrara, 2014). The surface epithelial layer of the cornea acts as a barrier preventing foreign substances from entering the eye (Saccomano & Ferrara, 2014). More than 65,000 work-related eye injuries are related to corneal abrasions (Saccomano & Ferrara, 2014). According to the Occupational Health and Safety Administration (OSHA), eye injuries account for more than $300 million per year in loss of productivity at work, medical costs, and worker compensation claims (United States Department of Labor, n.d.). Most occupational eye injuries occur in men between 25 and 44 years of age and most of these men are employed in the automotive industry (Saccomano & Ferrara, 2014). The most common causes of corneal abrasion are the injuries resulting from a foreign body or substance entering the eye. Common foreign substances include dust, chemicals, and sand (Saccomano & Ferrara, 2014).

Inadequate management and feelings of anxiety are often related to health care providers' (HCP) unfamiliarity in treating patients with corneal injuries (Thyagarajan, Sharma, Austin, Lasoye, & Hunter, 2006). There are no set guidelines and treatment varies among HCPs which results in inconsistencies in management. Corneal abrasion is a very common problem that is seen in the Rhode Island Urgent Care clinic. The problem in this clinic is that each provider's care of the patient with corneal abrasion may vary to some degree. Currently, there are no guidelines in this clinic for the management of corneal abrasion. Guidelines do exist for other common problems that are seen in this clinic. Follow up care of the patient may differ as well as the decision about when to refer to a specialist. Some HCPs refer patients to the ophthalmologist

even when referral may not be necessary. Some HCPs schedule a follow up clinic visit twenty-four hours after the initial visit and others advise the patient to follow up only if no improvement or if the patient experiences any new or worsening symptoms. Another problem is that the staff often needs to be reminded to perform the visual acuity exam. The visual acuity exam using the Snellen chart is considered the standard of care when assessing a patient with an eye injury. Having the eye examination completed before the HCP examines the patient can be very helpful and saves time. The medical assistant, radiology technician, or nurse who rooms the patient, is responsible for this task. Visual acuity test using a Snellen chart is important because this often determines if the patient requires referral to the ophthalmologist. If the patient has vision loss greater than 20/40, prompt referral is warranted (Wipperman & Dorsch, 2013).

Diagnosis. Corneal abrasion is a common condition that is seen in emergency departments, urgent care centers, and occupational health clinics. Clinical presentation of the client and the eye examination are important components which aid in the diagnosis of corneal abrasion (Saccomano & Ferrara, 2014). Monocular eye pain (pain in one eye) is a hallmark symptom of corneal abrasion and is typically the presenting complaint in the clinic (Saccomano & Ferrara, 2014). Other symptoms of corneal abrasion include tearing, pain with eye movements, photophobia, decreased visual acuity, blurred vision, sensation of scratchiness, grittiness, or foreign body sensation in the eye (Saccomano & Ferrara, 2014). Most abrasions heal very quickly without complications and clients typically make a full recovery (Ross & Deschenes, 2017). Although corneal abrasion is typically a benign condition, it can also be very painful if complications occur. Complications of corneal abrasion include infection, ulceration, and erosions (Ross & Deschenes, 2017).

According to the CDC, in the United States Acanthamoeba keratitis is a parasitic

infection that affects approximately 85% of people who wear contact lenses and corneal abrasions makes this population susceptible to this organism (CDC, 2011). Obtaining a thorough and complete ocular history is extremely important to discern if the patient is a contact lens wearer and at risk of contracting this disease.

Obtaining an accurate history and physical exam are key components in diagnosing corneal abrasion (Saccomano & Ferrara, 2014). Fluorescein stain is used to visualize the abrasion. General history questions may include but are not limited to: Are there any changes in visual acuity? Does the patient wear contact lenses or glasses? Is there any previous history of eye trauma? How long has the patient been experiencing eye discomfort? What type of injury was it? Was the patient wearing eye protection at the time of injury? What is the client's occupation?

Treatment. Patients with corneal abrasions should be evaluated and treated by a health care provider in order to prevent complications. There are no standardized treatments or protocols for the treatment of corneal abrasion (Ross & Deschenes, 2017). Treatment is often controversial and varies among health care providers (Thyagarajan et al., 2006). Treatment goals include relief of symptoms, preventing infection, removal of foreign body if present, preventing loss of eye function, and patient teaching regarding preventive care (Saccomano & Ferrara, 2014).

Treatment options for corneal abrasion include topical analgesics, topical antibiotics, oral analgesics, and topical anesthetics (Wilson & Last, 2004). Eye patching has been noted to decrease oxygenation, increase moisture, and increase the incidence of infection and is no longer recommended for the treatment of corneal abrasion (Harkins, 1996; Thiel, Sarau, & NG, 2017; and Wilson & Last, 2004). Wearing an eye patch causes the patient to have monocular vision

which may interfere with depth perception (Lim, Turner, & Lim, 2016). Furthermore, driving may also become impaired as a result of the monocular vision (Lim et al., 2016).

HCPs continue to treat corneal abrasion prophylactically with topical antibiotics despite the lack of supporting evidence (Peate, 2007; Ross & Deschenes, 2017). Topical antibiotic therapy continues to be the standard of practice because of the potential risk of keratitis with corneal abrasions (Ross & Deschenes, 2017). Complications of corneal abrasion can result in significant illness and sick leave from work that places a tremendous amount of burden on the worker, the worker's family, the employer, and the health care system (Menghini et al., 2013). In the United States eye injuries make up 2.9% of all occupational health injuries resulting from loss of workdays in the private sector (Ho et al., 2007). Many HCPs are untrained or poorly trained in treating eye conditions which often leads to provider feelings of anxiety and poor management of care (Thyagarajan et al., 2006).

Most uncomplicated cases of corneal abrasion do not require referral to a specialist and will heal in 24-48 hours (Wipperman & Dorsch, 2013). A corneal abrasion is considered to be healing if there is no evidence of the lesion seen after fluorescein stain or there is an isolated area of minimal absorption of the stain with mild or no symptoms (Le Sage, Verreault, & Rochette, 2001). If the patient presents with an abrasion that is uncomplicated, less than or equal to 4mm, and the patient has normal vision, follow up is not necessary (Wipperman & Dorsch, 2013). A review of clinical practice guidelines can assist the clinician with making appropriate evidenced-based practice health care decisions in the management of patients with corneal abrasions (Thyagarajan et al., 2006).

Purpose of the Project. The purpose of the Doctorate of Nursing Practice (DNP) Project was to implement an educational review of guidelines for the management and treatment

of corneal abrasion. The PICOT question was Does the implementation of an educational review of guidelines to providers (I) for the treatment of patients with corneal abrasions (P), compared to no formal review (C), reduce unnecessary referrals to Ophthalmology and improve healthcare provider knowledge and outcomes (O) over 5 weeks (T)? The following were the objectives of the DNP project: 1) Decrease unnecessary referrals to the ophthalmologist over a 5 week period; 2) Improve patient quality of care; 3) Enhance healthcare provider knowledge in treating clients with the diagnosis of corneal abrasion; 4) Enroll each of the 6 health care providers as participants in the project; 5) Begin project implementation by 8/13/18 and implement the educational review session by 9/6/18.

Currently, there are no set written guidelines in place at the Rhode Island Urgent Care/occupational health walk-in clinic. Each provider treats clients with corneal abrasions based on his or her past experiences and consequently the care of the client is not standardized.

According to the National Institute for Occupational Safety and Health (NIOSH), each day approximately 2,000 United States workers suffer a job-related eye injury that requires medical intervention and 100 of these injuries result in one or more days out of work (NIOSH, 2013). Corneal abrasion accounts for loss time from work which leads to a decrease in productivity, increase in the utilization of healthcare services, and increase in healthcare costs.

As mentioned previously, corneal abrasion is a common eye condition that is seen in urgent care centers, emergency departments and other outpatient health care centers. There are many variations in treatment and follow-up care (Ross & Deschenes, 2017). Consistent and cost-effective care is necessary in treating clients with corneal abrasions. This issue is relevant to nursing because corneal abrasion is a common condition that is seen in the healthcare industry.

Occupational eye injuries are also a serious public health issue that affect nursing (Ho et al., 2007).

Review of Evidence

A review of the literature using the search terms corneal abrasion, corneal abrasion treatment, corneal abrasion management, corneal abrasion research, guidelines and corneal injury, corneal abrasion protocols, and health care provider knowledge, was conducted in the Cumulative Index of Nursing and Allied Health Literature (CINAHL), PubMed, and Cochrane databases. Reference lists of published clinical trials were also searched. The initial search revealed 562 articles. After application of filters including English language only, evidenced-based practice, peer-reviewed, and human subjects the number was narrowed to 120. Articles were excluded if they did not specifically pertain to corneal abrasion in the outpatient clinical setting. Twenty-seven articles were chosen from the 120 reviewed.

A separate search of PubMed was undertaken using the following search phrases: education as an intervention; how to educate healthcare providers; performance improvement and formal education and health care providers; and training session and performance improvement and healthcare. Five hundred sixteen thousand and four hundred articles were revealed with this search. After application of filters including evidenced-based practice, English language, adults, systematic reviews, corneal abrasion, and eye injuries the number of articles was narrowed down to 207. Articles were excluded if they did not pertain to power point as a means of education or corneal injuries. Two articles were chosen from the 207 reviewed.

According to the literature, standardized treatment of corneal abrasion doesn't exist and treatment practices vary amongst HCP (Calder, 2004; Faraldi et al., 2012; Ross & Deschenes, 2017). Traditional treatment consisted of patching the eye; however, this treatment is no longer

recommended because the patch is conducive to a warm moist environment which can led to infection (Harkins, 1996). Common treatments for corneal abrasion include topical or oral analgesics such as non-steroidal anti-inflammatory drugs (NSAIDs), and topical antibiotics (Wilson & Last, 2004). The goals of treatment are alleviation of symptoms/pain, healing the abrasion, preventing infection, extracting foreign body if present, avoiding the loss of eye function, and patient teaching regarding preventive measures (Saccomano & Ferrara, 2014).

Clinical Guidelines

Thyagarajan et al. (2006) conducted a retrospective case study involving the use of guidelines for the management of corneal abrasion in an emergency department (ED) located in the United Kingdom. Authors revealed an increase in staff performance with regards to documentation of visual acuity and an increase in provider documentation describing the abrasion in the patients' clinical records after implementation of the guidelines. Provider confidence also improved because of the guidelines. Inappropriate referrals decreased after implementation of the guidelines. Unfortunately, the authors noted a decrease in health care provider documentation of patients' presenting symptoms and the use of fluorescein stain. This was considered to be an unfavorable result of the study. A bias to this study is that the ophthalmologist receiving the referrals was not blinded to the grade (skill level) of the clinician. One of the limitations of the study is that three of the nine participants who completed the pre-guideline survey did not complete the post-guideline survey. Another limitation is the small sample size. Lastly, the emergency department nurse practitioners were not included in the pretest/post-test portion of the study.

Al-Saleh and Alfawaz (2017) conducted a survey based study involving the management of traumatic corneal abrasion in an ophthalmology clinic in Saudi Arabia. Practicing clinicians

were subjected to a 16 question survey that focused on the common aspects of corneal abrasion management. The authors revealed that eye patching with topical antibiotics and cycloplegics was the most frequently used treatment regimen despite the controversy and lack of scientific evidence to support the use of these substances. Non-steroidal anti-inflammatory drugs were rarely used by the study participants despite evidence supporting the use of these drugs. The authors noted that there was variability among ophthalmologist in the treatment of traumatic corneal abrasion and that clearer guidelines based on evidence are warranted. The authors also concluded that more randomized clinical trials are needed to assess the efficacy of the various treatment modalities for traumatic corneal abrasion. This study does support the use of clinical guidelines in the treatment of corneal abrasion.

