



Prevention of exposure keratitis in Ontario intensive care units: a survey study

Amy Basiliou, BSc · Mary Feng, MD · Leah Nicoletti, MD · Rookaya Mather, MD

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To the Editor,

Potentially vision-threatening ocular surface disorders have been found in over 50% of intensive care unit (ICU) patients. Incomplete eyelid closure poses a high risk.^{1,2} Complications can result in loss of vision and even complete loss of the eye. Ocular complications can significantly affect patients long after discharge from hospital. Appropriate eye care protocols in the ICU can prevent or reduce the severity of ocular complications.^{3,4} Nevertheless, in a study of ICUs in the UK, less than half of surveyed ICUs employed an eye care protocol.⁵ In our study, we characterize ocular protection protocols in Ontario ICUs.

We conducted a survey of Ontario ICUs in May 2019. Intensive care units providing care to ventilated adult patients within Ontario were included. The survey was administered by a telephone interview with each unit's charge nurse. Charge nurses were asked about eye care

practices in their ICU with a questionnaire adapted from a previous study that investigated eye care practices in ICUs in the UK.⁵ At present, there are no standardized or validated questionnaires available. Intensive care unit charge nurses were interviewed about the methods and scheduling of ocular protection measures, as well as ocular complications occurring in the unit.

A total of 24 ICUs were contacted. If the charge nurse was not available for interview, a second call was scheduled. Of the 24 ICUs, three were excluded because care was not provided for ventilated patients. Of 21 eligible ICUs, 18 (86%) participated. These included 14 general ICUs, three neurologic observation ICUs, and one neurosurgical ICU located in Toronto, Ottawa, Hamilton, London, and Kingston. Responses are summarized in [Table](#).

Ten (56%) ICUs reported assessing eyelid closure in all patients; however, only seven (39%) stated that eyelid closure assessment is part of their admission process. Five (28%) ICUs had an eye care protocol for unconscious patients, while 12 (72%) had a protocol for any patients unable to close their eyes. Five (28%) units did not have any standardized protocols for ocular protection.

The elements included in ocular protection protocols were variable between ICUs. Seventeen (94%) protocols included ointment, 16 (89%) included lubricant artificial tears, and 15 (83%) included both. Eleven (61%) units reported the administration of ointment on an as-needed basis as part of their protocol and seven (39%) reported application of ointment at scheduled intervals (every four hours, two times per day, three times per day, or every night). Two units supplemented scheduled ointment administration with additional doses as needed. Fourteen (78%) ICUs administered artificial tears as needed and four

A. Basiliou, BSc (✉)
Schulich School of Medicine and Dentistry, Western University,
London, ON, Canada
e-mail: amybasiliou@gmail.com

M. Feng, MD · R. Mather, MD
Department of Ophthalmology, Schulich School of Medicine
and Dentistry, Western University, London, ON, Canada

L. Nicoletti, MD
Division of Critical Care Medicine, Department of Medicine,
Schulich School of Medicine and Dentistry, Western University,
London, ON, Canada

