

Dry Eye Syndrome in Intensive Care Units: a concept analysis

Olho Seco em Unidade de Terapia Intensiva: uma análise de conceito

Ojo Seco en Unidad de Terapia Intensiva: un análisis de concepto

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ABSTRACT

Purpose: To analyse the concept of Dry Eye Syndrome in patients admitted to Intensive Care Units (ICU). **Method:** This is a concept analysis, according to Walker's and Avant's method, conducted using an integrative review, through search in the database. Science Direct, Scopus, Cinahl, Pubmed, Lilacs, Cochrane and Web of Science. The following keywords were used: "Keratoconjunctivite Sicca", "Risk Factors", "Dry eye Syndromes" and "Intensive Care Units". After selection, 85 articles have been kept. **Results:** Antecedents found: age, lagophthalmos, environmental factors, use of medications, systemic diseases, mechanical ventilation and eye surgeries. Attributes: Tear Break-up Time < 10 s, Schirmer's test I < 10 mm, Schirmer's test II < 5 mm and signs and symptoms. Consequents: eye damage and discomfort; unstable vision. The Model Case and the Contrary Case were used to illustrate it. **Conclusion:** The research provided clarification of the concept and consequent understanding of the Dry Eye Syndrome, which is preventable especially in ICU.

Descriptors: Keratoconjunctivitis Sicca; Risk Factors; Dry Eye Syndrome; Intensive Care Units; Nursing.

RESUMO

Objetivo: Analisar o conceito de Olho Seco em pacientes internados em Unidade de Terapia Intensiva (UTI). **Método:** Trata-se de uma análise de conceito, segundo método de Walker e Avant, operacionalizada mediante revisão integrativa por meio da busca nas bases de dados: Science Direct, Scopus, Cinahl, Pubmed, Lilacs, Cochrane e Web of Science. Foram utilizados os descritores: "Keratoconjunctivite Sicca", "Risk Factors", "Dry eye Syndromes" e "Intensive Care Units". Após seleção, resultaram 85 artigos. **Resultados:** Identificaram-se como antecedentes: idade, lagoftalmia, fatores ambientais, uso de medicamentos, doenças sistêmicas, ventilação mecânica e cirurgias oftálmicas. Atributos: Tear Break-up Time < 10 s, teste de Schimer I < 10 mm, teste de Schimer II < 5 mm e sinais e sintomas. Consequentes: dano e desconforto à superfície ocular, instabilidade visual. Como ilustração apresentaram-se o Caso Modelo e o Caso Contrário. **Conclusão:** O estudo promoveu clarificação do conceito e consequente entendimento do fenômeno, o qual é evitável, sobretudo na UTI.

Descritores: Ceratoconjunctivite Seca; Fatores de Risco; **Síndromes do Olho Seco**; Unidades de Terapia Intensiva; Enfermagem.

RESUMEN

Objetivo: Analizar el concepto del Ojo Seco en pacientes hospitalizados en Unidades de Terapia Intensiva (UTI). **Método:** Esto es un análisis de concepto, según el método de Walker y Avant, operacionalizado mediante revisión integrativa por medio de la búsqueda en las bases de datos: Science Direct, Scopus, Cinahl, Pubmed, Lilacs, Cochrane e Web of Science. Fueron utilizados los descriptores: "Queratoconjunctivitis Seca", "Factores de Riesgo", "Síndromes del Ojo Seco" y "Unidades de Terapia Intensiva". Después de la selección, resultaron 85 artículos. **Resultados:** Identificamos como antecedentes: edad, lagoftalmia, factores ambientales, uso de medicamentos, enfermedades sistémicas, ventilación mecánica y cirugías oftalmológicas. Atributos: Tear Break-up Time < 10 s, test de Schirmer I < 10 mm, test de Schirmer II < 5 mm y señales y síntomas. Consecuencias: daño e incomodidad a la superficie ocular, inestabilidad visual. Como representación se presentó el Caso Modelo y el Caso Contrario.

Conclusión: El estudio possibilitó clarificación del concepto y consecuente entendimiento del fenómeno, lo cual es evitable, sobre todo en la UTI.

