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Eye Problems, Eye Care and Ocular Awareness in a Level 3 Intensive Care Unit

Bir 3. Basamak Yoğun Bakım Ünitesinde Göz Problemleri, Göz Bakımı ve Oküler Farkındalık

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ABSTRACT *Objective:* The aim of this study was to determine the eye problems and risk factors encountered by patients in intensive care units and to evaluate the eye care awareness of healthcare workers in these units.
Materials and Methods: In this study, 186 eyes of 93 patients without ophthalmological consultations were examined prospectively and observationally. The patients were evaluated for dry eye, hypertonic solution use, eyelid/eyelash hygiene, blink reflex, corneal pathology and eye care consultations. The ventilation type, length of hospitalization, Glasgow Coma Scale score and sedation status were also evaluated. The presence of dry eye was evaluated according to gender, ventilation type, hypertonic solution use, Glasgow Coma Scale score and hospitalization diagnosis. Additionally, patients were evaluated according to the risk factors of corneal pathologies.
Results: The mean age of the patients was 63.53 ± 22.06 (18–96) years and male/female ratio was 51/42. The mean length of hospitalization was 42.19 ± 92.73 (7–203) days and the mean Glasgow Coma Scale score was 9.35 ± 4.34. Dry eye was detected in 30 (32.3%) patients. A higher rate of dry eye was detected in the mechanically ventilated and sedated patients, but the difference was not statistically significant (p = 0.243 and p = 0.384). Various corneal disorders were detected in 18 patients (19.35%). The sedation rate and length of hospitalization were higher in these patients, but the difference was not statistically significant (p = 0.66 and p = 0.126). However, Glasgow coma scale score was significantly lower (p= 0.027). The eyelid hygiene was adequate in 78 patients (83.9%) and inadequate in 15 patients (16.1%). Ophthalmological consultations were required for 29 patients (31.2%), but only 11 (37.9%) of these patients received consultations. Of 18 patients who were not consulted, 11 had punctate corneal epithelial defects, four had purulent conjunctivitis and three had keratitis.
Conclusion: Eye disorders are quite common in intensive care unit inpatients. Increasing eye care awareness by providing eye care training to healthcare professionals focused on maintaining these patients' vital functions will help prevent the emergence of eye diseases.
Keywords: awareness, dry eye, eye care, intensive care unit, keratopathy

ÖZ *Amaç:* Yoğun bakım ünitesindeki (YBÜ) hastalarda karşılaşılan göz problemleri ve risk faktörlerini tespit edip bu ünitelerdeki sağlık çalışanlarının göz bakımı farkındalığını değerlendirmek.
Gereç ve Yöntem: Çalışma kapsamında 93 hastanın 186 gözü oftalmoloji konsültasyonu talep edilmeden gözlemsel prospektif olarak incelendi. Hastalar kuru göz,hipertonik solüsyon kullanımı,göz kapağı/kirpik hijyeni,göz kırpma refleksi, korneal patoloji, göz bakımı ve oftalmoloji konsültasyonu ihtiyacı açısından incelendi. Ayrıca ventilasyon türü, yatış süresi, glaskow koma skalası ve sedasyon durumuna göre değerlendirildi. Kuru göz varlığı cinsiyet, ventilasyon tipi, hipertonik çözelti kullanımı, Glasgow Koma Skalası skoru ve hastaneye yatış tanısı açısından değerlendirildi. Hastalar ayrıca korneal patolojilerin risk faktörlerine göre değerlendirildi.
Bulgular: Yaş ortalaması 63,53 ± 22,06 (18-96) yıl, erkek/kadın oranı 51/42 idi. Yatış süresi 42,19 ± 92,73 (7-203) gün olup glaskow koma skalası 9,35 ± 4,34 idi. Hastaların 63(% 67,7) ünde kuru göz saptanmazken 30(%32,3) hastada kuru göz saptandı. Mekanik ventilasyon yapılmış ve sedatize edilmiş hastalarda daha yüksek oranda kuru göz saptandı ancak fark istatistiksel olarak anlamlı bulunmadı (p:0,243 ve p:0,384). 18 hastada (% 19,35) çeşitli korneal bozukluklar saptandı. Bu hastalarda sedasyon oranı ve yatış süresi daha yüksek saptandı fakat fark istatistiksel olarak anlamlı değildi (p:0,66 ve p:0,186).Ancak glaskow koma skalası anlamlı şekilde düşüktü (p:0,027). Göz kapağı hijyeni 78 (% 83,9) hastada yeterli iken 15(%16,1) hastada yetersizdi. Hastaların 29