Table Intensive care units' responses to telephone questionnaire

1. Do you assess eyelid closure in every patient?	Yes: 10/18 (56%); No: 8/18 (44%)
2. Is eyelid closure assessment part of your admission process?	Yes: 7/18 (39%); No: 11/18 (61%)
3. Do you have an eye care protocol or policy for unconscious patients?	Yes: 5/18 (28%); No: 13/18 (72%)
4. Do you have an eye care protocol or policy for patients who are unable to close their eyes?	Yes: 13/18 (72%); No: 5/18 (28%)
5. Do you have an algorithmic approach?	Yes: 5/18 (28%); No: 13/18 (72%)
6. What is your protocol?	Ointment: 17/18 (94%) <ul style="list-style-type: none"> • <i>Prn</i>: 11/18 (61%) • Scheduled: 7/18 (39%) Artificial tears: 16/18 (89%) <ul style="list-style-type: none"> • <i>Prn</i>: 14/18 (78%) • Scheduled: 4/18 (22%) Other <ul style="list-style-type: none"> • Eye cover: 10/18 (56%) (Patch, gauze, cotton eye shield, saline-soaked eye pads, wet compresses, wet face cloth) <ul style="list-style-type: none"> • Saline wash: 3/18 (17%) • Tape: 2/18 (11%)
7. List all the methods of ocular surface protection you use in the ICU	Tears: 18/18 (100%) Ointment: 17/18 (94%) Eye cover: 14/18 (78%) Saline: 2/18 (11%) Suture: 1/18 (6%) Face cloth: 1/18 (6%)
8. At what stage would you consult an ophthalmologist?	Infection/fungemia: 9/18 (50%) Redness: 8/18 (44%) Any eye problems: 5/18 (28%) Patient complaints: 4/18 (22%) Lagophthalmos: 4/18 (22%) Eye Trauma/Injury: 4/18 (22%) Corneal pathology: 3/18 (17%) Reduced visual acuity: 3/18 (17%) Discharge: 2/18 (11%) Abnormal pupillary response: 2/18 (11%) Exophthalmos: 2/18 (11%) Intractable eye problem: 2/18 (11%) Swelling: 1/18 (6%) Irritation: 1/18 (6%)
9. If you had to give an estimate, how many ocular complications have you had in the last year? ("Don't know" is allowed)	Range: 0–40 Mode: 3 Don't know: 3
10. What is the last complication you or your colleagues have encountered?	Corneal abrasion: 4/18 (22%) Infection: 2/18 (11%) Corneal ulceration: 1/18 (6%) Severe corneal dryness: 1/18 (6%) Stretched optic nerve secondary to trauma: 1/18 (6%) Unilateral blindness: 1/18 (6%) Swollen orbit: 1/18 (6%) Don't know: 7 (39%)
11. Do you keep a register/audit of eye problems?	No: 18/18 (100%)
12. Do you have a follow-up clinic for your survivors?	Yes: 1/18 (6%); No: 17/18 (94%)

(22%) reported use at scheduled intervals (every two hours, every six hours, two times per day, or alternating artificial tears and ointment every four hours). Two units administered scheduled artificial tears supplemented with as-needed use. Of note, one ICU reported the use of artificial tears on an as-needed basis as the only intervention in their protocol.

The most commonly employed methods to lubricate the ocular surface were the use of artificial tears, ointment, and eye covers (such as gauze, eye patches, and face cloths). Others included saline washes, taping, and lid suturing.

The common reasons for consulting the ophthalmology department were infection (9; 50%) or redness (8; 44%). Five (28%) ICUs would request a consult in the case of “any eye problems” and four (22%) for patients with “complaints.” The reported number of ocular complications in the previous year ranged from 0 to 40, with a mode of 3. Corneal pathology, such as corneal abrasions and ulceration, was reported as the most common recent complication. Unilateral blindness was also a reported complication. No ICUs kept an audit of eye problems. One unit had a follow-up clinic for discharged patients where this information may be collected.

In summary, ocular protection varies across ICUs, with some having no protocols in place for ocular protection. The majority of units did not report eyelid closure assessment as part of the admission process, but most have a protocol for patients with incomplete eyelid closure. Nevertheless, several protocols involve the *prn* administration of ocular lubricants without specifying the ocular findings that would warrant additional application of lubricants or the institution of other measures. Furthermore, some methods of ocular protection, such as saline irrigation and gauze, continue to be implemented in some ICUs despite evidence that these measures increase the risk of ocular surface complications.² These findings suggest that suboptimal eye care to prevent exposure keratitis is provided in Ontario ICUs and that evidence-based protocols should be developed and implemented.

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References

1. Selvan H, Pujari A, Sachan A, Gupta S, Sharma N. Neglected ocular surface care in critical care medicine: an observational study. *Cont Lens Anterior Eye* 2020; 43: 350–4. <https://doi.org/10.1016/j.clae.2019.08.009>.
2. Alansari MA, Hijazi MH, Maghrabi KA. Making a difference in eye care of the critically ill patients. *J Intensive Care Med* 2013; 30: 311–7. <https://doi.org/10.1177/0885066613510674>
3. Azfar MF, Khan MF, Alzeer AH. Protocolized eye care prevents corneal complications in ventilated patients in a medical intensive care unit. *Saudi J Anaesth* 2013; 7: 33–6. <https://doi.org/10.4103/1658-354x.109805>
4. Kousha O, Kousha Z, Paddle J. Incidence, risk factors and impact of protocolised care on exposure keratopathy in critically ill adults: a two-phase prospective cohort study. *Crit Care* 2018; 22: 5. <https://doi.org/10.1186/s13054-017-1925-5>
5. Kam KR, Haldar S, Papamichael E, Pearce KC, Hayes M, Joshi N. Eye care in the critically ill: a national survey and protocol. *J Intensive Care Soc* 2013; 14: 150–4. <https://doi.org/10.1177/175114371301400213>

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