Descriptores: Queratoconjuntivitis Seca; Factores de Riesgo; Síndromes del Ojo Seco; Unidades de Terapia Intensiva; Enfermería.

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INTRODUCTION

The Dry Eye Syndrome (DES), also known as Keratoconjunctivitis sicca (KCS), is a multifactorial disease caused by the inadequate tear production and/or fast evaporation of tear. The DES can result from inflammatory diseases, environmental factors, hormonal changes or age⁽¹⁾.

There are two causes for developing the Dry Eye Syndrome. One is due to a deficiency in the production of the tear film and the other is due to increased evaporation. Regarding Intensive Care Units (ICU), the tear film is compromised due to a disorder in the responsible mechanisms for lubricating and protecting the eyes⁽²⁾.

In a study conducted, the DES was the most frequent eye affection. It presented 72.2% cases in Intensive Care Units, which shows a high incidence of the phenomenon in this sector⁽³⁾. The ICU are care sectors for patients who are more dependent on account of a serious or risky health condition. The units have health professionals from diverse areas and specialties, who use a great range of technologies for diagnosis and therapy in the hospital environment⁽⁴⁾.

Hospitalized patients in ICU are in critical health conditions, often depending on technological devices and using several medication to continue living. Nurses are the professionals who provide the most assistance to these patients and perform fundamental activities in this sector⁽⁵⁾.

Therefore, knowing what the Dry Eye condition is, its characteristics and factors that happen before and after this phenomenon, is extremely important to perform a qualified nursing care, directed to preventing this potential adverse event.

Exposure and eye dryness may result in different complications, including superficial keratopathy and inflammatory diseases in the cornea. Moreover, involvement of the epithelial surface and subsequent corneal exposure, resulting in ulceration or perforation. All these consequences hurt and reduce the patient's life⁽⁶⁾.

In this context, patients admitted to ICU present a high risk for the development of Dry Eye, since they present, in most cases, severe clinical conditions, such as the use of numerous medication, sedation and ventilatory support. Some other technologies to maintain vital signs and promote comfort and therapeutic aid are also used. These patients are predisposed to lose their natural mechanisms of eye protection and therefore need effective assistance from the health team, with emphasis on nursing⁽⁷⁾.

Among the many responsibilities of nurses, there is a clear prioritisation of the immediate procedures for critical patients to the detriment of certain easily accessible care, such as eye care. This is related to lack of knowledge of the nurse and the multi-professional team about anatomy, physiology, eye examination

and care to be implemented, besides the consequences that may arise from an inadequate or inexistent eye care⁽⁶⁾.

Hence, clarifying this concept is crucial to develop a theoretical support that bases the practice of nursing destined to preventing the DES in patients admitted to ICU.

We found imperative to analyse this concept given the abundance of information in literature and the need to establish consensus about the incidence of this phenomenon in ICU.

OBJECTIVE

Analysing the concept of Dry Eye in patients admitted to Intensive Care Units (ICU).

METHOD

Concept analysis based on the framework proposed by Walker and Avant, performed through an integrative review of literature according to Whittemore and Knalf⁽⁹⁾. They will be described separately for better understanding.

Integrative Review of Literature

We performed the review from April to June 2015 and followed the steps recommended in the literature by Whittemore and Knalf⁽⁹⁾, which allowed us to order the knowledge produced on the Dry Eye concept. The steps were identification of research questions; literature search; data assessment; results analysis and presentation of review. We drew up these research questions: What is the concept of Dry Eye? What are the attributes of Dry Eye in ICU? Which aspects precede and proceed the Dry Eye Syndrome?

We selected studies using the relevance test⁽¹⁰⁾, respecting the following inclusion criteria: articles fully available in the selected databases, in Portuguese, English or Spanish; studies that respond to the proposed guiding questions. We implemented previous notes, protocols, ongoing research, reviews, editorials and letters to the editor as exclusion criteria. We also implemented secondary studies, e.g., bibliographical reviews in general to understand definitions and concepts about the phenomenon studied. Excluding this type of publication could mean a significant reduction of essential information to be used in this analysis.