In a single blinded prospective study Ezra, Mellington, Cugnoni, and Westcott (2005) compared nurse practitioner treatment of corneal abrasions to that of senior house officers in the ED and found that inappropriate referrals and unnecessary telephone calls to ophthalmologists on call led to increase work hours. Nurse practitioners were less likely to make unnecessary referrals and demonstrated better assessment skills. Both groups lacked clinical knowledge in the assessment of corneal abrasion and that was seen as a factor in unnecessary referrals/telephone calls. This supports the need for increased training of the clinicians and more formal review of guidelines including when to refer to a specialist. One of the limitations of this study is that the study was only conducted over a four week time frame. A bias to this study is that the ophthalmologist receiving the referrals was not blinded to the grade (skill level) of the clinician.

Ho et al. (2007) conducted a hospital-based epidemiological study in a heavy populated industrial city in Taiwan and found that work-related eye injuries were at 38.9% compared to the United States data on work-related eye injuries which is 20-25%. Twenty-two percent of eye

injuries were diagnosed as corneal abrasions. These eye injuries resulted in loss time from work and increased medical costs. Some of the injured workers were the major breadwinners for their families which poses a public health concern. A limitation of the study is that there was missing data regarding the distribution of eye-related injuries for the city of Taiwan where the study was conducted.

Eye Patching and Antibiotic Use

Le Sage et al. (2001); Lim, Turner, and Lim (2016); and Menghini et al. (2013) conducted randomized control studies examining the treatment of a corneal abrasion using the eye patch. Menghini et al.'s study consisted of a three-armed randomized control trial looking at the treatment for traumatic abrasion caused by a foreign body. The researchers found that pressure patching and antibiotic ointment; therapeutic contact lens and antibiotic eye drops; and antibiotic ointment alone were all equally effective in minimizing the abrasion and decreasing pain associated with the injured eye.

Use of an antibiotic in combination with the patch could have swayed the results of Menghini's study (2013). The antibiotic could be the cause of corneal healing and not the eyepatch. These results are inconsistent with recommendations against the use of the eye patch (Neu, 2002; Wilson & Last, 2004). C. H. Lim, Turner, and Lim's systematic review (2016) included twelve studies looking at the use of eye patching versus no eye patching and found that there was no statistically significant difference in subjects who were treated with eye patching when compared to those without eye patching. This review was based on randomized control studies conducted in the United Kingdom, United States, Canada, Brazil and Switzerland.

Le Sage, Verreault, and Rochette's (2001) study concluded that the use of an eye patch was not more advantageous than the use of topical antibiotic ointment in the treatment of corneal

abrasion. Limitations of this study include the decision to treat study participants with a mydriatic agent or opioid analgesic was solely determined by the treating clinician which could represent study bias, a high percentage of patients did not complete the study, and criteria used for wound healing was based on the opinion of the attending physician which could be very subjective leading to differences of opinions amongst the providers.

Topical Anesthetics

In the past, routine use of the topical anesthetic tetracaine (amethocaine), for the treatment of corneal abrasion, was discouraged because of concerns regarding safety and delay in wound healing. However, most of these data were based on case reports and not evidenced-based research (Waldman et al., 2018). Furthermore, all of the earlier case reports involved human subjects who misused the topical anesthetics (frequent or prolonged use) (Swaminathan, Otterness, Milne, & Rezaie, 2015).

Waldman et al. (2018) conducted a retrospective cohort study in an ED in New Zealand looking at the use of tetracaine for home use for the management of pain associated with corneal abrasion. This study was the largest randomized controlled trial conducted on the use of anesthetics for the treatment of corneal abrasion. One group of subjects received standard treatment which consisted of antibiotic eye ointment and an oral analgesic. The other group was prescribed undiluted tetracaine for home use along with the standard treatment. There did not appear to be any serious adverse events with the use of tetracaine nor did it cause any delay in abrasion healing with short term use (24 hours). One limitation to this study is that the researchers collecting the data from the electronic health record (EHR) were not blinded to the study hypothesis.

Ball, Seabrook, Desai, Allen, and Anderson (2010); Puls, Cabrera, Murad, Erwin, and Bellolio (2015) conducted studies evaluating the use of topical anesthetics for the management of eye pain associated with corneal abrasion. Ball et al. compared patient home use of diluted proparacaine versus placebo. Puls et al.'s systematic review and meta-analysis evaluated 298 studies comparing topical anesthetics with placebo and found only 2 studies that were appropriate for the review. Ball et al. noted pain reduction was greater in the group that received the drug. Puls et al. reported no difference in relation to pain and corneal abrasion healing in either group. However, the authors felt that the evidence was lacking in support of the use of topical anesthetics. Ball et al.'s study does support the home use of topical anesthetic for treatment of pain associated with corneal abrasion. There were no eye complications in either study. One of the limitations of Ball et al.'s study is the small sample size. Another limitation of this study was that there were no measurements of corneal injury at all. Results of healing were solely based on subjective complaints of the participants. The inclusion of additional measureable outcomes would have given more reliability and validity to Ball's study. Lastly, the ophthalmologist who performed follow up examinations on the study participants was not blinded to the allocation of the study participants.

Topical Analgesics and Antibiotics

A systematic review conducted by Thiel, Sarau, and Ng (2017) found that topical analgesics such as diclofenac (Voltaren), a NSAID, are effective in relieving the pain associated with corneal abrasion. However, the sample sizes used in these studies were small which makes generalizability somewhat challenging. In a randomized double-blinded placebo-controlled clinical trial Szucs, Nashed, Allegra, and Eskin (1999) encountered similar results with diclofenac. Limitations to this study include small sample size, based on physician's opinion

some patients received a cycloplegic and others did not, evaluation of corneal abrasion healing was determined by the patient's subjective complaints, and numeric pain score data and slit lamp or Wood's light visualization of the cornea were not incorporated into these results. Furthermore, physicians may have differences of opinions as to who gets treated with the cycloplegic drug. Not all participants had equal chance of receiving the cycloplegic drug and this alone could have some effects on the results of this study.

Faraldi et al. (2012); Lin and Gong (2015) conducted randomized trials examining the use of sodium hyaluronate in the treatment of corneal abrasion. Lin and Gong (2015) studied hyaluronate in combination with levofloxacin eye drops compared to basic fibroblast growth factor (bFGF) with levofloxacin for the treatment of superficial corneal abrasion in Chinese patients caused by mechanical damage such as fingernails, branches, and contact lenses. Faraldi et al. (2012) studied hyaluronate, xanthan gum, netilmicin (an aminoglycoside antibiotic drug) and occlusive patch compared to netilmicin and occlusive patch in the treatment of patients with traumatic corneal abrasion. Each of these studies found that there were no statistically significant differences in healing rates and subjective symptoms between the two study groups. There were also no serious adverse effects in either of these two studies.

Faraldi et al. (2012) reported both treatments were very effective in decreasing the size of the corneal abrasion. A limitation to Faraldi's (2012) study is different patching regimens were used which decreases the comparability of the two groups. Another limitation is small sample size was studied. One of the limitations of Lin & Gong's (2015) study is the subjects were Chinese and genetic factors may have played a role in the healing process and the participants' responses to medication used in the study. Another limitation to this study is the lack of generalizability to other ethnic groups since none was represented in the study.

Visual Acuity

The visual acuity examination is a key component in the assessment of corneal abrasion that allows the clinician to assess for deficits in vision (Pflipsen, Massaquoi, & Wolf, 2016). The Snellen chart is used to test visual acuity. This test is often missing in the clinical documentation in the EHR. Myuran (2017) found that the use of a sticker placed on the client's record was effective in reminding staff to perform a visual acuity test on each client presenting with an orbital eye injury. Study results revealed an increase in visual acuity testing rate of 40% with the implementation of the proforma sticker. A lack of clinician knowledge and/or training was felt to be responsible for missing documentation regarding a thorough eye exam including visual acuity testing. Increased knowledge of visual acuity testing provided during the teaching session prior to implementing the study may have contributed to the increase in visual acuity documentation and could be viewed as study bias.

Conclusion

Work-related eye injuries are a serious public health concern that result in economic loss for businesses as well as financial loss to communities and families in the United States and abroad (Ho et al., 2007). There is a lack of information in the literature regarding the use of clinical guidelines in the treatment of corneal abrasion. Two articles pertaining to guidelines were found in the literature and only one was a research study. The other article by Wipperman and Dorsch (2013) contained clinical guidelines developed by the authors based on evidence from the literature. The study conducted by Al-Saleh and Alfawaz (2006) revealed variability in the treatment of traumatic corneal abrasion among HCPs. Thyagarajan et al.'s study (2006) revealed the use of clinical guidelines improved provider performance and decreased unnecessary referrals to a specialist. This study does support the DNP project PICOT question.

In addition, the review of evidence supports short-term use of topical anesthetics for relief of pain associated with corneal abrasion. However, prolonged use of these agents can lead to toxic effects in the corneal epithelium resulting in increased corneal thickness, opacification, stromal infiltration, and epithelial defects (Swaminathan et al., 2015). The evidence supporting the use of topical anesthetics is greater than the evidence opposing its use which is mainly based on case reports and animal subjects (Swaminathan et al., 2015). NSAIDs were also noted to reduce the pain of corneal abrasion without any adverse effects. Eye patching was once the standard of care for treating corneal abrasions and this practice is no longer recommended; although, some practitioners continue to utilize this form of treatment. This form of practice, not based on evidence, further supports the necessity for the use of guidelines in clinical practice. Further research is needed with regard to the use of clinical guidelines for the management of corneal abrasion. Additional research, involving larger study populations, is needed to evaluate the safe use of topical anesthetic eye drops in the home. This practice is currently not approved by the Food and Drug Administration (FDA).

Conceptual Framework

The conceptual framework utilized to guide the DNP Project is Plan- Do- Study- Act (PDSA) (see Figure1). PDSA is a model for change that arose from industry and was developed by Edward Deming. PDSA is a process used to improve quality of healthcare while making care safer, improving productivity with minimum waste, and providing patient-centered care that is more timely and cost effective (Donnelly & Kirk, 2015).

The **Plan** phase of the DNP Project includes the goal or aim of the project and the percentage of improvement that is expected from project implementation. The original plan was to enroll 6 HCP in the project; however one person left the clinic and the other person declined

participation in the project. Steps in the plan include the following: 1. Distribution of confidence survey to the HCP, 2. Approach key stakeholders to assist with implementation of the plan. The stakeholders would consist of nurses, medical secretaries, center operations director (office manager), physicians, medical assistants, and the medical director of the facility, 3. Approach the regional director/organizational leadership and ask for support of the project while providing an overview of the project including rationales. Information technology personnel support will be necessary to assist with extracting data from the patient electronic health records (EHR); and 4. Implement the plan for change.

In the **Do** phase the Project intervention or plan is implemented. The DNP student consulted with the faculty advisor and the clinical mentor to develop the quality improvement project. The DNP student also engaged key stakeholders in this process. An informational meeting discussing the project was held at the clinical site and those in attendance were the DNP student, clinical mentor, Regional Medical Director, and Director of Medical Operations.

The Corneal Abrasion Confidence Surveys were distributed electronically to the HCPs via Survey Monkey. All clinical staff were educated on the etiology and pathophysiology of corneal abrasion including serious complications, current treatment recommendations and modalities, what necessitates a referral to a specialist, and patient teaching regarding self-care and preventive measures. A power point presentation and handout was utilized for this process. A clinical guideline in the format of an algorithm was used as part of the educational power point presentation to inform clinicians about the management of a patient presenting to the clinic with an eye injury (see Appendix A). Permission to use the guideline was obtained from the author (see Appendix B).

