



Best Practice

Evidence Based Practice Information Sheets for Health Professionals

Eye Care for Intensive Care Patients

Information Source

This Best Practice Information Sheet is based upon a Systematic Review¹ of the literature conducted under the supervision of The Joanna Briggs Institute for Evidence Based Nursing and Midwifery. The primary references on which this information is based are available in the systematic review report available from The Joanna Briggs Institute and from the web site: www.joannabriggs.edu.au

Introduction

Eye care forms part of the care provided to all patients in acute care environments with impaired or compromised protective mechanisms. However, some hospital populations are at greater risk than others for developing complications during their stay. Unconscious, sedated or paralysed patients represent one such high risk group who are dependent on eye care to maintain the integrity of the

This Information Sheet Covers the Following Concepts:

- Eye Problems in ICU
- Loss of Protective Mechanisms
- Potential Problems
- Review Findings

ocular surface. This systematic review was conducted to determine the most effective method of providing eye care to this patient group.

Eye Problems in ICU

Eye care is recognised as a basic nursing care procedure essential for critically ill patients to prevent complications such as eye infection or injury. It is one of the most important, yet simple to perform, nursing interventions required when caring for

Levels of Evidence²

All studies were categorised according to the strength of the evidence based on the following revised classification system.²

Level I Evidence obtained from a systematic review of all relevant randomised controlled trials.

Level II Evidence obtained from at least one properly designed randomised controlled trial.

Level III.1 Evidence obtained from well designed pseudo-randomised controlled trials (alternate allocation or some other method).

Level III.2 Evidence obtained from comparative studies with concurrent controls and allocation not randomised (cohort studies), case-control studies or interrupted time series with a control group.

Level III.3 Evidence obtained from comparative studies with historical control, two or more single arm studies, or interrupted time series without a parallel control group.

Level IV Evidence obtained from case series, either post-test or pre-test and post-test.

ventilated patients. The incidence of eye disorders in the intensive care population is difficult to quantify. This is due to factors such as poor documentation and that compared to the nursing care required to stabilise vital body systems, eye care is often seen as a relatively minor problem.

However, the unconscious, sedated or paralysed patient is exposed to a variety of potentially harmful eye insults. Eye complications can range from mild conjunctival infection to serious corneal injury and corneal ulceration. Permanent ocular damage may result from ulceration, perforation, vascularisation and scarring of the cornea.

Loss of Protective Mechanisms

People admitted to intensive care units often require mechanical ventilation and the majority of these patients are sedated to ensure comfort and to facilitate treatment. Some patients are also paralysed with muscle relaxants to optimise their care. Other patients may be unconscious as a result of an underlying medical condition such as a head injury. Normal lid closure is maintained during sleep by the tonic contraction of the orbicularis oculi muscle. The use of muscle relaxants reduces the tonic contraction of this muscle and results in eye closure only with a passive force. Additionally, there may be a lack of random eye movements and a loss of the blink reflex with the use of sedation. These factors interfere with tear film coverage of the eye. Inadequate eyelid closure permits an increase in tear film evaporation. As a result patients become susceptible to desiccation (or

drying) of the eye. This can be exacerbated by a decrease in secretions caused by medications such as: atropine, antihistamines, phenothiazines, disopyramide and tricyclic antidepressants. These factors seriously impair corneal and conjunctival surface defences.

Potential Problems for ICU Patients

Exposure and drying of the eye can result in superficial keratopathy, which is a non-inflammatory disease of the cornea. This results in a compromise to the integrity of the epithelial surface of the cornea. The resultant corneal exposure can lead to ulceration, perforation and scarring, which though usually self-limiting, may cause permanent damage. Superficial corneal abrasions are a more common result of eye exposure.

Another potential problem is keratitis which refers to any inflammation of the cornea, and in particular relates to infection. Bacterial or exposure keratitis is considered a dire complication associated with corneal exposure and a compromise in the normal tear film. Inflammation of the conjunctiva, termed conjunctivitis, is also a risk and is caused by bacterial or viral infection, allergy or environmental factors.

Potential predisposing factors for infection in the eyes of a ventilated

patient include, poor eye care technique, the use of contaminated eye care materials and the presence of pathogenic organisms, particularly from the patient's respiratory tract.