(%31,2) unda çeşitli göz bozuklukları sebebiyle oftalmolog görüşü gerekli idi ancak bu hastaların sadece 11(%37,9) ine konsültasyon talep edilmişti. Konsülte edilmemiş 18 hastanın 11 inde punktat tarzda kornea epitel defekti, 4 hastada pürülan konjonktivit, 3 hastada keratit mevcuttu.
Sonuç: Göz bozuklukları, ybü de yatan hastalarda oldukça sık görülmektedir. Hastanın yaşamsal fonksiyonlarını düzeltmeye odaklanmış sağlık çalışanlarına göz bakımı konusunda eğitim verilerek göz bakım farkındalığının arttırılması bu hastalıkların ortaya çıkmasını önlemeye katkı sağlayacaktır.
Anahtar Kelimeler: Farkındalık, göz bakımı, keratopati, kuru göz, YBÜ

Introduction

When using the multidisciplinary approach to preventing the development of ocular disorders, eye care is of great importance for patients being treated in intensive care units (ICUs). These patients have increased risks for dry eye, corneal epitheliopathy, superficial corneal abrasions, chemosis, conjunctivitis, keratitis, corneal ulcers and corneal perforations. (1). Normally, the regular eyelid movements, intact corneal epithelium, adequate and functional tear production and conjunctival tissue immune functions that should exist in ICU patients may be impaired by the effects of certain preparatory risk factors. ICU patients can experience reduced or nonfunctional tear production (due to a fluid-electrolyte imbalance), decreased tear immunity, the lack of a blink reflex (due to sedation or neuromuscular blocking agents), decreased corneal reflexes, increased contamination risks and difficulty expressing themselves (due to mechanical ventilation). Unfortunately, may healthcare personnel do not recognize ocular disorders early, and they may even be ignored (1-4).

In ICU patients, ocular surface disorders usually occur within 48 hours to 1 week after hospitalization (5), and prolonged hospitalization and sedation can increase the risk of developing corneal damage (2). In previous studies, the corneal damage rates have ranged from 3.3% to 22%, but this rate could reach 60% in patients who have been sedated for longer than 48 hours (5,6).

The aim of this study was to determine the risk factors for eye disorders in patients that were being treated and followed up in the ICU. These patients were also examined in terms of whether or not routine eye care was performed effectively, as well as whether an ophthalmologist was consulted when needed. In this way, the healthcare personnel were evaluated with regard to their awareness of the ocular system.

Materials and Methods

Our prospective and observational study was carried out between September 2018 and January 2019 at the Diyarbakır Gazi Yaşargil Training and Research Hospital Intensive Care Clinic in Turkey, which is a 3rd stage centre with 37 beds. Ethics committee approval was received for this study from the ethics committee of Health Sciences University Diyarbakır Gazi Yaşargil Education and Research Hospital (2018/193).

Patients older than 18 years of age without any histories of eye diseases who were treated and followed up for more than one week were examined in their beds without waiting for ophthalmological consultation requests. The following information was obtained from each patient: age, sex, reason for hospitalization (internal/surgical), hospitalization duration, ventilation type (spontaneous, continuous positive airway pressure or intubation), Glasgow Coma Scale score, sedative or neuromuscular blocking drug treatment and intravenous hypertonic solution treatment on the day of examination (20% mannitol and 3% NaCl).

All of the patients were observed by the same ophthalmologist with regard to their blink reflexes and eyelid/eyelash hygiene. Those patients with corneal and conjunctival redness and secretions were noted in favour of eye hygiene insufficiency. A detailed anterior segment examination was performed to determine the presence of punctate keratopathy, corneal erosion, conjunctival chemosis, conjunctivitis and keratitis via direct ophthalmoscopy (Heine, Germany). The presence of punctate keratopathy and/or corneal erosion was assessed using fluorescence under a blue filter. A Schirmer I test was used to evaluate the basal and reflex tear production. This test was conducted without local anaesthesia, and special filter paper was placed on the external side of the eye. After 5 minutes, the amount of wetness on the filter paper was measured in millimetres. Less than 10 mm was considered to be dry eye, while 10 mm or more was considered to be normal. Each patient was also evaluated with regard to their need for an ophthalmological consultation. All of the data were recorded using the Statistical Package for the Social Sciences for Windows (version 16; SPSS Inc., Chicago, IL, USA). The categorical variables were presented as the mean ± standard deviation (min–max), but in some

cases, they were shown with the n (%). An independent t test was used for the comparisons between two groups of numerical variables, and a chi-squared test was used to compare the categorical variables between two or more groups. A p value of < 0.05 was considered to be statistically significant.