The search was performed from April to July 2015 by a pair of researchers in these databases: Science Direct, Scopus, Cinahl (Cumulative Index to Nursing and Allied Health Literature), Pubmed (Public Medline), Lilacs (Latin American and Caribbean Health Science Literature Database), Cochrane, Web of Science. The access to these databases was carried out through the Brazilian portal of Coordination for the Improvement of Higher Education Personnel (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES).

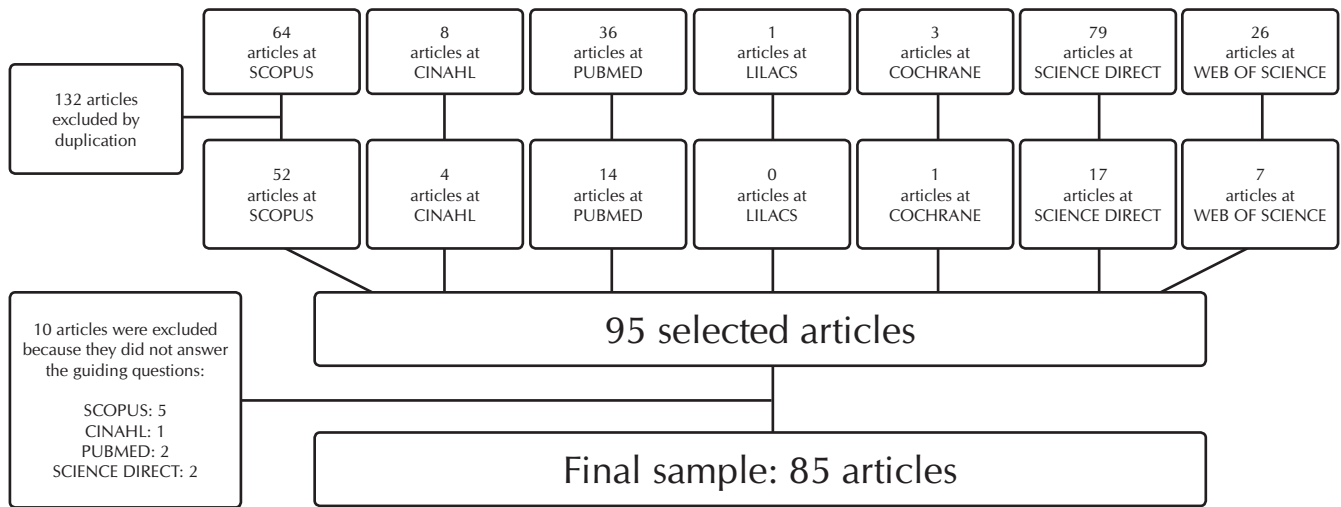


Figure 1 – Diagram of results by phase of selection of articles, 2015

The search was performed in an uncontrolled way, using keywords indexed in the *MeSH* (Medical Subject Headings) and the Keywords in Health Sciences (Descritores em Ciências da Saúde - DeCS), in Portuguese, English and Spanish: “Keratoconjuntivite Sicca”, “Risk Factors”, “Dry eye Syndromes” and “Intensive Care Units”.

There were 19.856 titles found in different databases. When the relevance test was performed, 191 publications were selected for the next phase. After reading the abstracts, 132 were excluded by duplication and 95 selected. Due to the exclusion of ten articles after full reading, the study had a sample of 85 articles, as shown in Figure 1.

After obtaining the sample, data extraction was started through a form that had methodological information of the study and items related to concept analysis. When extracted, the data were summarised in tables and later grouped into categories by similar ideas and concepts.

Model of concept analysis of Walker and Avant

This model clarifies the concept in eight steps: (1) Selection of the Dry Eye concept in Intensive Care Units; (2) Purpose of the analysis, which was to analyse the Dry Eyes in patients admitted to ICU; (3) Use of the Dry Eye concept in ICU; (4) Establishment of the attributes that define Dry Eye in ICU; (5) Identification of a Model Case; (6) Identification of a Contrary Case; (7) Identification of antecedents and consequents of the phenomenon; (8) Definition of the empirical references.