The staff member rooming the patient was responsible for obtaining a visual acuity test using the Snellen chart prior to settling the patient in the examination room. The results of the eye exam were documented in the patient's EHR for the HCP to review. This process was monitored by the lead registered nurse and HCP who treated the patient. The HCP checked the results of the visual acuity exam prior to performing an assessment on the patient. This alerted the provider to any changes or abnormalities in the patient's vision that may necessitate immediate referral to an ophthalmologist. The provider was encouraged to manage the patient's care according to evidenced-based guidelines that were provided in the prior educational session. The patient was discharged home with detailed instructions on self-care including warning signs of worsening symptoms and the need to return for follow up in the clinic.

The **Study** phase is where data analysis takes place. The HCP surveys were collected and reviewed by the DNP student and faculty chair. The one person overseeing information technology (IT) and electronics was not able to assist in gathering information from the EHR. The DNP student performed a review of EHR gathering information regarding number of patients seen for corneal abrasion before and during project implementation and HCP management of the case. The results of the quality improvement project were shared with the faculty chair of the project as well as the clinical mentor. Plans are ongoing to share results with HCPs and other key stakeholders. Included in discussions were factors that may or may not have influenced the results.

The **Act** phase is where the decisions are made to implement the change to other areas of the organization. Important questions to ask are the following: What changes are needed to the process? What is the climate of readiness for making additional change (s)? (Donnelly & Kirk, 2015). In this phase of the quality improvement project and the entire Plan-Do-Study- Act

(PDSA) cycle was reviewed. EHR data that was collected was discussed with the faculty chair and clinical mentor. Survey results were reviewed. The team analyzed the success and failures of the quality improvement plan and attempt to understand why they occurred.

A future plan would be to implement the DNP Quality Improvement Project in the other Rhode Island Urgent Care clinic which is another microsystem similar to the initial clinic where the project was piloted. The majority of the patient population in that clinic consists of those requiring a Department of Transportation (DOT) examination medical card or those being seen for worker's compensation related injuries including eye injuries such as corneal abrasions. The long term goal is for the improvement plan to be implemented in several, if not all the outpatient clinics within the organization (macrosystem).

Implementation

This is a quality improvement project using descriptive statistics. The DNP Project was approved by the Institutional Review Board of the University of Alabama in Huntsville and the Director of Medical Operations of the clinical site and, Regional Medical Director of the clinical site prior to implementation.

Participants

A convenience sample was utilized for this project. The population consisted of 2 physicians and 2 nurse practitioners. There were 3 males and 1 female subject. The age range was between 40 and 52 years of age. Inclusion criteria included all those HCP with a master's degree or higher, who diagnose and treat patients in the occupational health/urgent care clinic. Exclusion criteria included healthcare providers who do not provide hands-on care to patients in the urgent care setting. With regard to human subjects and ethics, the risk of physical or

emotional harm was none to minimal. The HCP's willingness to complete the pretest survey along with a signed consent form was accepted as consent to participate in the project.

Setting

The setting was a community urgent care clinic located in a small city in Southern Rhode Island. The clinic functions as an urgent care/occupational health walk-in center. The clinic treats 30,000 plus patients per year. Patients can also make appointments to be seen for things such as Department of Transportation (DOT) physical exams, Worker's Compensation (WC) injury evaluations/treatments, drug screening, and pre-employment physical examinations.

Tools

One of the tools that were utilized in this project was a survey questionnaire that sought to elicit information regarding each provider's confidence level and experience in treating a patient presenting with a corneal abrasion (see Appendix C). The survey was amended with the addition of two demographic questions and the questions regarding implementation of guidelines was omitted from the survey. One of the questions asked the HCPs about their credentials and the other question pertained to number of years in practice. The same survey was used as a pretest/post-test questionnaire. Permission to utilize the survey was obtained from the author (see Appendix D). The pretest was made available on 11/27/18 and participants were given one week to complete the survey. The post-test survey was distributed on 1/3/2019. Due to circumstances beyond the control of the DNP student, the start date of the project was significantly delayed from the original planned date. The returned results of the surveys were anonymous to protect the confidentiality of each participant's responses. Each participant was asked to complete an electronic survey online via the Survey Monkey website. The other tool that was used for this project was an Electronic Health Record Chart Review Tool developed by

the DNP student. The tool consisted of six questions and was used by the principal investigator to obtain clinical data from the patients' EHR (See Appendix E).

Provider Education

A twenty-five minute Power Point presentation on corneal abrasion served as the primary intervention for the DNP project. The presentation included discussions about the etiology, pathophysiology, incidence, treatment recommendations, complications, and patient teaching related to corneal abrasion management. The presentation was given to the project participants (clinicians) during the first week of December. Quality of care issues surrounding the management of corneal abrasion based on the review of the literature was included in this educational session. The Power Point presentation also included a review of the corneal abrasion guidelines. Key stakeholders such as the regional director and clinical site manager, and ancillary staff were encouraged to attend the presentation; although, none were in attendance. Refreshments and soft drinks were served.

EHR Record Review

The Vice President of Clinical Solutions was asked to assist with retrieving EHRs of those patients seen in the clinic with a diagnosis of corneal abrasion during the 5 weeks of project implementation and also those seen in the four months prior to project implementation. However, due to other work obligations she was not able to accommodate. The DNP student performed the EHR review using the EHR Review Tool. Inclusion criteria for the prospective/retrospective chart review include the following: clients 18 years of age and older with a chief complaint of eye injury/problem seen in the clinic in the four months preceding project implementation; and clients 18 years of age and older with diagnosis of corneal abrasion

or eye injury/problem seen in the clinic during the five weeks of the project implementation period. A retrospective chart review was ongoing during the implementation of the project.

Plan for Project Evaluation

Participants' demographics included age, sex, professional credentials, years in practice, and ethnic background. Gender included male or female and was expressed as a percentage. Race included African American, Caucasian, Hispanic, American-Indian, Philippine or other.

The first objective of the quality improvement project was to decrease unnecessary referrals to the ophthalmologist. An improvement of 85% was the goal. This measurement was not able to be determined because there were not enough records meeting study criteria post-intervention. A retrospective chart review was undertaken comparing client data 4 months prior to project implementation and 5 weeks afterwards. Microsoft Excel was used to organize and analyze demographic data. The results of the survey from Survey Monkey were utilized and reviewed by the DNP student, clinical mentor and faculty chair.

The second objective was to improve patient quality of care. This was intended to be evaluated by a retrospective chart review comparing the number of referrals to the ophthalmologist as well the HCP's management of care before project implementation and after project implementation. However, this was not able to be directly measured due to the lack of data during the post-intervention period. It was expected that unnecessary referrals would decrease by 85% and loss time from work would decrease by 85%.

The third outcome objective was the improvement in health care provider's knowledge in the treatment of corneal abrasion. This objective was measured by comparing the pretest and post-test survey results. The same questionnaire was utilized for the pretest/post-test. The questionnaire was developed by Thyagarajan et al. (2006). The survey contained items

pertaining to the health care provider's confidence and knowledge in the management of corneal abrasion including the use of the slit lamp for examination of the injured eye, confidence in history taking and follow up of corneal abrasion, and knowledge of when to refer to ophthalmologist. Some of the questions required a Yes or No answer and others required a response of "little confident" "confident" or "not confident." The data from the surveys was analyzed by the DNP student and reviewed by the faculty chair. The expectation was that the post-test scores would show an increase in confidence level as evidenced by more ticked boxes for the confident responses as well as ticked boxes suggesting the educational session improved provider knowledge.

The fourth objective of the DNP Project was to enroll each of the four remaining health care providers in the project. This was accomplished by discussing the identification of the clinical problem with the health care providers. Each heath care provider was encouraged to attend an educational session encompassing the review of clinical guidelines for the treatment of corneal abrasion. The Divisional Medical Director, registered nurses, and clinical operations director were also invited to attend. The educational session consisted of a 25 minute power point presentation and was presented after each provider had completed a pretest survey.

The final objective was to begin project implementation by 8/13/18. However, due to setbacks beyond the control of the principal investigator, the project did not get underway until 11/27/18. The cost for the project was evaluated to see if it would be feasible to duplicate in other clinics within the organization.

Application for Practice

A review of the evidence revealed varying treatments for corneal abrasion including

drugs utilized and when to refer to a specialist. The evidence also revealed a knowledge deficit among some health care providers with regards to management of the patient presenting to the outpatient clinic with an eye injury resulting in an abrasion.

The DNP quality improvement project will have a significant effect on the way healthcare providers in the Rhode Island Urgent Care clinic manage patients with a corneal abrasion. Clinical knowledge did improve as well as HCP confidence. Prompt and accurate diagnosis and treatment can help decrease loss time from work and improve patient outcomes. Accurate diagnosis, referral, and treatment may also allay HCP feelings of anxiety and may also decrease litigation claims. Patients will have a better understanding about self- treatment and preventive measures. The authors hope that newly hired clinicians would be required to have an understanding of the corneal abrasion guidelines as part of the new employee onboarding process. This orientation process will help to sustain the progress made from implementation of the quality improvement project.

According to the study conducted by Thyagarajan, Sharma, Austin, Lasoye, and Hunter (2006) the use of guidelines for the treatment of corneal abrasion improved visual acuity documentation, improved healthcare provider EHR documentation, decreased inappropriate referrals to specialist, and improved patient education regarding when to return to clinic if complications arose. Guidelines are meant to decrease variability in clinical practice and improve overall quality and safety of patient care (Thyagarajan et al., 2006).

The budget planning for the DNP Project included the following: refreshments served during the in-service for staff explaining the project as well as educational session aimed at reviewing guidelines for the treatment of corneal abrasion using power point presentation; copy paper for handouts containing the guidelines; electronic survey; and worker salaries including

DNP/Clinical Mentor's time spent on data collection and analysis. The estimated budget is as follows: $250 for refreshments, $148 electronic survey development and monthly fees, $20 copy paper for surveys and power point presentation (DNP student utilized personal laptop for presentation), $2,400 DNP salary, and $2,250 MD salary. The total productivity hours for project implementation and evaluation were 85.33 hours. The estimated salary cost for the Project is $4,981(see Table 1).

The DNP Quality Improvement Project can be replicated to other clinical sites within the organization. The organization has clinical sites located in most of the 50 states in the US and the clinic where the project will be conducted is one of two clinics in the state of Rhode Island. The DNP quality improvement project will likely result in cost savings for the company, the American industrial work force as a whole, and will also reduce healthcare dollars spent on workers compensation claims related to eye injuries. It will also improve HCP knowledge and competency in caring for a patient with a corneal abrasion.

Professional Journal Selection

The professional journal selection chosen for the DNP Scholarly Project is Workplace Health & Safety (formerly American Association of Occupational Health Nurses Journal). Workplace Health & Safety is a journal that focuses on environmental and occupational health issues in nursing practice. The articles contained in the journal are peer-reviewed and contain information pertaining to research studies, and reports on new techniques, interventions, or program implementation in clinical practice. The aim of the journal is to support and promote the practice of occupational and environmental health nurses by providing the most current research findings, clinical, all-hazard preparedness, health promotion, safety, case management, workers' compensation, business and leadership state-of-art information on issues leading to

optimal performance through worker health and well-being while creating a positive business impact (see Appendix F, author guidelines).