Results

This study included 186 eyes of 93 patients. The demographic data, including the age, sex, reason for hospitalization, hospitalization duration, ventilation type, Glasgow Coma Scale score, hypertonic solution use, eyelid/eyelash hygiene and blink reflex, are summarized in Table 1. The cerebrovascular event was the most common cause of internal disease in 19 patients (32.8%) and trauma was the most common cause of surgical disease in 14 patients (40%). Sedation was the most common cause of a blink reflex disruption.

Table 1. Demographic data and clinical characteristics of the patients

AGE (years) (mean±SD) (range) (n:93)	63,53 ± 22,06 (18-96)
GENDER (Male / Female), (n/%) (n:93)	51 (54,8%) / 42 (45,2%)
CAUSE OF ICU ADMİSSİON (Non-surgical / Surgical),(n/%) (n:93)	58 (62,4%) / 35 (37,6%)
LENGTH OF ICU STAY (days) (mean±SD) (range) (n:93)	42,19 ± 92,73 (7-203)
VENTİLATİON TYPE İntubation Spontaneous Noninvasive Cpap (n:93),(n/%)	 43 (46,2%) 29 (31,2%) 21 (22,6%)
GLASGOW COMA SCALE SCORE (mean±SD) (n:93)	9,35 ± 4,34
USE OF İNTRAVENOUS HYPERTONİC SOLUTİON (- / +) ,(n/%) (n:93)	76 (81,7%) / 17 (18,3%)
EYELİD/EYELASH HYGİENE (adequate / inadequate) (n:93),(n/%)	78 (83,9 %) / 15 (16,1%)
BLİNK REFLEXES Normal /Abnormal (n: 186), (n/%)	 147 (79%) / 39 (21%)

Although dry eye was not detected in 63 patients (67.7%), it was detected in 30 (32.3%) patients. When the patients were evaluated according to their gender, ventilation type, hypertonic solution use, Glasgow Coma Scale score and hospitalization diagnosis, no statistically significant differences were observed between the groups (p = 0.840, p = 0.243, p = 0.781, p = 0.384 and p = 0.88, respectively). The results are summarized in Table 2.

The patients were also evaluated with regard to their eyelid and eyelash hygiene. Although 78 (83.9%) of the patients had adequate eyelid and eyelash hygiene, 15 (16.1%) patients exhibited inadequacies. The mean Glasgow Coma Scale score of the group with adequate eyelid/eyelash hygiene was 9.33 ± 4.43, and it was 9.46 ± 3.98 in the inadequate eyelid/eyelash hygiene group. The hospitalization periods were 72.80 ± 80.02 days in the group with insufficient eyelid/eyelash hygiene and 36.31 ± 76.88 days in the other group. Although the hospitalization mean duration was longer in the patients with insufficient eyelid/eyelash hygiene, the difference was not statistically significant (p = 0.164).

We observed that routine eye care was not adequate for all patients in our study. A normal saline solution was used to maintain eyelid/eyelash hygiene in some patients. The presence of conjunctival chemosis, redness, secretion was ignored and the ocular surface was not completely closed in patients with inadequate blink reflex.

In our study, 39 (20.97%) patients had inadequate eye blink reflexes. The most common causes were sedation, neuromuscular blocking drug use, general disorders and neurological pathologies. In 16 (41%) of these patients, the eyelid was covered with a bandage with a topical antibiotic pomade, and in 10 (25.6%) patients, the closure was made with artificial tear drops or a gel. Although 7 (18%) of the patients were treated with topical antibiotics without closures, 6 (15.4%) patients had no closures or topical applications. Moreover, the results showed that the eye closures were not performed in such a way that the ocular surface was completely closed. In those patients who did not receive ophthalmological consultations, the closure was not made with topical antibiotic pomade, and artificial tear and gel applications were not performed.