The authors propose in the sixth step that cases examples be put together, to exemplify the use of the concept in its different perspectives; although, they see these cases as supplementary. Therefore, according to the reading of 85 articles, the attributes of the concept of Dry Eye and its antecedents and consequents were identified. We point out that, for the reason set above, only one model case and one contrary case were constructed to exemplify the contrary elements to the concept studied.

Firstly, we will detail the description of the articles, and then we will show the results according to the steps defined for the concept analysis. No submission to the Ethics Committee

in Research was sent, since this is a study with search only in literature.

RESULTS

Among the 24 different countries found in the articles that composed the sample, the United States (US) stands out with 34 articles written (39.53%). We noticed a high occurrence of Asian countries such as: Japan, India, Taiwan, Turkey, China, Korea, Indonesia, Iran, Israel and Thailand. Together, they account for 23 articles and represent 26.74% of the sample.

As for the year of publication, the articles date from 1989 to 2015, of which 56.98% were published over the last five years. This express a greater recent interest in the matter. Regarding language, 96.51% of publications were in English and were not published in specific nursing journals, but rather in medical journals.

The methods used by the studies constituting the final sample were 7: 43.02% were based on narrative review studies; 29.07% on cross-sectional studies; 10.45% on experimental studies; 8.14% on case control studies; 5.81% on cross-cutting studies; 2.33% on systematic review; and 1.16% on methodological study. Regarding the type of approach, the majority (56.98%) consisted in quantitative research.

From the analysis of the articles, we identified the set of components of the concept, as described below.

Identification of the use of the concept

According to the theoretical and methodological framework adopted, the use of dictionaries, encyclopedias and all available literature is recommended to verify the possibilities of identification of the various attributes of the concept. As proposed, this initial phase should not be limited to only one aspect of the concept. All uses of the word must be considered. Therefore, here are the main and most used definitions of the Dry Eye concept, as shown in Chart 1.

Hence, for this study, the description of the core concept is that Dry Eye Syndrome in Intensive Care Units is a multifactorial disease caused by the inadequate production of tears and/or fast evaporation of the tear film.

Chart 1 – An overview of the main definitions of the Dry Eye concept, 2015

Definition	Authors/Year	Research Sources
The Dry Eye syndrome is a disease with multiple etiologies. The common characteristic of its different manifestations is an abnormal tear film. Abnormalities in the tear film linked to the Dry Eye disease are tear deficiencies, due to insufficient supply or excessive loss, and abnormal tear composition.	(Johnson & Murphy 2004)	Pubmed
Dry Eye is a multifactorial disease of the tear film and ocular surface, which may be due to reduced tear production or excessive tear evaporation. It results in discomfort, disturbances in vision and unstable tear film, with potential for damage to the ocular surface.	(Rege, Kulkarni; Puthran & Khandgave 2013)	Scopus
The Dry Eye Syndrome (DES) is a multifactorial disease caused by the inadequate production of tears and/or fast evaporation of the tear film. It is a result of inflammatory diseases, environmental factors, hormonal changes, age, etc.	(Yeh et al. 2015)	Pubmed

Identification of empirical references

This step consisted in determining the empirical references for the attributes, considered classes or categories of real phenomena that, by their existence, show the incidence of the concept⁽⁶⁾. Although this step of the concept analysis normally takes place at the end, being the eighth step of the Walker and Avant method, we chose to perform it before in this study, because it describes the assessment methods of each attribute.

There are four main ways to determine the Dry Eye: (1) The rupture time of the tear film; (2) Schirmer's Test I and II; (3) The Fluorescein, Rose Bengal and Lissamine Green Test; (4) Ocular assessment of signs and symptoms.

The rupture time of the tear film

Widely known as *Tear Break-up Time (TBUT)*, the rupture time of the tear film is a test to assess the evaporation of the tear film, that results in determining the tear quality. The procedure consists of instilling a 2% fluorescein strip, moistened with a drop of lubricant, into the lower conjunctival fornix between the external and the middle third of the lower eyelid for one minute. After instilling the strip, patients must blink naturally and keep their eyes open. The tear film is observed under a beam of cobalt blue illumination until dark spots appear. A timer must be turned on when patients stop blinking and turned off when the first dark spot appears⁽¹¹⁾.

