Organization: Sinai Hospital of Baltimore, Inc.

Solution Title: Prevention of perioperative corneal abrasions

Program/Project Description, Including Goals:

Our project sought to find solutions to the problem of perioperative corneal abrasions at Sinai Hospital, the incidence of which seemed subjectively to be increasing yearly over the prior several years. A multidisciplinary team was formed to determine the actual number of corneal abrasions requiring ophthalmology consultation during the 4 year period prior to launching the project, identify patients at risk for perioperative corneal abrasions, and design and implement a new anesthesia department protocol aimed at both reducing the number of corneal abrasions in patients rendered unconscious during the intraoperative/perioperative period and streamlining the management of these abrasions if and when they occur.

In addition, we were interested in the monetary cost of the current practice and determining if cost could be reduced through a new protocol.

The primary goals of the project were to:
- Increase patient safety and satisfaction with regard to perioperative eye pathology.
- Decrease cost to hospital and patients.
- Decrease PACU waiting time for consultation

Processes Implemented:

A comprehensive literature review was performed, which identified 6 relevant studies published between 1977 and the present. The results of these studies indicated that non-petroleum-based eye lubrication resulted in less post-operative blurred vision in patients and subsequently seemed to reduce the incidence of patients reaching for and rubbing their eyes in the immediate post-anesthesia period. One of the more recent studies also indicated that thicker methylcellulose-based “gel” drops remained effective on the ocular surface for a longer period of time than regular lubricating drops. Another recent study concluded that Tegaderm’s ability to adhere to the entire eyelid and periocular area and produce a sealed, moist ocular environment made it a superior choice over conventional plastic or paper tape for the purpose of operative eyelid closure. The ophthalmology department’s consult logs going back 4 years were also analyzed to determine the number of consults for post-operative eye pain during that time period. The number of consults during the 6-month period following implementation of the protocol was also analyzed. Observations of pre-policy methods of eye protection were performed. Pre-protocol, the typical means of eye protection was petroleum-based LacriLube ointment with a small amount of paper or plastic tape. The method used varied widely depending on provider. Following this, a panel consisting of representatives from the Departments of Ophthalmology, Anesthesia, Surgery and Risk Management was convened to discuss the results of the literature review and Operating Room observations and design a new policy to be enacted by the Department of Anesthesia for all surgeries performed under general anesthesia at Sinai Hospital. The panel determined that a combination of TheraTears liquid gel drops and Tegaderm (both of which were already available in the hospital) would be the method of choice. The protocol was
rolled out after presentation to the anesthesia department with feedback encouraged both at that time and as the project went on.

**Solution identified:**

New anesthesia department policy for addressing the incidence of corneal abrasions and for assessing and treating patients with postoperative ocular pain:

**Preventing Corneal Abrasions**
- Pre-operative screening for risk factors for corneal abrasion (dry eye syndrome, use of artificial tears, history of recurrent erosions, history of Graves disease or history of Sjogren Syndrome)
- Placement of TheraTears liquid gel drops for all patients undergoing general anesthesia
- Taping of eyes with Tegaderm immediately prior to endotracheal intubation
- In addition to TheraTears and Tegaderm, usage of eye shield for prone procedure or for procedures with high risk of eye swelling (steep Trendelenburg or high risk of large fluid shifts)
- Placement of pulse oximeter on non-dominant hand if possible
- Complete documentation of methods of eye protection used in patient’s medical record
- Documentation in anesthesia record, progress notes and Cerner if ophthalmology consult called

**Treating patients with postoperative ocular pain**
- Prompt evaluation by anesthesia provider
- Immediate consult by ophthalmology for complaints of visual loss or for pediatric patients
- Placement of tetracaine drop by anesthesia provider for diagnostic purposes. If pain is relieved, may assume abrasion/exposure is present. Anesthesia provider orders Erythromycin ointment QID x 24 hours. If pain still present after 24 hours, patient instructed to call Krieger Eye Institute for same-day appointment.
Measurable Outcomes:

Number of consults:

Cost of supplies pre-policy
- LacriLube tube: $8.54 per surgical case
- Tape: ~$0.01 per surgical case ($0.27/roll)

Cost of supplies after new policy implementation
- TheraTears Gel vial: $0.28 per surgical case ($7.82/box, 28 vials/box)
- Tegaderm: $0.21 each, 2 needed per surgery = $0.42 per surgical case
- $8.55 - $0.70 per surgery = $7.85 savings per surgical case
- ~20,000 cases per year = ~$150,000+ savings per year (on supplies alone).

Cost per consult
- $285 professional charge + ~$250-500 facility charge

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<thead>
<tr>
<th>Academic Year</th>
<th>Cost of Consults (Assume $500/consult)</th>
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<tr>
<td>2011-2012</td>
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<td>2012-2013</td>
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<td>2013-2014</td>
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<td>2014-2015</td>
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<tr>
<td>7/2015-9/2015 (Pre-policy; extrapolated to 12 months)</td>
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<tr>
<td>10/2015-4/2016 (Post-policy; extrapolated to 12 months)</td>
<td>$2,000</td>
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Conclusions:

This project achieved its primary goals and has had a considerable impact on patient safety by reducing the occurrence of postoperative corneal abrasions and exposure keratopathy to near zero since the introduction of the new protocol for eye protection during surgical procedures. The process for addressing abrasions if and when they occur was also successfully streamlined. Furthermore, the lower incidence of abrasions and the change in supplies used for eye protection leads to a substantial cost savings of over $150,000 per year.