The presence of corneal pathologies was also determined in these patients. In 75 (80.65%) of the patients, no corneal

Table 2. Schirmer test results of the patients

	SCHIRMER TEST (mm) Normal / Dry Eye	P value
SCHIRMER TEST (mm) Normal Dry Eye (n:93),(%)	 63 (67,7%) 30 (32,3%)	
GENDER Male (n:51),(%) Female (n:42),(%)	 35 (68,6%) / 16 (31,4%) 28 (66,6%) / 14 (33,4%)	P:0,840*
VENTİLATİON TYPE İntubation (n:43),(%) Spontaneous (n:29),(%) Noninvasive Cpap (n:21),(%)	 26 (60,4%) / 17(39,6%) 23 (79,4%) / 6 (20,6%) 14 (66,7%) / 7(33,3%)	P:0,243*
USE OF HYPERTONİC SOLUTİON (-) (n : 76),(%) (+) (n : 17),(%)	 51 (67,1%) / 25 (32,9%) 12 (70,6%) / 5 (29,4%)	P:0,781*
GLASGOW COMA SCALE SCORE Sedatized (n: 17),(%) Non-sedatized (n: 76),(%)	 10 (58,9%) / 7 (41,1%) 53 (69,7%) / 23 (30,3%)	P:0,384*
CAUSE OF ICU ADMİSSİON Non-surgical (n:58),(%) Surgical (n:35),(%)	 44 (75,9%) / 14(24,1%) 19 (54,3%) / 16(45,7%)	P:0,088*

Results are denoted as 'number(percent)' of subjects , mm: millimeter, * :Chi-square test

Table 3. Sedation statuses, length of ICU stay and Glasgow Coma Scale scores of the patients with or without corneal disorders

	Corneal Disease (–) (n:75)	Corneal Disease (+) (n:18)	P value
Sedatized (n:17), (%)	11 (64,7%)	6 (35,3%)	
Non-sedatized (n:76), (%)	64 (84,2%)	12 (15,8%)	P:0,66*
Length of ICU stay (days) (mean±SD)	35,31±79,90	65,81±89,17	P:0,186**
Glasgow Coma Scale Score (mean±SD)	9,84±4,23	7,33±4,28	P:0,027**

Results are denoted as 'number(percent)' of subjects, * :Chi-square test , **:İndependent t-test, SD:Standard deviation

pathologies were detected; however 18 (19.35%) patients did exhibit various corneal pathologies. The most commonly seen corneal pathology was punctate keratopathy, which was seen in 11 (61.1%) patients. When these patients were evaluated according to their sedation status and hospitalization duration, the sedation rate was higher and the hospitalization duration was longer in the corneal pathology group, but there were no statistically significant differences between the groups (p = 0.66 and p = 0.186, respectively). However, the Glasgow Coma Scale score was statistically significantly lower in the patients with corneal pathologies (p = 0.027) (Table 3).

Ophthalmology consultation was not requested for all patients in need. In our study, all of the patients were examined without any consultation requests. In this way, we aimed to have an idea about the ocular awareness of health workers. In 29 (31.2%) of the 93 patients, an ophthalmologist's opinion was required due to various eye disorders, but only 11 (37.9%) of these patients underwent consultations. Eleven of the 18 unresponsive patients had

punctate corneal epithelial defects, 4 patients had purulent conjunctivitis and 3 had keratitis.

Discussion

An ICU inpatient's normal rhythmic eyelid movements, intact corneal epithelium, adequate and functional tear production, hygienic eyelid, conjunctival immune functions and other smooth functioning protective mechanisms can be disrupted by many factors. The risk increases even more with the use of certain drugs that have negative effects on eye functions, in addition to the invasive procedures required for the diagnosis and treatment (1,4,6). The fact that healthcare workers who focus on improving a patient's vital functions do not recognize the presence of eye disorders early, as well as hygiene deficiencies, makes the situation more complicated. Some problems that could have been treated easily if they were noticed early can result in decreased vision and permanent functional losses when they are treated too late.