Conjunctival chemosis (oedema), otherwise known as 'ventilator eye' is viewed as the result of the adverse physiological effects of ventilatory support and the drugs used to facilitate artificial respiratory support. These can generate an acute increase in intraocular pressure, which promotes subconjunctival haemorrhage. Intermittent positive pressure ventilation (IPPV) encourages body-fluid retention and venous stasis. Fluid imbalances and increased permeability, which are common in the critically ill person, also promote conjunctival oedema. Ocular problems associated with ventilation are thought to occur with high intrathoracic pressure and in particular, use of positive end expiratory pressure (PEEP) of 5cm H₂O and above.

Exacerbation of conjunctival oedema has been said to occur if the endotracheal tube tape is secured too tightly. Constrictive 'securing tapes' can compromise venous return from the head, leading to venous congestion, and can potentially increase intraocular pressure. Conjunctival oedema may lead to inadequate eyelid closure, and if the conjunctiva prolapses beyond the eyelid, it increases corneal drying and defective epithelial repair.

Findings of the Review

Whilst eye care is perceived as a simple procedure, it is often applied with considerable variation from one institution to another. Various ocular surface maintenance measures are currently in use ranging from simple cleaning of the lids to suturing the lids to achieve adequate eye closure. Eye care interventions have been grouped into four main categories; eye hygiene regimes, prevention of dry eyes, eyelid closure, and programs of eye care.

The literature search identified six clinical trials evaluating the effectiveness of eye care interventions. These studies consisted of 3 randomised controlled trials (RCTs), a controlled trial, an uncontrolled trial and a before and after study. It should be noted that these 3 RCTs appear in more than one category as each study evaluated a range of interventions.

1. Eye Hygiene Regimes

There were a variety of methods used to cleanse including:

- Sterile packs containing a gallipot and cotton wool, with a solution of sterile water
- Normal saline eye toilet
- Gauze soaked in normal saline or sterile water

Despite many suggestions in the literature regarding hygiene regimes or regular cleansing of the eye, no research was identified evaluating this approach to eye care.

2. Prevention of Dry Eyes

A large number of different approaches have been utilised to maintain the tear film and facilitate adequate corneal wetting to prevent drying of the ocular surface and include:

- Polyethylene moisture chambers (Clingwrap, Gladwrap, Cellophane) films/covers
- Methylcellulose drops
- Methylcellulose ointment (Lacrilube)
- Lubricants in general
- Polyacrylamide gel (Geliperma)
- Paraffin gauze (Jelonet)
- Hypromellose drops (artificial tears)
- Lubricating prophylactic antibiotics

Two RCTs were identified that evaluated methods to prevent the drying of the ocular surface. One RCT investigated the effectiveness of eye drops, the second, eye ointments. The

effectiveness of these two interventions was measured in terms of their ability to prevent corneal abrasions.

a. Eye drops

A single RCT investigated the effectiveness of regular eye instillations of methylcellulose lubricating drops (Methopt Forte) compared to the application of polyethylene covers (Gladwrap) over the eyes. This study found that the polyethylene film group had significantly fewer corneal abrasions (1 person out of 30 in the study group) than did the methylcellulose lubricating drops group (8 people out of 30).

b. Eye ointments

Two randomised controlled trials examined the instillation of ointments for the prevention of corneal abrasions. The first RCT examined the effectiveness of applying artificial tear ointment (Duratears) versus passive eyelid closure. Passive eyelid closure in this trial consisted of the nurse physically closing the eyelids. This study found that fewer corneal abrasions occurred in the artificial tear ointment group (2 people out of 25) compared to the passive eyelid closure group (9 people out of 25).