Conclusion

This quality improvement project was conducted in the occupational health clinic and the duration of the project was five weeks. Only 2 of the 4 participants attended the live power point educational session. One of the registered nurses was also in attendance. The remaining two participants listened to a voiceover power point presentation which they were asked to complete in a few days so that the principal investigator could proceed with the post-intervention data collection process. Upon receipt of the post intervention surveys, two of the participants email addresses were accidently revealed and hence anonymity was not maintained. As a result of the intervention, there was a noticeable increase in HCP knowledge and confidence with regards to the management and treatment of corneal abrasions. There was also an increase in knowing when to refer the case to the ophthalmologist. Analysis of two of the project's objectives was indeterminate because there was an unequal number of electronic health record data available for comparison between the pre and post intervention stages. Overall, this project was a success and there was a lot of individual positive feedback received from the participants. Going forward this project will have a positive impact on how health care providers manage corneal abrasion cases and will subsequently have a positive impact on patient care.

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Table 1

DNP Project Budget

Staff	Task	Hours	Time Frame (weeks)	Salary ($)
DNP/NP	Survey Evaluation/ Working with data	40	3	2,400
DNP/NP	Education Session	0.33	1	31
MD	Survey Evaluation/ Working data	30	3	2,250
NP	Data retrieval	15	1	300
Totals		85.33	8	4,981

Miscellaneous : Food $250; laminated pocket guides $90; copy paper $20; survey development and fees $148

Note. DNP = Doctorate of Nursing Practice; NP = Nurse Practitioner; MD = Medical Doctor; IT = Information technologist

The total hours needed for the Project Implementation is 55.33. The total amount of time re of time required for the project is 8 weeks. Salary costs for the program is $4,981.
DNP/NP salaries account for the highest budgeted salary costs. The overall cost including miscellaneous items is $5,489.

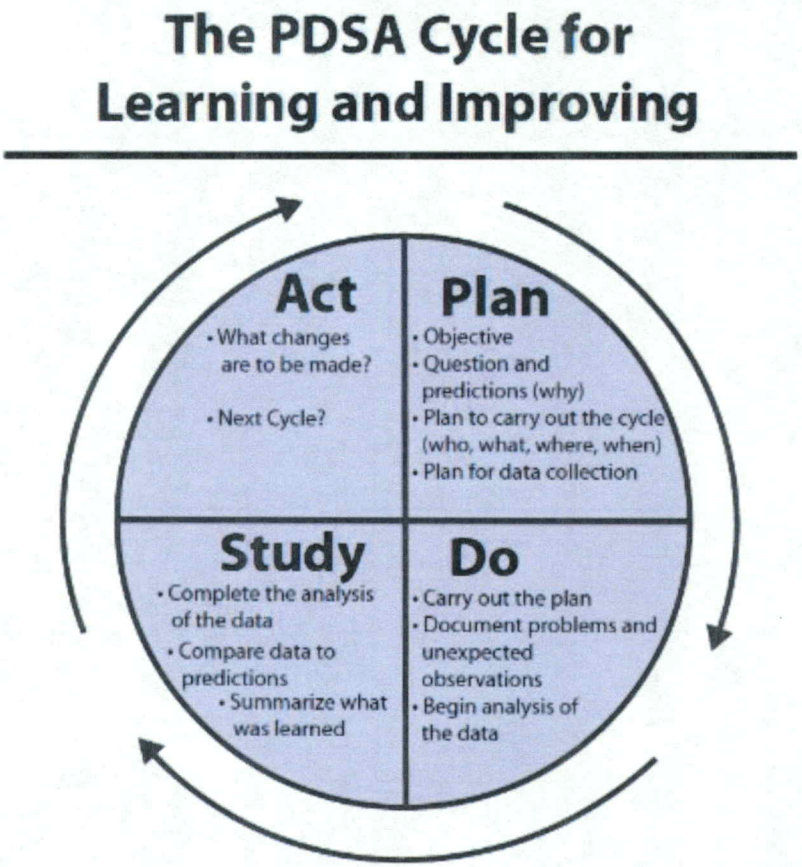
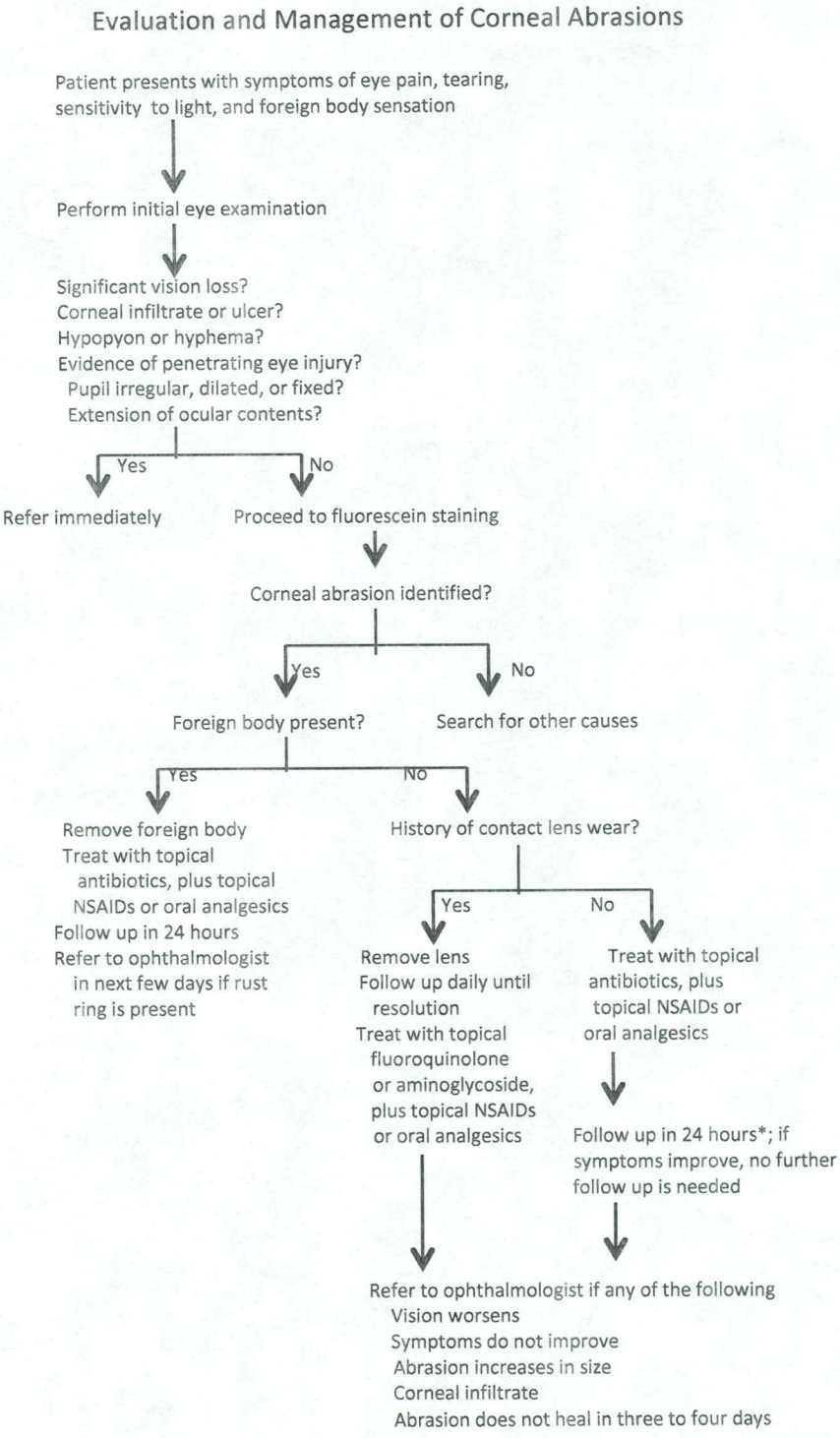


Figure 1. Edward Deming's Plan-Do-Study-Act Model for Improvement (Pinterest, n.d.)

Appendix A



*Follow up may not be necessary for patients with small abrasions (4mm or less), normal vision, and symptoms improvement. Exception: All Worker compensation cases must be followed up in in 1-2 days.

(Algorithm for the evaluation and management of corneal abrasions. (NSAIDs = nonsteroidal anti-inflammatory drugs.) (Wipperman & Dorsch, 2013).

Appendix B

John Dorsch Jun 10

to me

You have my permission to use the algorithm. I am glad you have found it helpful.

From: Wanda Pothier [wp0008@uah.edu]
Sent: Saturday, June 09, 2018 8:18 PM
To: John Dorsch
Subject: Doctor of Nursing Practice (DNP) Scholarly Project

(Copy of email granting permission to utilize corneal abrasion guideline.)

Appendix C

URGENT CARE STAFF CONFIDENCE SURVEY QUESTIONS

Please tick the relevant boxes

1. Have you had formal training and instruction in the management of corneal abrasion in urgent care?
a. Some []
b. None []
c. Enough for me []

2. If your answer to 1 was a or c, who taught you?
a. Senior ED/Urgent care staff []
b. Ophthalmologist []
c. NP []
d. Other []

3. Have you been taught how to use the slit lamp?

a. Yes []
b. No []

4. How confident do you feel in the use of the slit lamp?
a. Confident []
b. A little confident []
c. Not confident []

5. How many corneal abrasions have you seen in the last 3 months?

a. <5
b. 5–10 []
c. 11–20 []
d. >20 []

6. How confident are you with dealing with a corneal abrasion case?
a. Confident []
b. A little confident []
c. Not confident []

7. If your answer to question 6 was b or c, what was the reason? (You may give more than one answer.)
a. Not confident about diagnosis and management. []
b. Afraid you may miss something important. []
c. Not sure about what you should refer. []

8. Please rate your confidence for the following aspects of a corneal abrasion case
The history taking: a little confident []
confident [] not confident []
The examination: a little confident []
confident [] not confident []

The management: a little confident []
confident [] not confident []

The follow up: a little confident []
confident [] not confident []

9. Do you refer corneal abrasions to the ophthalmologist/eye clinic?
a. Yes, always []
b. No, never []
c. Sometimes []

10. Do you speak to the ophthalmologist on-call about corneal abrasion?
a. Yes, always []
b. No, never []
c. Sometimes []
d. Yes, for specific reasons []

If your answer to question 10 was d. then please tell us your specific reasons for referral:

11. Do you know when to refer abrasions to the ophthalmologist?
a. Yes, always []
b. No, never []
c. Sometimes []

12. Which of the following describes your credentials?

MD []
NP []
PA []

13. How many years have you been practicing?
<5 []
6-10 []
11-15 []
16-20 []
>20 []

(Thyagarajan, Sharma, Austin, Lasoye, & Hunter, 2006)

Appendix D

LASOYE, Tj (KING'S COLLEGE HOSPITAL NHS FOUNDATION TRUST) 3:24 AM (20 hours ago)

to me

Dear Wanda

I'm sorry about the delay in getting back to you. Personally, I'm happy for you to use our questionnaire but you may want to seek my fellow authors' permission as well.

All best wishes with your study.

Tj

Mr T A Lasoye FRCS FRCEM MA Med Ed

Director of Medical Education

Consultant and Honorary Senior Lecturer in Emergency Medicine

King's College Hospital NHS FT

London SE5 9RS

Tel- 02078485591/ 02078485525/ 02032993518

From: Wanda Pothier [mailto:wp0008@uah.edu]
Sent: 24 June 2018 22:17
To: LASOYE, Tj (KING'S COLLEGE HOSPITAL NHS FOUNDATION TRUST)
Subject: Permission to use survey questionnaire for corneal abrasion project

(Copy of email granting permission to utilize survey questionnaire)

Appendix E

Enhancing Treatment of Corneal Abrasion through Provider Education

Electronic Health Record Review Tool (check the appropriate box when indicated)

1. Is the visual acuity assessment documented in the patient's EHR? Yes ☐ No ☐
2. What medications were prescribed, if any (including Rx and OTC medications)?