Schirmer's Test I and II

One of the commonly used methods to measure aqueous tear production is the Schirmer's test, also known as tear film's

volume. This test consists of placing small strip of sterile filter paper under the eyelid, in the lower fornix near the lateral corner, away from the cornea. The eyelid is then closed for five minutes and the wet portion of the strip is measured in millimetres⁽⁵⁾.

There are two types of Schirmer's Test, I and II. In Schirmer's test I, reflex tear secretion is evaluated in response to nasal and conjunctival stimulation, which makes a Schirmer I less than 10 mm positive for Dry Eye. Schirmer II is conducted after instilling a topical aesthetic. This test allows the measurement of the basal component of the tear film. The reflex component is considered absent. This results in a Schirmer II less than 5 mm positive for Dry Eye⁽¹²⁾.

Fluorescein, Rose Bengal and Lissamine Green Test

The fluorescein dye is useful to assess the Dry Eye disease. This dye checks the integrity of the epithelium of the cornea and conjunctiva, in which an intact epithelium presents no spots, due to the presence of the mucin layer of the tear film. The assessment must be systematically performed using the cobalt illumination after two minutes using the dye, and the identification of spots highlights the absence of the protective layer and consequent presence of the Dry Eye disease⁽¹³⁾.

The rose bengal stain derives from fluorescein. The stain is used in strips, moistened with artificial tears and has a similar function, but unlike fluorescein it is a test of low sensitivity and causes great eye irritability. It can capture devitalised cells of both the conjunctiva and the cornea, resulting from the absence of the mucin layer of the tear film⁽¹⁴⁾.

Lissamine green is a stain used to assess the anterior segment of the eye and dye degenerated or dead cells. It is applied the same way rose bengal is but causes less irritation than the latter⁽¹³⁾.

Ocular assessment of signs and symptoms

The ocular assessment of signs and symptoms is conducted according to a set of strategies to verify the changes that can occur at the ocular level. A record analysis should be the first step so that predisposing factors are identified at the moment of admission.

Once all data are collected, signs must then be verified according to their corresponding method; symptoms must be questioned regarding existence, periodicity, intensity and level of limitation caused. This way, the most common signs and symptoms are: decreases lacrimal production; incomplete palpebral closure; burning feel in eyes; hyperaemia; sensation of ocular pruritus; sandy feeling in eyes; foreign body sensation; eye pain; excessive tearing; blurred vision; mucous secretion; light sensitivity; ocular fatigue; and diminished blinking mechanism⁽¹⁵⁾.

Critical attributes

Attributes are components that define a concept, i.e., characteristics that will determine the Dry Eye condition in Intensive Care Units. The four critical attributes of "Dry Eyes in ICU" identified through concept analysis are: (1) Precipitate tear film rupture; (2) Insufficient volume; (3) Spots in the use of stain in the ocular surface; (4) Eye anamnesis.

Precipitate tear film rupture

The time between the last blinking frequency and the appearance of the first spot will be the time of tear film rupture, which is considered Dry Eye when it is less than 10 seconds⁽⁹⁾.

Insufficient volume

To identify the volume of the tear film we must conduct Schirmer's test I or II. Values lower than 10 mm in Schirmer's test I represent eye dryness, as well as values lower than 5 in Schirmer's test II.

These tests measure the volume/amount of the tear film and make it possible to identify the insufficient volume of this eye component⁽⁵⁾.

Spots in the use of stains in the ocular surface

The main vital stains used to assess the ocular surface and help to detect the DES are: fluorescein, rose bengal and lissamine green. The appearance of spots when performing these three tests means the person has DES.

All vital stains present similar functions and point to eye dryness, especially regarding the reduction of the lipid layer of the tear film. However, as evidenced, the isolated use of one of these tests cannot infer the diagnosis of DES. The combination with the following attribute is needed⁽¹³⁾.