The eyelids and eyelashes are focal points for the development of ocular infections due to both normal and changed microorganisms flora. For this reason, eyelid and eyelash cleansing should be performed correctly and effectively in all patients. According to one study of the ocular surfaces of patients who were hospitalized for longer than one week by Mela et al., 77% had at least one bacterium other than those normally found (mostly ***Pseudomonas aeruginosa***, ***Acinetobacter*** spp. and ***Staphylococcus epidermidis***), and 40% of the patients underwent long term sedation (7). Şahin et al. found that the ***Staphylococcus aureus*** and ***Neisseria*** spp. colonization rates increased significantly after one week of hospitalization (8). Both studies reported that long term sedation and a long hospital stay had negative effects with regard to ocular surface colonization, and they explained the importance of selecting the appropriate topical prophylactic antibiotics by considering the changing mocroorganisms. In our study, 15 (16.1%) of the 93 patients had certain deficiencies in terms of eyelid and eyelash hygiene. Although no corneal disorders were detected in these patients, the eyelid and eyelash hygiene was poor enough to lay the groundwork for a possible ocular infection. We found that the length of the hospital stay was longer in these patients than in the uninfected group. However, we believe that the difference was not statistically significant because the number of patients was not evenly distributed. We also believe that healthcare professionals should know that eyelid and eyelash cleansing should be done.

In patients with spontaneous blink reflexes, the eyelids and eyelashes should be cleaned by wiping the secretions, scabs and lubrication from the inner canthus to the external canthus. Eye care can be performed using special paper wipes, eye pomades, eye drops or other eye care products prepared for lid hygiene. Normal saline solution should not be used because it can change the intraocular osmolarity and cause mechanical trauma during washing (9). Davoodabady et al., in addition to opposing the standard treatment with normal saline solution due to the increased incidence and severity of exposure keratopathy, did not recommend eyelid cleaning (10). In our patient group, 11 (11.8%) of 93 patients had regular eyelid cleaning. The healthcare workers frequently used paper napkins for ophthalmic use, but sometimes they preferred saline solution. Corneal findings of exposure keratopathy were detected in only one patient in this patient group.

In order to prevent the development of dry eye and the associated corneal disorders in these patients, and if there is a blink failure in a patient due to sedation or a neurological disorder, polyethylene moisturizing film/covers, methylcellulose drops, methylcellulose ointments or prophylactic antibiotic ointments should be used. Adhesive tape, bandage contact lenses and polyacrylamide gel may be used for this purpose (11).

Ezra et al. showed that polyacrylamide gels are as effective as ocular lubricants for preventing exposure keratopathy (12). Another study stated that a polyethylene cover/cap was the most effective method, and that artificial tear gels were more effective for preventing corneal damage when compared to artificial tear drops (13). In addition, Bendavid et al. stated that bandage contact lenses and punctual plugs were more effective for limiting keratopathy than ocular lubricants, and that the use of bandage contact lenses was also effective for healing existing lesions (14).

Surgical procedures, such as punctual plugs and upper and lower lid suturing from the lateral side, are other applications that can be used in cases where standard treatments fail. Siebert et al. reported that 4.3% of the patients with unsuccessful conservative option treatments received cover sutures in order to protect the ocular surface (15). Conservative treatment was inadequate in 1 (2.6%) patient with corneal ulcer and eyelid stitching was required.

The prevention and early diagnosis of eye diseases in ICU

patients are undoubtedly of great importance for preventing permanent damage. However, many researchers stated that there was evidence that standard eye care protocols were not being observed, and that eye care was being neglected. At this point, the basic deficiency was in the lack of application rather than the lack of knowledge (2,16-17). In the studies that have been conducted, training was given to the healthcare personnel working with the patients, and significant decreases were observed in the emergence of ocular diseases after this training (18,19). Kousha et al. observed that the keratopathy exposure rate decreased from 21% to 2.6% after a simple maintenance protocol application, and they pointed out the importance of implementing a simple and standardized protocol, as did other researchers (16). We observed that all of the healthcare workers that we met face to face during each patient visit had information about eye care, but there were some information deficiencies regarding how to perform this.

Conjunctival chemosis can occur between 2 and 7 days after starting mechanical ventilation due to the application of intermittent or continuous positive pressure. In addition, increased intraocular and/or intrathoracic pressure can occur due to the tightening of the endotracheal tubes, as well as excess fluid accumulation in the body and the suppression of venous return (11). Jammal et al. found that the development of exposure keratopathy was associated with the degrees of chemosis and lagophthalmos, and the incidence of lagophthalmos was significantly increased in those patients with chemosis (20). Moreover, Grixti et al. reported that the chemosis rate was between 9% and 80% (21). In our study, conjunctival chemosis was observed in 17 (39.5%) of the 43 intubated patients and in 4 (19%) of the 21 patients who were being treated with continuous positive airway pressure. In 15 (71.4%) of the patients with conjunctival chemosis, the eyelid was not covered effectively, and 10 of these patients had signs of exposure keratopathy. These findings are especially important to draw attention to the fact that when conjunctival chemosis develops in patients with impaired eye function, the closure should be performed more effectively.