_____

3. Is the patient being referred to a specialist (ophthalmologist/optometrist)? Yes ☐ No ☐
4. Was an eye patch applied at the time of visit? Yes ☐ No ☐
5. Was the patient given a follow up appointment in the clinic? Yes ☐ No ☐
6. Is this a workers' compensation case ☐ or urgent care case☐?

(Pothier, 2018)

Appendix F

General Submission Articles

Research study—A report of an original study, including methodology, results, and discussion; a substantive section at the end of the article "Implications for Practice"; and a brief summary of practical applications/implications of the research for the reader to be highlighted in a sidebar "Applying Research to Practice." Requires an unstructured abstract of 50 to 150 words.

Review article—A review of existing occupational and environmental health nursing or related literature using a research approach (i.e., research question, keywords, criteria for inclusion and exclusion) to define the articles included in the review. The manuscript should provide conclusions based on the review and recommend new approaches for occupational and environmental health nursing practice, research, or education. Requires an "In Summary," consisting of three or four items, each one or two sentences in length, that summarize the article. Requires an unstructured abstract of 50 to 150 words.

Clinical article—A report of new techniques, interventions, or program implementation in clinical practice. Requires an "In Summary," consisting of three or four items, each one or two sentences in length, that summarize the article. Requires an unstructured abstract of 50 to 150 words.

Case report—A report of a clinical case affecting or involving occupational and environmental health nursing. Requires an "In Summary," consisting of three or four items, each one or two sentences in length, that summarize the article. Requires an unstructured abstract of 50 to 150 words.

Successful programs article—A report of the planning, implementation, and evaluation of successful programs in the workplace. Requires an "In Summary," consisting of three or four items, each one or two sentences in length, that summarize the article. Requires an unstructured abstract of 50 to 150 words.

Business and leadership article—A discussion of a business or leader- ship theory, issue, or process of interest to occupational and environmental health nurses. Requires an "In Summary," consisting of three or four items, each one or two sentences in length, that summarize the article. Requires an unstructured abstract of 50 to 150 words.

Letters to the Editor – *WHS* accepts Letters to the Editor about previously published articles or other topics relevant to occupational and environmental health nurses. A Letter to the Editor should not be used as a substitution for a peer-reviewed manuscript.

MANUSCRIPT PREPARATION

Manuscripts should be between 3,700 and 4,200 words, not to exceed 20 typed pages. Manuscripts should be written in the third person. They must conform to the following guidelines:

Double space throughout the manuscript, including acknowledgments, abstract, text, , figure legends, and tables. All pages should be numbered.

;e/Author Information. All uploaded manuscript files should be devoid of author (e.g., name, institution), including title page, to facilitate blind peer review.

. All articles require an unstructured abstract of 50 to 150 words.

anuscripts must conform to the guidelines for manuscript preparation of the *n Manual of the American Psychological Association,* 6th ed. (2010).

es. References must conform to APA style. The authors are responsible for the of references.

Tables should be placed at the end of the manuscript, one to a page.

Digital images should be high resolution (at least 300 dpi) and saved in JPEG or TIFF ıage files should be uploaded separately from manuscript text file; images embedded in and PowerPoint® slides are not acceptable. Figure legends should not be included in c files.

Biographies. All article types, except Current Topics and Letters to the Editor, should short biography for each author. The biographies should be 1-2 sentences and include s (PhD, MA, CDE, etc.). Do not use titles (Dr., Ms., Mr., etc.).

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manuscript reports on a registered clinical trial and has been assigned a trial registration number from a public trials registry, authors should provide this information.

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Papers should only be submitted for consideration once consent is given by all contributing authors. Those submitting papers should carefully check that all those whose work contributed to the paper are acknowledged as contributing authors.

The list of authors should include all those who can legitimately claim authorship. This is all those who:

(i) made a substantial contribution to the concept and design, acquisition of data or analysis and interpretation of data,
(ii) drafted the article or revised it critically for important intellectual content,
(iii) approved the version to be published.

Please refer to the ICMJE Authorship guidelines at http://www.icmje.org/ethical_1author.html

Research ethics

All papers reporting animal and human studies must include whether written consent was obtained from the local Ethics Committee or Institutional Review Board. Please ensure that you

have provided the full name and institution of the review committee and an Ethics Committee reference number.

We accept manuscripts that report human and/or animal studies for publication only if it is made clear that investigations were carried out to a high ethical standard. Studies in humans which might be interpreted as experimental (e.g. controlled trials) should conform to the Declaration of Helsinki http://www.wma.net/en/30publications/10policies/b3/index.html and typescripts must include a statement that the research protocol was approved by the appropriate ethical committee. In line with the Declaration of Helsinki 1975, revised Hong Kong 1989, we encourage authors to register their clinical trials (at http://clinicaltrials.gov or other suitable databases identified by the ICMJE, http://www.icmje.org/publishing_10register.html). If your trial has been registered, please state this on the Title Page. When reporting experiments on animals, indicate on the Title Page which guideline/law on the care and use of laboratory animals was followed.

Patient consent

Authors are required to ensure the following guidelines are followed, as recommended by the International Committee of Medical Journal Editors, Uniform Requirements for Manuscripts Submitted to Biomedical Journals. Patients have a right to privacy that should not be infringed without informed consent. Identifying information, including patients' names, initials, or hospital numbers, should not be published in written descriptions, photographs, and pedigrees unless the information is essential for scientific purposes and the patient (or parent or guardian) gives written informed consent for publication. Informed consent for this purpose requires that a patient who is identifiable be shown the manuscript to be published.

Identifying details should be omitted if they are not essential. Complete anonymity is difficult to achieve, however, and informed consent should be obtained if there is any doubt. For example, masking the eye region in photographs of patients is inadequate protection of anonymity. If identifying characteristics are altered to protect anonymity, such as in genetic pedigrees, authors should provide assurance that alterations do not distort scientific meaning and editors should so note. When informed consent has been obtained it should be indicated in the submitted article.

Funding

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(Author guidelines for journal submission; Sage Publications, 2018.)

Appendix G

I. Anatomy & Physiology of the Cornea

A. Functions

1. Barrier Protection

2. Filtration

3. Refraction

II. Etiology of Corneal Abrasion

A. Corneal Epithelial Defect

B. Causes

III. Pathophysiology

IV. Symptoms of a Corneal Abrasion

V. Complications of Corneal Abrasion

VI. Identification of the Problem

A. Background

B. Statistics

VII. Diagnosis and Treatment of Corneal Abrasion

A. Discuss variability in treatment

B. Drug Options

1. Anesthetics

2. Cycloplegics

3. Antibiotics

VII. Review of Evidence from the Literature

VIII. Referral Guidelines and Recommendations

IX. Patient Education on self –management

(Outline of Power Point Presentation Used for Educational Intervention)

Appendix H

THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

☒ Expedited (see pg 2)
☐ Exempted (see pg 3)
☐ Full Review
☐ Extension of Approval

October 26th 2018

Wanda Pothier
Department of Nusting
University of Alabama in Huntsville

Dear Mrs. Pothier,

The UAH Institutional Review Board of Human Subjects Committee has reviewed your proposal, *Enhancing Treatment of Corneal Abrasions through Provider Education: A Performance Improvement Project,* and found it meets the necessary criteria for approval. Your proposal seems to be in compliance with this institutions Federal Wide Assurance (FWA) 00019998 and the DHHS Regulations for the Protection of Human Subjects (45 CFR 46).

Please note that this approval is good for one year from the date on this letter. If data collection continues past this period, you are responsible for processing a renewal application a minimum of 60 days prior to the expiration date.

No changes are to be made to the approved protocol without prior review and approval from the UAH IRB. All changes (e.g. a change in procedure, number of subjects, personnel, study locations, new recruitment materials, study instruments, etc) must be prospectively reviewed and approved by the IRB before they are implemented. You should report any unanticipated problems involving risks to the participants or others to the IRB Chair.

If you have any questions regarding the IRB's decision, please contact me.

Sincerely,

Bruce Stallsmith

Bruce Stallsmith
IRB Chair
Professor, Biological Sciences

OFFICE OF THE VICE PRESIDENT FOR RESEARCH
Von Braun Research Hall M-17 Huntsville, AL 35899T 256.824.6100 256.824.6783

Expedited:

☐ Clinical studies of drugs and medical devices only when condition (a) or (b) is met. (a) Research on drugs for which an investigational new drug application (21 CFR Part 312) is not required. (Note: Research on marketed drugs that significantly increases the risks or decreases the acceptability of the risks associated with the use of the product is not eligible for expedited review. (b) Research on medical devices for which (i) an investigational device exemption application (21 CFR Part 812) is not required; or (ii) the medical device is cleared/approved for marketing and the medical device is being used in accordance with its cleared/approved labeling.

☐ Collection of blood samples by finger stick, heel stick, ear stick, or venipuncture as follows: (a) from healthy, nonpregnant adults who weigh at least 110 pounds. For these subjects, the amounts drawn may not exceed 550 ml in an 8 week period and collection may not occur more frequently than 2 times per week; or (b) from other adults and children, considering the age, weight, and health of the subjects, the collection procedure, the amount of blood to be collected, and the frequency with which it will be collected. For these subjects, the amount drawn may not exceed the lesser of 50 ml or 3 ml per kg in an 8 week period and collection may not occur more frequently than 2 times per week.

☐ Prospective collection of biological specimens for research purposes by noninvasive means. Examples: (a) hair and nail clippings in a nondisfiguring manner; (b) deciduous teeth at time of exfoliation or if routine patient care indicates a need for extraction; (c) permanent teeth if routine patient care indicates a need for extraction; (d) excreta and external secretions (including sweat); (e) uncannulated saliva collected either in an unstimulated fashion or stimulated by chewing gumbase or wax or by applying a dilute citric solution to the tongue; (f) placenta removed at delivery; (g) amniotic fluid obtained at the time of rupture of the membrane prior to or during labor; (h) supra- and subgingival dental plaque and calculus, provided the collection procedure is not more invasive than routine prophylactic scaling of the teeth and the process is accomplished in accordance with accepted prophylactic techniques; (i) mucosal and skin cells collected by buccal scraping or swab, skin swab, or mouth washings; (j) sputum collected after saline mist nebulization.

☐ Collection of data through noninvasive procedures (not involving general anesthesia or sedation) routinely employed in clinical practice, excluding procedures involving x-rays or microwaves. Where medical devices are employed, they must be cleared/approved for marketing. (Studies intended to evaluate the safety and effectiveness of the medical device are not generally eligible for expedited review, including studies of cleared medical devices for new indications).

☐ Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis).

☐ Collection of data from voice, video, digital, or image recordings made for research purposes.

☒ Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Enhancing Treatment of Corneal Abrasions through Provider Education: A Performance Improvement Project

Abstract

Corneal abrasion is a common condition that is often seen in outpatient clinical settings including emergency departments and urgent care centers. Inexperience and lack of clinical guidelines can lead to health care provider (HCP) anxiety and stress and this often results in less than optimal patient care. Evidence in the literature reveals that there is a lack of consistency in the management of corneal abrasion. There is also a lack of clinical guidelines. The purpose of this quality improvement project was to determine if an educational review of clinical guidelines for the management of corneal abrasion enhanced healthcare provider knowledge and confidence, and improved patient care outcomes. The intervention was a formal educational session using Microsoft Power Point. The twenty-five minute teaching session included review of evidence from the literature, current guidelines for the management of corneal abrasion, and patient teaching recommendations. A total of four participants took part in this project. Participants were asked to complete a thirteen item confidence survey before and after the intervention. As a result of the educational intervention staff stopped using the eye patch as a form of treatment for corneal abrasion, there was a 25% increase in healthcare provider confidence levels, and 25% increase in knowledge. Positive changes in patient care management were also noted. The project revealed those areas in need of further staff development and also showed that review of clinical guidelines for the treatment of corneal abrasion can enhance clinical practice and outcomes.