Eye anamnesis

Ocular assessment, made of anamnesis and physical examination, is a primordial step to identify DES. It should be conducted together with the tests to conclude this detection.

Previous symptoms are analysed along with the patient's records, work environment, anxiety, systemic diseases, autoimmune diseases, infections such as hepatitis and the human immunodeficiency virus (HIV), vascular history and medications⁽¹⁶⁾.

Because of the characteristics of the admitted patients and the ICU's environment, some elements require the professional to perform recurrent assessments, e.g.: sedation, lagophthalmia, low humidity, multi-drug therapy, basic systemic diseases. According to evidences, people exposed to these environments present acceleration in the process of the phenomenon's development⁽⁵⁾.

On physical examinations it is possible to identify ocular signs and symptoms⁽¹⁵⁾.

We observed that other tests are suggested, such as tear film osmolarity, measurement of corneal sensitivity, cytology printing, biopsy of the conjunctival tissue, assays of fluids of detachable proteins and tear drainage by fluorescein dye. Despite the existence of these common tests in research, we highlight that the attributes currently exposed to determine DES in ICU are the most applied in clinical practice.

All the attributes listed can be measured by nurses using the empirical references described above, either autonomously or in a team⁽¹⁷⁾.

Antecedents and consequences

The next step proposed by Walker and Avant⁽⁸⁾ is to identify the antecedents and consequents. According to this model, antecedents are events commonly occurring before the identification of the phenomenon and contribute to its consolidation. On the other hand, the consequents are identified or

even foreseen whenever there is the combination of factors of different origins in the presence of the phenomenon, if developed and left untreated⁽⁸⁾.

Antecedents

On the matter, some intrinsic factors predispose to DES regardless of the environment in which the patient is, e.g.: age over 40 years old, female over 50 years old, young men, anxiety, hypovitaminosis, hormonal imbalance, autoimmune diseases (Rheumatoid arthritis, Lupus, Myasthenia Gravis, Sjögren's Syndrome), systemic diseases (Stroke, Hyperlipidemia, Diabetes Mellitus, Systemic Arterial Hypertension); and infections such as HIV and Hepatitis^(5,13).

Important precursors of eye dryness are environmental factors involved in increasing the rate of evaporation of the tear film. They may take place isolated in combination with the intrinsic factors, namely: high altitude, temperature, smoke, strong winds, environmental pollution, low humidity, sunlight and radiation. Another significant antecedent, common in ICU, is the use of medication such as diuretics, beta blockers, antidepressants, antihistamines, anxiolytics and eye drops for glaucoma.

Also related to ICU, there is a private environment with specific therapy for patients who need intermittent care. In this field, intrinsic and extrinsic factors exist and can precede the occurrence of Dry Eyes, e.g.: presence of systemic drugs; associated use of various drugs; lagophthalmia; sedation; insufficient blinking periodicity, length of admission; frequent use of health technological devices, use of mechanical ventilation and environmental factors such as low humidity and low temperature.

Consequents

Since consequents are considered resulting from the occurrence of the concept, this analysis revealed the existence of severe consequences from Dry Eye in ICU. We identified the following consequents: eye damage, loss of vision, decreased quality of life and specific signs and symptoms of DES.

In ICU patients, ocular lubrication and protection mechanisms may be inefficient or even compromised, and they increase the proneness to develop the DES. Once the phenomenon occurs, the cornea is the first ocular structure to suffer from the inefficiency of the tear film, with consequent damage to the ocular surface and possible serious impairment to the patient's vision, depending on the increase and extension of the damage⁽⁶⁾. To assess this damage, the vital fluorescein, rose bengal and lissamine green stains are used.

The loss of vision is a serious consequence of DES. It only occurs when the person has impairment of visual acuity and it can reach the point of making the individual can no longer perform routine activities. Both ways of measurement loss of vision are conducted using specific ophthalmologic examinations to assess the reduction of acuity and visual field⁽¹⁸⁾.