Exposure keratopathy is a clinical manifestation with a wide spectrum, from corneal punctate epitheliopathy to corneal perforation. Additionally, mechanical ventilation, sedation, neuromuscular system blocking drug use, metabolic disorders, fluid electrolyte imbalances, blink function insufficiencies and decreased corneal reflexes are predictive risk factors for the development of exposure keratopathy (4,6). Grixti et al. reported that exposure keratopathy, which is the most common ocular disorder, can be prevented (21). In another study, the incidence of superficial keratopathy was 40%. However, most of the patients were intubated, with longer hospitalization times and lower Glasgow Coma Scale scores (22). In our study, corneal disorders were found in 18 patients (19.35%), and 14 patients (77.8%) were intubated. The corneal pathology development rate was higher in the sedated group of patients, but the difference was not statistically significant. The hospitalization duration of the corneal pathology patient group was higher than in the group without corneal disorders, but we do not believe that the difference was statistically significant. However, we found that the Glasgow Coma Scale score was significantly lower ($p = 0.027$).

Dry eye is a multifactorial disease that has the potential to cause damage to the ocular surface due to a tear film layer insufficiency. This is characterized by the increased osmolarity of the tear film layer and ocular surface inflammation (23). In different studies, it has been estimated that 6–34% of the adult population is affected worldwide (24). Functional impairment of the eyelid, decreased corneal reflexes, metabolic disorders, mechanical ventilation, sedative or neuromuscular system blockade drugs and a fluid electrolyte imbalances in patients with dry eye may cause some preparatory risk factors (23).

Blinking movements allow not only tear secretion, but they also contribute to the effective distribution of ossified tears on the ocular surface. The general condition of the patient, degree of sedation, accompanying neurological diseases and functional losses related to the drugs being used can cause other ocular surface diseases, in addition to dry eye. Igarashi et al. reported that even a short exposure to hyperosmolarity could induce interleukin-6 expression from the corneal epithelial cells and lead to the emergence of dry eye (25). Saritas et al. found that 40% of the inpatients had dry eye, but they did not find that mechanical ventilation, sedation and inotropic drug use affected dry eye development (26). The rate of dry eye was higher in the patients with mechanical ventilation than in the spontaneous breathing group, but the difference was not statistically significant. We found a higher dry eye rate in the sedated patients, but we did not find a relationship between sedation and dry eye.

When necessary, ophthalmology consultation should be requested in ICU patients. The occurrence of ocular

complications in these patients is associated with conjunctival chemosis, redness, eye secretions, eyelid dysfunctions, mechanical ventilation, muscle relaxant use and the presence of neurological diseases (15). Siebert et al. reported that 72% of the patients were given additional treatments during eye consultations, 6% of them required special eye care and 64% of them were given medication (15). All of the patients were examined without any consultation requests in our study.

Conclusion

The blink reflex is of great importance in protecting the cornea and vision. Loss of blink reflex is common in ICU for different reasons. In order to protect these patients from corneal pathologies, the corneal surface may need to be moistened with artificial tears and drops. In addition, in order to prevent the infection, topical antibiotic ointment may need to be applied at regular intervals. In the absence of a blink reflex, the complete closure of the ocular surface is important for eye protection. However, there are some shortcomings in this regard.

It has been observed that in the patients treated in ICU, health workers focus on correcting the vital functions of the patient but ignore the presence of non-vital pathologies. However, careful observation of these patients, effective eyelid cleansing, and precaution to protect the cornea are of great importance in preventing the emergence of these diseases. The fact that some non-consulted patients should be consulted to an ophthalmologist is a sign that the awareness of the health care workers is missing.

Patients with inadequate eye blinking, conjunctival chemosis, secretion ,redness, mechanical ventilation, the presence of neurological diseases and muscle relaxant use should be consulted to the ophthalmologist periodically to prevent corneal disorder. Healthcare workers should be more careful, especially in those patients exhibiting the abovementioned conditions. Eye care consultation is required in those patients who have these problems despite routine eye care.

Eye diseases are common in ICU. Increasing the awareness and establishing standard protocols with the regular trainings that can be given to the healthcare workers in the ICU can reduce the rate of ocular system diseases to a great extent.

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