Corneal abrasion is an occupational health concern that results from injury to the cornea which is the outermost layer of the eye (Ross & Deschenes, 2017). More than 65,000 work-related eye injuries are related to corneal abrasions (Saccomano & Ferrara, 2014). Inadequate management and feelings of anxiety are often related to health care providers' (HCP) unfamiliarity in treating patients with corneal injuries (Thyagarajan et al., 2006). Often there are no set guidelines for the management of corneal abrasion and treatment varies among HCPs which results in inconsistencies in management. Follow up care of the patient may differ as well as the decision about when to refer to a specialist such as an ophthalmologist. To address these issues an evidenced-based educational project was implemented over an 8 week period. The project used a power point presentation that consisted of the recommended treatment and proposed guidelines for the management of corneal abrasion as well as a review of the literature with the aim of increasing healthcare provider knowledge and confidence levels, and decreasing unnecessary referrals to the specialist.

Background

A corneal abrasion results from injury to the outer layer of the cornea known as the epithelium (Ross & Deschenes, 2017). The cornea is the outermost lens of the eye and controls most of the functions of the eye (Saccomano & Ferrara, 2014). The surface epithelial layer of the cornea functions as a barrier preventing foreign substances from entering the eye (Saccomano & Ferrara, 2014). According to the Occupational Health and Safety Administration (OSHA), eye injuries account for more than $300 million per year in loss of productivity at work, medical costs, and worker compensation claims (United States Department of Labor, n.d.). Most occupational eye injuries occur in men between 25 and 44 years of age and most of these men are employed in the automotive industry (Saccomano & Ferrara, 2014). The most common

causes of corneal abrasion are those injuries resulting from a foreign body or substance entering the eye. Foreign substances that can cause cornel abrasions include dust, chemicals, and sand just to name a few (Saccomano & Ferrara, 2014).

Corneal abrasion is a very common problem that is seen in the Rhode Island Urgent Care clinic. One of the problems in this clinic is that each provider's care of the patient with corneal abrasion may vary to some degree. Currently, there are no guidelines in this clinic for the management of corneal abrasion. Another issue is that follow up care of the patient may differ as well as the decision about when to refer to a specialist. Some HCPs refer patients to the ophthalmologist even when referral may not be necessary. Some HCPs schedule a follow up clinic visit twenty-four hours after the initial visit and others advise the patient to follow up only if no improvement or if the patient experiences any new or worsening symptoms. Another problem is that the staff often needs to be reminded to perform the visual acuity exam. The visual acuity exam using the Snellen chart is considered the standard of care when assessing a patient with an eye injury. Having the eye examination completed before the HCP examines the patient can help with the assessment of the patient and also saves time.

Education as an intervention is one approach that can be used to increase health care provider (HCP) knowledge and confidence levels and decrease unnecessary referrals especially if the education is based on evidence from research (Lee, Kraemer, Smotherman, & Eid, 2016). In the workplace, the Institute of Medicine recommends providing information and educational planning including co-worker support (Giese & Cook, 2014). An educational training session can also be used to assist HCPs with becoming familiar with guidelines for the treatment of corneal abrasion. Educational training session can go beyond improving HCPs knowledge by allowing organizations to improve the workflow processes and make a positive impact on

patient/client satisfaction (Giese & Cook, 2014). The purpose of this Doctor of Nursing Practice (DNP) Project was to implement and educational review of guidelines for the management and evaluation of patients with a diagnosis of corneal abrasion. The PICOT question for this study is as follows: Does the implementation of an educational review of guidelines to providers (I) for the treatment of patients with corneal abrasions (P), compared to no formal review (C), reduce unnecessary referrals to Ophthalmology and improve healthcare provider knowledge and outcomes (O) over 5 weeks (T)?

Conceptual Framework

The conceptual framework utilized to guide the DNP Project is Plan- Do- Study- Act (PDSA) (see Figure1). PDSA is a model for change that arose from industry and was developed by Edward Deming. PDSA is a process used to improve quality of healthcare while making care safer, improving productivity with minimum waste, and providing patient-centered care that is more timely and cost effective (Donnelly & Kirk, 2015). The **Plan** phase of the DNP Project includes the goal or aim of the project and the percentage of improvement that is expected from project implementation. In the **Do** phase the Project intervention or plan is implemented. The **Study** phase is where data analysis takes place. The **Act** phase is where the decisions are made to implement the change to other areas of the organization.

Materials and Methods

A literature search was conducted looking at guidelines for the treatment of corneal abrasions. Randomized control trials as well as meta-analyses were reviewed. Much of the literature advised against the use of eye patching for the treatment of corneal abrasion. Antibiotic use was the standard of care for prophylaxis treatment of corneal abrasion. The use

of oral over the counter pain relievers was a common theme that was seen for the management of the pain associated with corneal abrasion and this was also noted as something that was rarely prescribed. A modified version of the Staff Confidence Survey questionnaire developed by Thyagarajan, Sharma, Austin, Lasoye, and Hunter (2006) was used for this project (see Appendix A). This tool consists of 14 questions (2 items focus on demographics, 9 items focus on management of corneal abrasion, and 3 items focus on the use of the slit lamp). Answer responses ranged from yes, sometimes, and never to confident, little confident, and not confident. The survey was distributed to each participant electronically using Survey Monkey. A guideline for the management of corneal abrasion written by Wipperman and Dorsch (2013) was adopted and utilized as part of the educational intervention for this project. The guideline is evidenced-based and is in the format of an algorithm (see Appendix B). Each participant received a handout of the guideline.

A qualitative experimental design was used to examine clinicians employed in an outpatient occupational health/urgent care clinic in a small town located in southern Rhode Island. The project was designed to look at the treatment of corneal abrasion and ways to improve management of this condition as well as HCP confidence and knowledge base.

Approval for the project was obtained by the University of Alabama in Huntsville Institutional Review Board (IRB). Approval to conduct the project at the occupational health clinic was obtained from the clinic's Director of Medical Operations (DMO).

This project involved four licensed health care providers employed in an outpatient occupational health clinic, using a twenty-five minute educational session that was delivered by power point presentation. Subjects consisted of 2 medical doctors (MD), and 2 nurse

practitioners (NP) whom agreed to participate in the project. Each of the participants met the following inclusion criteria: 1) master's degree or higher level of education, and 2) responsible for diagnosis and treatment of patients in the urgent care clinic. Exclusion criteria included those HCPs who do not meet the inclusion criteria and those who do not provide hands-on care to patients.

The educational session was offered in one time slot and the entire clinic staff, regional medical director, DMO, and center operations director were all invited to attend the educational session. The office manager blocked the schedule so that all HCPs could be free to attend the educational session. Altogether, there were 3 people in attendance that consisted of one registered nurse and two study participants that included a MD and NP. The remaining two study participants were not able to attend the live educational presentation. They were given access to a voice over power point presentation to listen to at their convenience and both completed this task within one week of the live presentation. The duration of the DNP project was eleven weeks.

Data Collection

A retrospective review of the electronic health records (EHR) of all patients seen in the clinic for corneal abrasion was conducted for the months of August 2018 through 10/28/2018. A prospective review of EHR was conducted from 10/29/18 through 1/7/2019. The EHR review was done by the DNP student who was the principal investigator for this quality improvement project. The HCP patient daily schedules were reviewed searching for presenting symptoms of eye injury, pink eye, and foreign body in eye, eye pain, and eye redness that are typically noted to lead to a diagnosis of corneal abrasion. The EHR was further reviewed for diagnosis of

corneal abrasion and if discovered the office notes were further evaluated using the EHR review tool. The Electronic Health Record Chart Review Tool was used for the survey of records (see Appendix B).

EHR review was followed by the educational session. Participants were approached individually 2 weeks prior to implementation of the educational session. They were informed of the objectives of the project and were also told that they would be receiving an electronic survey questionnaire prior to the educational session (see Appendix C). The survey was emailed to each participant after obtaining written consent to participate in the project. When the educational session was completed, the principal investigator conducted a prospective review of EHR for four and a half weeks duration.

Results

Four individuals participated in this quality improvement project. The participants ranged from 40 to 52 years of age. Two of the participants were medical doctors and two were nurse practitioners. Work experience ranged from less than 5 years to greater than 20 years with seventy five percent of the participants having less than 5 years of experience (see Table 1).

The pre-intervention Staff Confidence Survey revealed that all of participants had some formal training in the management of corneal abrasion and were taught by either senior emergency department staff or ophthalmologist. Fifty percent of the participants were not trained on how to use the slit lamp and 50% were trained. Twenty-five percent felt confident with using the slit lamp, 25% not confident and 50% were a little confident. Fifty percent of respondents were unsure about what cases should be referred to the ophthalmologist. With regards to feeling confident in dealing with corneal abrasion 50% felt little confidence and were afraid they "might

miss something" and 50% stated they were not sure of what they should refer. After the educational intervention results of the Staff Confidence Survey showed that 100% of the respondents were afraid they might miss something when treating a corneal abrasion case. However, there was a 100% confidence level in knowing what to refer to the ophthalmologist which represents a 50% increase from pre-intervention status. There was a 25% decrease in confidence level with regards to the examination of a corneal abrasion case. There was also a 25% decrease in confidence levels with regards to the follow up care of corneal abrasion. All 4 participants did complete both pre and post intervention surveys.

Discussion

The purpose of this quality improvement project was to determine if an educational review of guidelines, for the treatment of patients with corneal abrasions, improved healthcare provider knowledge and outcomes. A corneal abrasion is the result of injury to the eye. According to OSHA, eye injuries account for more than $300 million per year in loss of productivity at work, medical costs, and worker compensation claims (United States Department of Labor, n.d.). This quality improvement project found that there was a 25% decrease in the use of the eye patch as a result of the educational intervention. Eye patching results in decreased oxygenation, increased moisture and increased incidence of infection and is not recommended as standard treatment for corneal abrasion (Harkins, 1996; Thiel et al., 2017; Wilson & Last, 2004). Post-intervention none of the HCPs prescribed the patch for treatment of corneal abrasion as evidence by EHR review.

All of the participants expressed little to no confidence in the use of the slit lamp. A slit lamp is available in the clinic and is not being utilized. There was a noticeable change in staff

confidence as the result of the quality improvement project. Project participants expressed increased confidence in the management of corneal abrasion as well as knowing what cases to refer to the ophthalmologist as evidenced by a 25% increase in these items on the electronic survey. This is a direct result of the power point education session. Prior to the intervention 75% of participants felt confident in dealing with a corneal abrasion case and 25% denoted little confidence. Of these, 50% were afraid they may miss something and 50% were not sure of which patient's to refer. According to the post-intervention survey results, only 25% felt they were afraid to miss something and 100% were confident in what they should refer. This is a direct result of the review of guidelines in the intervention phase of this project.

One unexpected outcome of the quality improvement project was that there was a 25% decrease in staff confidence with regards to follow up care of corneal abrasion post intervention. One reason for this finding could be that some of the participants did not realize how much they did not actually know in the pre-intervention state and were enlightened by the educational session reviewing the guidelines for treatment. Another unexpected outcome of the intervention was that there was a 25% decrease in staff confidence levels with regards to the examination of the patient with a corneal abrasion. It was expected that his would actually increase as the result of the intervention. The principal investigator surmises that the participants realized how much they did not know prior to the educational session and were possible more forthright with their post- test responses. A comparison of the results of EHR review pre and post-intervention could not be used due to insufficient data post intervention.