Another consequence identified was the decrease in the quality of life due to the difficulty to carry out activities of daily life, because of the harmful effects of DES, such as unstable vision, pain, sandy sensation in eyes and reduction of visual acuity. To assess the quality of life of these individuals, specifically, we suggest the use of the Dry Eye on Everyday Life (IDEEL). It is a reliable, valid

survey with relevant and comprehensive questions, that can analyse the effective impact of this phenomenon⁽¹⁹⁾.

IDEEL is an instrument with 27 items and consists of three main domains: limitations of daily activities, emotional well-being and working limitations. All domains offer a score, which goes from zero (representing total impairment) to 100 (representing no impairment)⁽²⁰⁾.

Identification of a Model Case and a Contrary Case

The Model Case is an example of the use of the concept, where all defining attributes are demonstrated, i.e., a pure case (the instance of the concept is eminent⁽⁸⁾). For this stage, the following fictitious case was created:

Model Case

Ms. Maria, 56, on the 5th day of admission in an Intensive Care Unit (ICU) for stroke, presents Systemic Arterial Hypertension (SAH). The patient is intubated under mechanical invasive ventilation, sedated and presents lagophthalmia. She has been using diuretics and beta blockers. In the ocular assessment, the presence of hyperaemia, palpebral edema and excess of mucous secretion were verified. The rupture time of the tear film was 5 seconds; Schirmer's test I showed a result of 6 millimetres. The ocular surface was assessed using fluorescein and lissamine green and random spots were detected.

The Contrary Case is an example of denial to the concept. According to Wilson⁽²¹⁾, it is a case to verify and conclude that, certainly, whatever the concept is, the opposite case is not an example of this, as it follows:

Contrary Case

Mr. João, 37, on the 1st day of admission in the Intensive Care Unit in the postoperative period of bariatric surgery, had no associated comorbidities, was conscious, oriented, breathing ambient oxygen, using analgesics, gastric protector and prophylactic antibiotic therapy. There is no change in the surface of the eye in the ocular assessment. The rupture time of the tear film was 15 seconds; Schirmer's test I showed a result of 25 millimetres. The ocular surface was assessed using the vital fluorescein and lissamine green stains. No spots were found.

Therefore, the figure below is the representation of the concept studied, its definition, antecedents, consequents and attributes. It illustrates the information found and assembled.

DISCUSSION

The Dry Eye phenomenon is widely discussed and, as evidence in this study, research is often carried out by establishing studies of prevalence, experimental investigations, systematic reviews with meta-analysis; setting guidelines and protocols. There has been a more frequent production over the last five years and application of several approaches to the same problem.

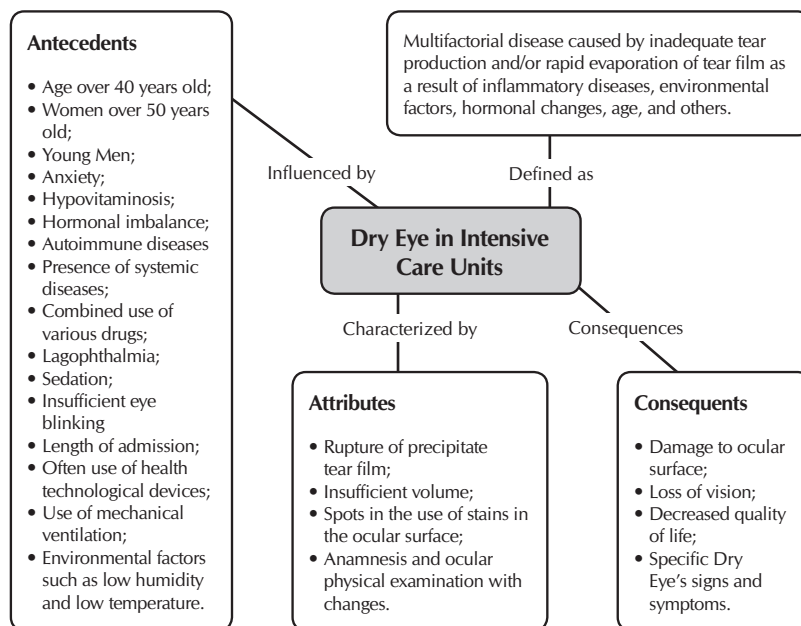


Figure 2 – Representation of the concept studied, 2015

All this progress made it possible to recognize the phenomenon's risk factors, ways of detection, measurement and consequences. Our goal was to answer a question about the clarity of the Dry Eye concept in the intensive care environment and explore the diverse predisposing factors to its occurrence.