Findings of the Review

The second RCT examined the effectiveness of 2 hourly hypromellose (Lacrilube) ointment versus polyethylene covers (Gladwrap). The findings of this study suggest there was no significant difference on corneal abrasions between the Lacrilube group (4 people out of 60) compared to the Gladwrap group (0 people out of 50).

c. Polyethylene Covers (Gladwrap)

Two RCTs evaluated the effectiveness of placing polyethylene film (Gladwrap) over the eyes as a measure to prevent dry eyes. In both trials, the polyethylene moisture chambers were compared with eye instillation products (methylcellulose lubricating drops in one RCT and Lacrilube ointments in the other). The findings of these RCTs were pooled in a meta-analysis to compare polyethylene covers to eye instillations of either drops or ointments. The meta-analysis demonstrated a significant difference in favour of polyethylene covers in reducing corneal abrasions compared to eye instillations.

3. Eyelid Closure

A vast array of approaches have been used to ensure the eyelid remains closed, and included:

- Adhesive tape
- Gauze
- Saline soaked gauze

- Paraffin gauze (Jelonet)
- Eye pads/patches
- Eye shields
- Polyacrylamide gel (Geliperm)
- Frost sutures (lower lid traction sutures)
- Temporary tarsorrhaphy (lateral or medial bar or Fuch's sutures)

Passive closure of the eyelid by the nurses (as has previously been discussed) was significantly less effective at preventing corneal abrasions than artificial tear ointment (Duratears). No other studies were identified. So while many other interventions such as pads and patches, gels, suturing and tapes are commonly recommended in the literature, none have been subject to any evaluation.

4. Programs of Eye Care

The literature suggests that there have been some attempts to standardise eye care in intensive care units through adoption of the following:

- Education of staff
- Utilisation and implementation of eye care algorithms
- Development of general guidelines for eye care

Programs of eye care have been proposed in the literature, however none have been evaluated by RCT.

Summary of Major Findings

The major finding of this systematic review was that there has been little evaluation of eye care interventions in the intensive care setting. Based on limited information it would appear that polyethylene covers are more effective than eye drops or ointment. However, both eye drops and ointment are better than no eye installations.

While oedema and infection of the eye is often cited as a problem for this population there has been little evaluation of preventative strategies. It would appear that of the many interventions and products used or recommended in the literature, few have been subject to evaluation.

Based on these findings, it is suggested that there is an urgent need for further investigation into all aspects of eye care for intensive care patients.

The Incidence of Eye Problems

Another very important finding of this systematic review is that corneal abrasions do occur in the intensive care population. The findings of randomised controlled trials (RCT) suggest corneal abrasions can occur within a relatively short period of time, ranging from 48 hours to 1 week.

Based on three RCTs the incidence of corneal abrasions ranged from 3.33% to 22% of the

intensive care population. During a prospective analysis of 50 randomly selected intensive care patients, one study found corneal abrasions in 40% of patients. Another study suggested that up to 60% of ICU patients who receive sedation for longer than 48 hours may get corneal abrasions. Another study reported 42% of patients were detected with some degree of corneal abrasion, and that the majority of these were detected in the first week of admission.

These findings indicate that the risk of corneal abrasion is a significant problem for intensive care patients. The findings also clearly highlight the importance of eye care for this group of people.

In addition to corneal abrasions, conjunctival oedema and infection have commonly been cited as adverse events. The search of the literature failed to identify any studies investigating interventions to prevent these two outcomes. The lack of research in this area is of great concern and makes determination of the scope of the problem difficult.

Impact of Eye Care on the Family

One paper noted that placing Gladwrap over the eyes of a person in the intensive care unit had a significant impact on their appearance. Anecdotal information suggests that eye care may have a significant impact on relatives. However, there appears to have been no investigation of this issue.



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Recommendations

Based on the findings of three small RCTs, the following recommendations are proposed:

- Eye care should be part of the care provided to all people during their admission to intensive care units. (Level II)
- Ointments and drops are more effective at reducing the incidence of corneal abrasions than no eye instillations. (Level II)
- Polyethylene covers (Gladwrap) are more effective at reducing the incidence of corneal abrasions than ointments and drops. (Level II)

As these recommendations are based on limited information this is an area in urgent need of further research.

References

1. Joyce, N, 2002, Eye care for intensive care patients, A Systematic Review No. 21 The Joanna Briggs Institute for Evidence Based Nursing and Midwifery, Adelaide.
2. NHMRC, 1999, A guide to the development, implementation and evaluation of clinical practice guidelines, Canberra, NHMRC.

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