Some participants commented on how much they had learned from the power point presentation. Some colleagues expressed that they were not aware that the patch caused decreased oxygenation to the eye resulting in delayed healing. Two of the participants also

expressed that their knowledge was increased with respect to antibiotics used to treat certain types of patients presenting to the clinic with a corneal abrasion. The principal investigator's practice was changed as the result of the quality improvement project. The investigator was not in the habit of prescribing over the counter (OTC) pain medications for corneal abrasion prior to project implementation and finds she now recommends these medications to her patients.

Health care providers generally do not receive a lot of training on the treatment of patients with ophthalmic conditions and most clinical practices do not have clear guidelines for the management of these patients. Evidenced-based guidelines can be found and formulated from review of the literature. A review of guidelines is one way to increase HCP knowledge and confidence when caring for patients with eye conditions such as corneal abrasions.

Conclusion

In summary, clinical practice guidelines assists the HCP with making decisions about how to manage a particular clinical situation (Thyagarajan et al., 2006). Guidelines decrease the variability in treatment and enhance quality of care (Thyagarajan et al., 2006). Most patients with a corneal abrasion can be managed without the assistance of an eye specialist and most cases do not require next day follow up. This quality improvement project found that a review of clinical guidelines, based on evidence from the literature, improved healthcare provider confidence and knowledge. HCP confidence in the management of corneal abrasion improved as well as knowing when to refer a case to the ophthalmologist/eye specialist. One participant who had greater than 20 years' experience expressed much confidence in dealing with corneal abrasion when compared to others who had much less experience. One can conclude from this evidence that experience results in improved confidence and knowledge. As a result of the educational intervention, it was expected that documentation would improve and inappropriate

referrals would decrease. Unfortunately, the latter two outcomes could not be measured due to the lack of corneal abrasion cases during the post-intervention phase of the project.

Participants and colleagues expressed that the information gleaned from this quality improvement project did expand their knowledge of treating patients with corneal abrasions. For example, one colleague expressed that prior to this project, that they were unaware of the rationale for recommendations against the use of the eye patch. Another participant was not aware that fluoroquinolones are the drugs of choice when treating contact lens wearers who have a corneal abrasion. One of the concerns of the principal investigator is that there are no written guidelines in place for the treatment of corneal abrasion at the clinic. Having written guidelines available for the HCPs to reference would enhance the accuracy of diagnosis and treatment, decrease HCPs feelings of anxiety, and improve patient outcomes. The guidelines can also be made available as a pocket guide in the format of an algorithm.

Implications for Practice

A review of the literature revealed various treatments for corneal abrasion including medications utilized and guidance about when to refer to a specialist for treatment. The evidence also revealed a knowledge deficit among HCPs with regards to management of the patient with a corneal abrasion. Moving forward, the DNP quality improvement project has a significant impact on the way HCPs in the clinic manage patients with corneal abrasions. Clinical knowledge improved as well as HCP confidence. Included in the teaching session was information regarding patient self-care. Because of the intervention, patient's will have a better understanding about self-treatment and preventive measures which allows them to be vested partners in their healthcare. One recommendation is that periodic review of the guidelines in a formal session should occur at least every six months to help maintain total quality improvement

in patient care. As part of the orientation process for new hires, formal review of the clinical guidelines should be undertaken.

According to the pre and post intervention surveys, further teaching needs to be done with regards to the use of the slit lamp for evaluation of the patient with a corneal abrasion. The HCPs also expressed interest in learning the slit lamp. The slit lamp would enhance HCP knowledge and confidence. It will also improve the diagnosis and management of corneal abrasion because even small abrasions can be missed by Wood's light or direct ophthalmoscope visualization. Buy in from key stakeholders and upper level management would obviously be a key component.

The medical director, who was the clinical mentor for this project, is planning to submit this project to her superiors as part of her requirements to embark on a quality improvement project biannually at the clinic worksite. The DNP Quality Improvement project can be replicated to other clinical sites within the organization. The organization has clinical sites in most, if not all of the 50 states in the United States. The quality improvement project may result in cost savings for the company, the American industrial workforce as a whole, and could also reduce healthcare dollars spent on workers compensation claims related to eye injuries.

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The authors wish to express gratitude to Concentra for granting the use of the facility for this project to take place. The authors would also like to thank Dr. Richard Amegadzie and Dr. Latha Brubaker for their cooperation and support of this clinical project. Additionally we would like to thank The University of Alabama in Huntsville IRB committee and it's Chair Dr. Bruce Stallsmith for granting us permission to embark on this quality improvement project.

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Table 1

Participants Demographics

	Age	MD	NP	# Years	Race	Sex
Participant 1	40	✓		<5	White	Male
Participant 2	44		✓	<5	White	Male
Participant 3	46		✓	<5	White	Male
Participant 4	52	✓		>20	Philippine	Female

Note. Age is noted in years; # Years = years in practice; MD = medical doctor; NP = Nurse Practitioner

Seventy-five percent of the participants were white and 25% Philippine; 75% had less than 5 years of clinical experience. There were 2 nurse practitioners and 2 medical doctors. The number of males participating in this project outnumbered the female.

Table 2

Confidence rating for certain aspects of corneal abrasion case

	History Taking		The Management		Examination		Follow up	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**
Little Confident	0%	0%	25%	0%	25%	50%	25%	50%
Confident	100%	100%	75%	100%	75%	50%	75%	50%
Not Confident	0%	0%	0%	0%	0%	0%	0%	0%

The post survey results showed a 25% increase in confidence with the management of corneal abrasion yielding a total confidence rate of 100%. Confidence in follow up was decreased by 25 percent post-intervention.

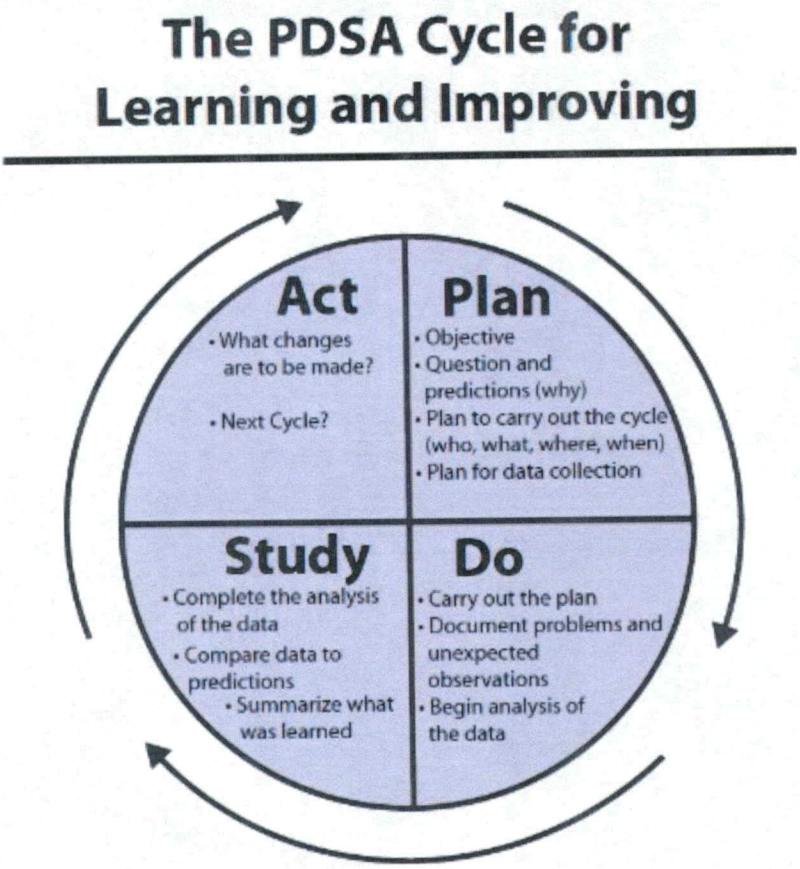


Figure1 Edward Demig's Plan-Do-Study-Act Model for Improvement

(Pinterest, n.d.)

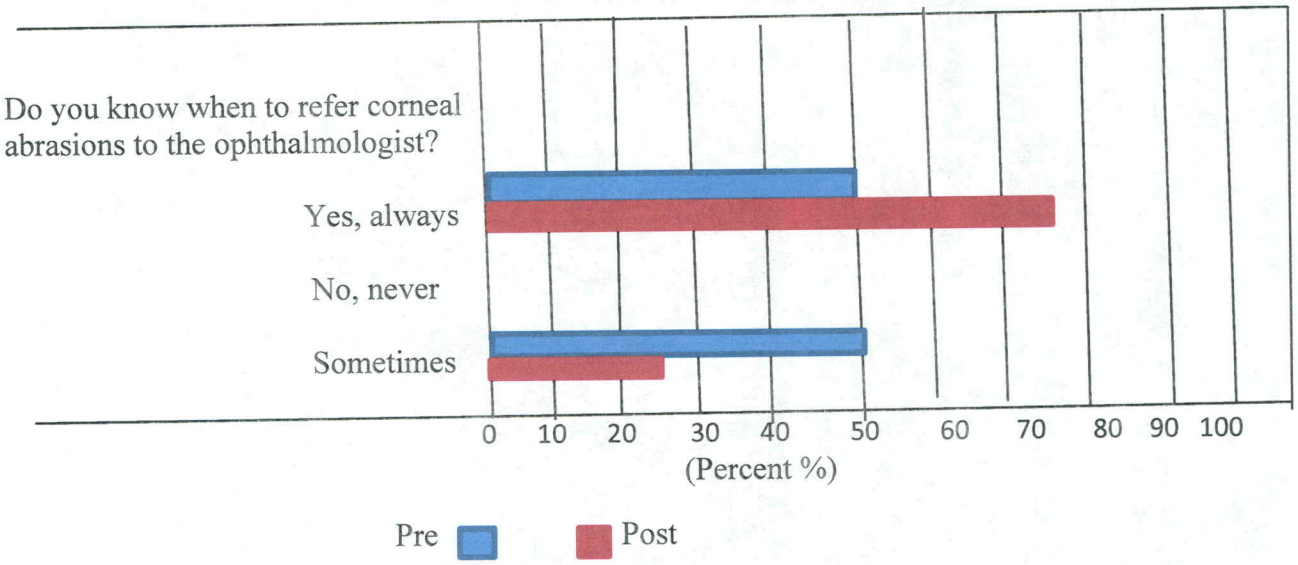


Figure 2. Comparison of responses to pre and post intervention survey question # 12.