Unlike many organs of our body, and despite the eye is easily available and accessible for clinical assessment, research still exposes different connotations about the development of DES, its risk factors and consequences. Therefore, it became necessary to produce a synthesis that would subsidize the clarification of this concept.

Factors such as sedation, use of drug combinations, mechanical ventilation, prolonged admission time, low humidity, low temperature and lagophthalmia are examples of risk factors often present in ICU and thus favour a prevalence of more than 70% of patients with eye dryness up to five days of hospitalization⁽³⁾.

Although there is not a clear consensus to define the best way of treatment and which is the most used, the application of some substances such as topical cyclosporine, linoleic acid, omega-3 fatty acids, androgens, some types of tetracyclines and steroids are prescribed by physicians⁽²²⁾, and recommended.

The role of nursing clearly refers to its prevention and detection. As for prevention, the best alternative relates to ocular care procedures through the creation of a tear film with the use of eye drops, lubricants, artificial tears or the constitution of a moisture chamber by the occlusion with polyethylene film. Another prevention option is ocular closure using gauzes, adhesives or even sutures^(6,23). As for detection, the nurse can autonomously or in teams conduct tests that allow generating guides to identify the phenomenon. Once trained, nurses are capable of conducting TBUT tests, Fluorescein Test, Rose Bengal and Lissamine Green, besides the usual Schirmer's test I and II and Ocular Physical Examination⁽¹⁷⁾.

As we have observed, the prevention options are easy to access procedures, simple handling and low cost. This is why the high prevalence of DES in intensive care is questioned, because patients admitted to this environment are cared in a global and intermittent manner.

Studies to investigate the performance of ocular care should be carried out in order to diagnose which elements of nursing care may be revised due to the relevance of this phenomenon.

Study limitations

In this study, we discussed the concept analysis of DES in Intensive Care Units and we found two limitations during the construction and finishing procedure. The first regards the method of integrative review chosen to conduct the concept analysis.

This method allows the researcher to summarize the required information through articles located in databases. Therefore, the material used was restricted to that of the bases, published in previously selected languages, and not considered grey literature like dissertations and theses.

Another limitation relates to the non-evaluation of methodological quality, allowing the inclusion of studies considered of low scientific evidence, like narrative reviews. Nevertheless, we had to admit them in view of the need to synthesize definitions and identify diverse concepts.

Contributions to the Nursing, health or public policy sectors

This study provided clarification of the concept and, consequently, a better understanding of the phenomenon. In addition, it is in line with the World Health Organisation's Global Action Plan on Universal Eye Health 2014-1029, aimed at reducing avoidable visual impairment as a global public health problem⁽²⁴⁾.

Hence, its results evidence and influence the development of policies aimed at prevention and assessment of Dry Eye in

ICU. Moreover, it allows the foundation of the knowledge of nursing practice in relation to this phenomenon, and it specially highlights the urgent need for research and professional education when considering the analysis of antecedents, attributes and consequents of Dry Eye in ICU.

CONCLUSION

This analysis of the concept of Dry Eye in Intensive Care Units proposed a clear meaning of the selected concept. It allowed us to verify this is an evitable phenomenon, despite recurring, mainly when the condition is acquired in ICU.

The antecedents and consequents found after the integrative review and analysis of the concept show that ICU are predisposing environments to the development of Dry Eye. After considering the consequents, we found that this is a limiting condition in physical and psychological aspects, intervening in the reduction of the quality of life of its patients, besides the possibility of causing irreversible damage.

This analysis is extremely important since it investigates a harmful condition, which can be prevented with the use of lubrication procedures considered simple and easily accessible. In conclusion, this study may represent a progress in literature on the matter by synthesizing, defining and analysing the Dry Eye phenomenon in a specific and highly prone environment.

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