Sustainability:

Observation of practices and reinforcement of the project’s goals and importance have continued. As the hospital’s anesthesia documentation transitions from paper to electronic, documentation specific to this project (whether gel tears + tegaderm have been applied to the patient’s eyes and what time this took place) has been included in the new flowsheet. Sinai Hospital’s anesthesia department also informed the leadership of North American Partners in Anesthesia (NAPA), one of the largest management companies for anesthesia providers in the United States, of the great success of our protocol. NAPA informed their nationwide providers in their newsletter that our protocol should now be preferred by all their providers. Ongoing goals of the project include analysis of HCHAPS and patient quality scores to identify if patient satisfaction has increased in surgical patients, continued education for anesthesia providers and inclusion of a module on eye protection for new providers during their orientation, and comprehensive analysis aimed at identifying why the incidence of postoperative corneal abrasions increased dramatically from 2011 to 2015.

Role of Collaboration and Leadership

In 2013, the Graduate Medical Education Committee at Sinai Hospital implemented a program to train and support resident lead Quality Improvement projects. Residents, the program directors and a faculty mentor selected a quality/patient safety issue in their area and recruited a team of stakeholders to address the issue. We provided workshop on the Plan-Act-Study-Do Cycle and Root Cause Analysis, a statistician consultant and an IRB mentor.

Project Team
Kenneth Levin, MD, Ophthalmology, PGY 4, Resident Team Leader
Neeraj Verma, MD (Anesthesia) and Gloria Lay, RN, BSN (Risk Management), Team Members
Laura Green, MD and Theresa Kramer, MD, MBA, Faculty Mentors

Innovation

This QI project is a component of Sinai Hospital’s Graduate Medical Education Committee’s Quality Improvement and Patient Safety Program. The program is in collaboration with Risk Management and the LifeBridge Chief Quality Officer and is intended to promote a Culture of Safety throughout the hospital and residency training programs. The QI/PI Program includes the following components:
1. Resident QI Project
Residents formed multidisciplinary and intra-departmental teams to address quality improvement, patient safety and patient satisfaction issues. These teams used the Plan-Do-Study-Act model to analyze the issue, develop interventions and measure outcomes.

2. Resident Patient Safety Council
A Resident Patient Safety Council was established in July 2014, with representation from all residency programs, to engage residents across programs in order to decrease/minimize adverse events by facilitating communication, ensuring smart work flow and measuring outcomes to determine best practices. The Council meets six times a year in conjunction with the Performance Management Committee. The Chief Quality Officer leads the Resident Patient Safety Council.

One of the most positive features of this specific project and all resident-lead QI projects is the synergy that occurs when a variety of health care providers come together to study a quality/patient safety issue, identify solutions and analyze outcomes. Much of our response to quality/patient safety issues are siloed with team members from the same department and very little multidisciplinary involvement. Working together to solve a problem strengthens a Culture of Safety and respect for the contribution of each category of health care providers.

Patient and Family Integration

At Sinai Hospital patient and family education is given at the point of entrance into the system, during the patient’s stay and continued post discharge. The information given is appropriate for the patient’s age, literacy level, education, and language skills. Patient materials are available electronic as well as in the form of a packet. With shorter lengths of stay and limited time for teaching, print and audiovisual materials are important adjuncts for any discharge teaching plan. They are, however, just adjuncts and will not replace individualized instruction at the point of service. Printed materials are useful for reinforcing information provided to patients while in the hospital and or outpatient clinic and also serve as a ready resource. Printed material is an important reminder of key points after patients return home. Family members are the vital links in the transition from hospital to home care. Families must be included in the discussions and demonstrations. Family is any person who plays an important role in the patient’s life. At Sinai Hospital of Baltimore every effort is made to ensure that learning takes place in incremental steps and that patients are not overwhelmed with too much information at one time.

The First Step in patient and family integration is the review of the Admission Assessment for learning needs. Then the health care team members meet with the patient to determine the specific needs for that patient and family. Individualized teaching is based on the patient’s assessment, readiness to learn, and patient and family needs. Patient and family integration is a team effort. Different members of the interdisciplinary health care team do the teaching, depending on what skills need to be learned. Patient education is safer with every experience at Sinai Hospital of Baltimore. The Safe and Effective use of medications is standardized across the
continuum of care. The integration includes a checklist which is electronic and can be printed on demand for the health care team. Teaching and Learning are mirror images of each other. The integration of patient and family education are inseparable. Effective communication with the patient and family has created the opportunity for patients to adhere to their treatment plan, with improved and sustained patient outcomes.

Related Tools and Resources


Contact Persons:

Tina Gionet, RN, BSN, MS, Patient Safety Officer
Sinai Hospital of Baltimore, Inc.
tgionet@lifebridgehealth.org
410-601-5793

Diane Maloney-Krichmar, Ph.D., Director Medical Education
Sinai Hospital of Baltimore, Inc.
dkrichma@lifebridgehealth.org
410-601-9720