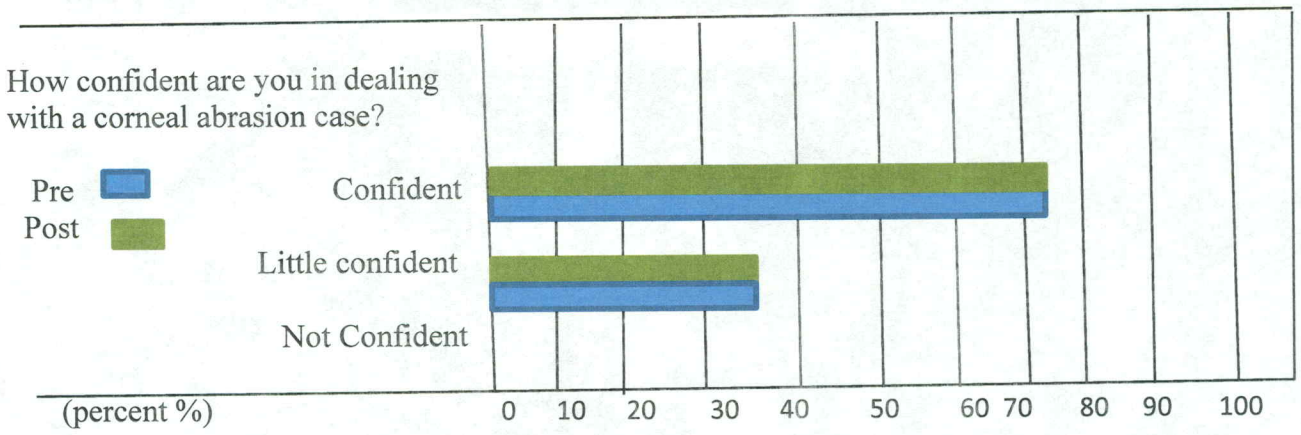


Figure 3. Comparison of responses to pre and post intervention survey question # 6.

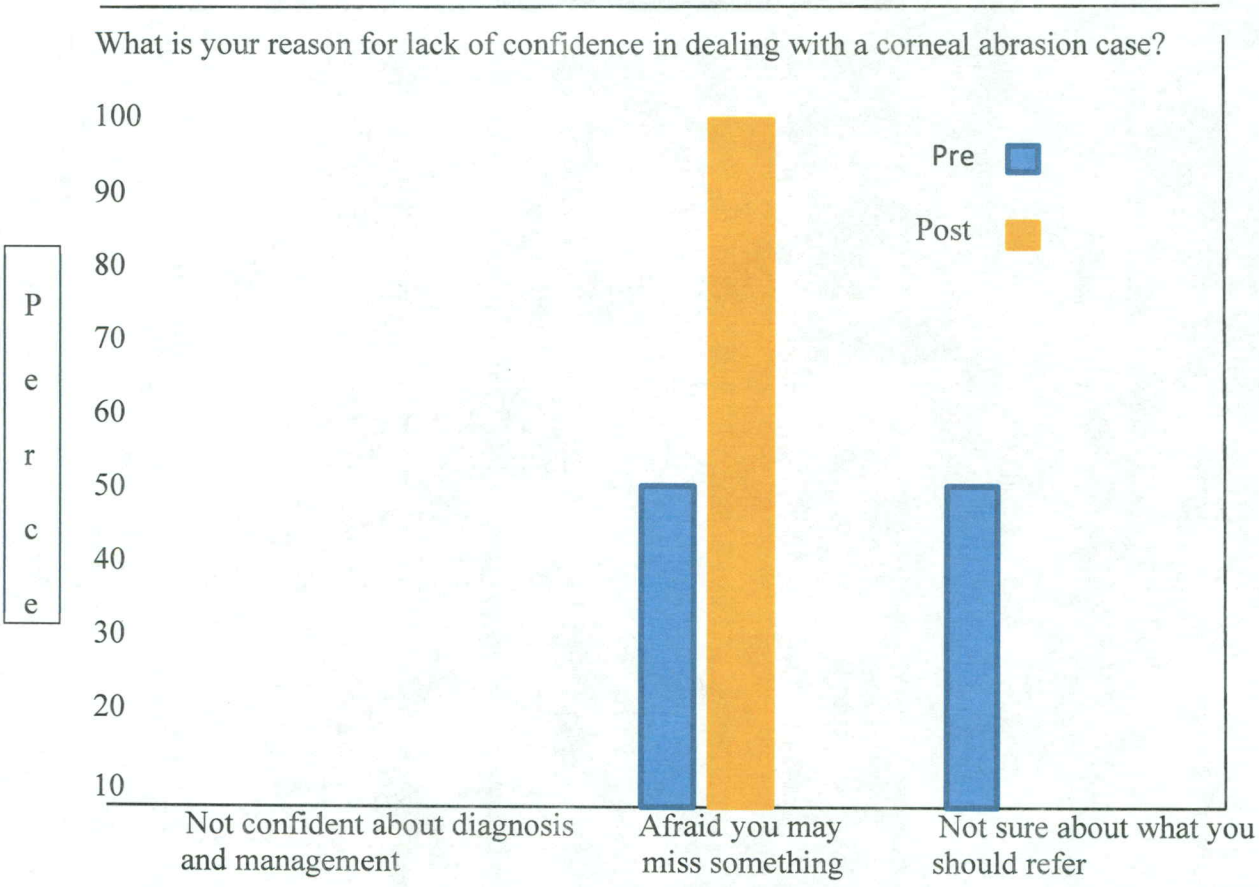


Figure 4. Comparison of responses to pre and post intervention survey question #7

Appendix A

URGENT CARE STAFF CONFIDENCE SURVEY QUESTIONS

Please tick the relevant boxes

1. Have you had formal training and instruction in the management of corneal abrasion in urgent care?
a. Some []
b. None []
c. Enough for me []

2. If your answer to 1 was a or c, who taught you?
a. Senior ED/Urgent care staff []
b. Ophthalmologist []
c. NP []
d. Other []

3. Have you been taught how to use the slit lamp?

a. Yes []
b. No []

4. How confident do you feel in the use of the slit lamp?
a. Confident []
b. A little confident []
c. Not confident []

5. How many corneal abrasions have you seen in the last 3 months?

a. <5
b. 5–10 []
c. 11–20 []
d. >20 []

6. How confident are you with dealing with a corneal abrasion case?
a. Confident []
b. A little confident []
c. Not confident []

7. If your answer to question 6 was b or c, what was the reason? (You may give more than one answer.)
a. Not confident about diagnosis and management. []
b. Afraid you may miss something important. []
c. Not sure about what you should refer. []

8. Please rate your confidence for the following aspects of a corneal abrasion case
The history taking: a little confident []
confident [] not confident []
The examination: a little confident []
confident [] not confident []

The management: a little confident []
confident [] not confident []

The follow up: a little confident []
confident [] not confident []

9. Do you refer corneal abrasions to the Ophthalmologist/eye clinic?
a. Yes, always []
b. No, never []
c. Sometimes []

10. Do you speak to the ophthalmologist on-call about corneal abrasion?
a. Yes, always []
b. No, never []
c. Sometimes []
d. Yes, for specific reasons []

If your answer to question 10 was d. then please tell us your specific reasons for referral:

11. Do you know when to refer abrasions to the ophthalmologist?
a. Yes, always []
b. No, never []
c. Sometimes []

12. Which of the following describes your credentials?

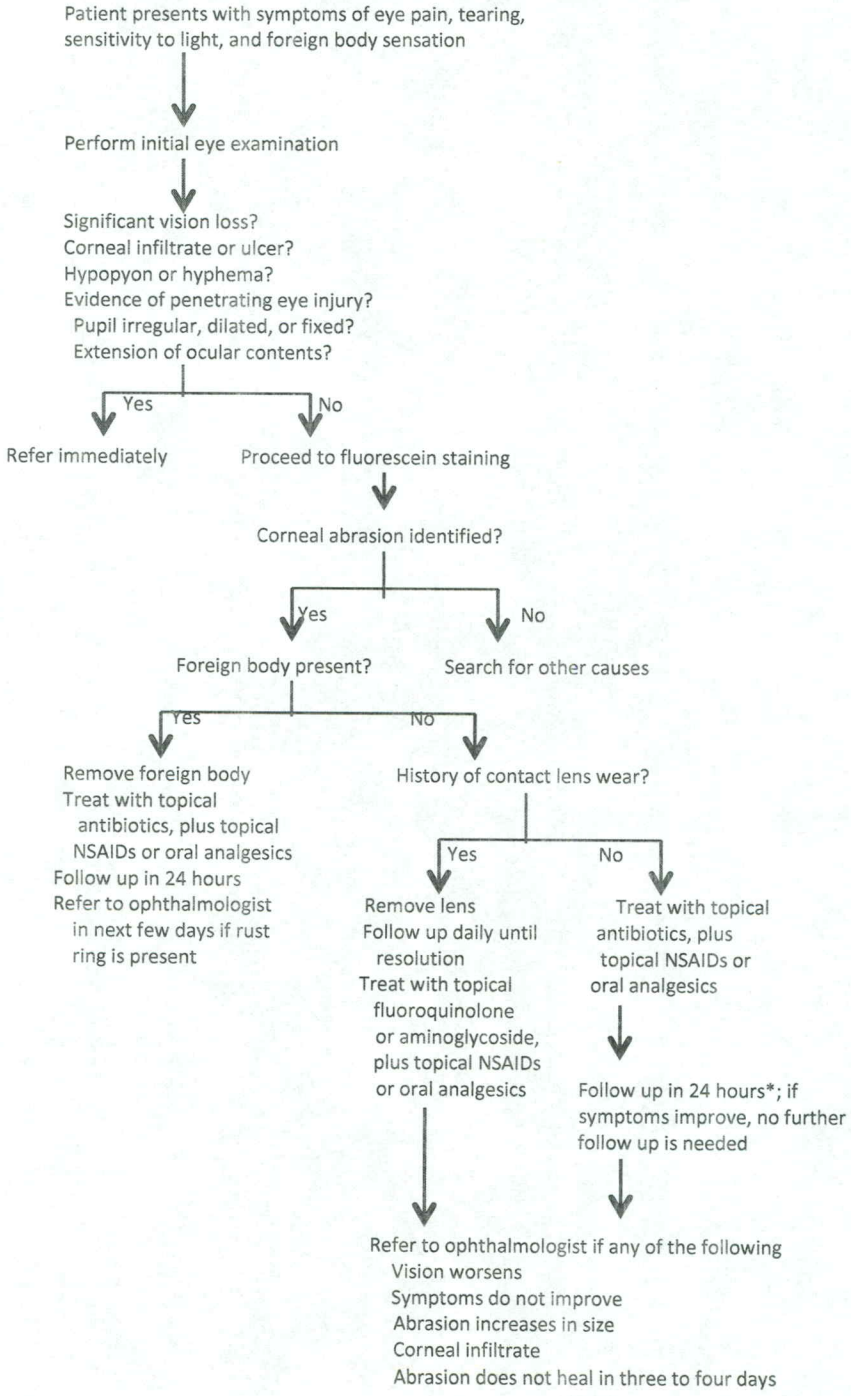
MD []
NP []
PA []

13. How many years have you been practicing?
<5 []
6-10 []
11-15 []
16-20 []
>20 []

(Thyagarajan, Sharma, Austin, Lasoye, & Hunter, 2006)

Appendix B

Evaluation and Management of Corneal Abrasions



*Follow up may not be necessary for patients with small abrasions (4mm or less), normal vision, and symptoms improvement. Exception: All Worker compensation cases must be followed up in in 1-2 days.
(Algorithm for the evaluation and management of corneal abrasions. (NSAIDs = nonsteroidal anti-inflammatory drugs.) (Wipperman & Dorsch, 2013).

Appendix C

Enhancing Treatment of Corneal Abrasion through Provider Education

Electronic Health Record Review Tool (check the appropriate box when indicated)

1. Is the visual acuity assessment documented in the patient's EHR? Yes ☐ No ☐

2. What medications were prescribed, if any (including Rx and OTC medications)?

_____

3. Is the patient being referred to a specialist (ophthalmologist/optometrist)? Yes ☐ No ☐

4. Was an eye patch applied at the time of visit? Yes ☐ No ☐

5. Was the patient given a follow up appointment in the clinic? Yes ☐ No ☐

6. Is this a workers' compensation case ☐ or urgent care case☐?

(Pothier, 2018)