

CONCORDÂNCIA INTERAVALIADORES EM AVALIAÇÃO DA CÓRNEA DE PACIENTES CRÍTICOS

INTER-RATER RELIABILITY IN THE ASSESSMENT OF CRITICAL PATIENTS CORNEA

CONCORDANCIA INTEREVALUADORES EN EVALUACIÓN DE LA CÓRNEA DE PACIENTES CRÍTICOS

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RESUMO

Objetivo: estabelecer o grau de concordância interavaliadores na avaliação da córnea de pacientes adultos, internados em unidade de terapia intensiva de um hospital público, através do teste de fluoresceína. **Métodos:** trata-se de um estudo transversal com abordagem descritiva, realizado com cinco avaliadores a partir do teste de concordância na avaliação da córnea de pacientes adultos internados em unidade de terapia intensiva de um hospital público de Belo Horizonte, Minas Gerais. Oitenta e cinco pacientes foram avaliados, totalizando 170 córneas. O coeficiente kappa foi utilizado para a avaliação do grau de concordância interavaliadores e para esta análise o nível de significância adotado foi o valor $p < 0,05$. **Resultados:** verificou-se concordância geral com variação do coeficiente kappa de 0,84 a 0,93 entre os avaliadores. Os índices obtidos indicam concordâncias quase perfeitas. **Conclusão:** a partir dos resultados, evidencia-se que os avaliadores após capacitação para avaliação corneana estão aptos a realizar o exame da córnea em pacientes adultos internados em unidade de terapia intensiva e que a concordância interavaliadores é uma importante etapa de validação a ser utilizada na calibração de profissionais para avaliações ou análises subsequentes.

Descritores: Córnea; Unidades de terapia intensiva; Reprodutibilidade dos testes; Avaliação em enfermagem, Enfermagem.

ABSTRACT

Objective: To establish the degree of inter-rater reliability in the assessment of the cornea of adult inpatients of an intensive care unit of a public hospital, using the fluorescein-eye-stain test. **Methods:** Cross-sectional descriptive study, conducted with five evaluators to reach inter-rater reliability in the assessment of cornea of adult inpatients of an intensive care unit of a public hospital in the city of Belo Horizonte, state of Minas Gerais. Eighty-five patients were evaluated, totaling 170 corneas. Kappa coefficient was used to measure the degree of inter-rater reliability, and the level of significance adopted for the analysis was $p < 0.05$. **Results:** Inter-rater reliability among evaluators was reached with a variation of 0.84 - 0.93 for the kappa coefficient. The results obtained indicate an almost perfect reliability. **Conclusion:** These results show that, after receiving training for corneal assessment, the evaluators are able to examine cornea of adult inpatients of an intensive care unit. Inter-rater reliability is an important validation step to use in the education of professionals to perform assessment, or for further analyses.

Descriptors: Cornea; Intensive care units; Reproducibility of results; Nursing assessment; Nursing.

RESUMEN

Objetivo: Establecer el grado de concordancia interevaluadores en la evaluación de córneas de pacientes adultos, en la unidad de cuidados intensivos de un hospital público, mediante el test de fluoresceína. **Métodos:** Se trata de un estudio transversal con enfoque descriptivo, realizado con cinco evaluadores a partir de la prueba de concordancia en la evaluación de la córnea de pacientes adultos ingresados en la unidad de cuidados intensivos de un hospital público de Belo Horizonte, Minas Gerais. Se evaluaron ochenta y cinco pacientes, con un total de 170 córneas. El coeficiente kappa fue utilizado para evaluar el grado de concordancia interevaluadores y para este análisis el nivel de significación fue de $p < 0,05$. **Resultados:** Hubo acuerdo general con la variación del coeficiente kappa de 0,84 a 0,93 entre los evaluadores. Los índices obtenidos indican concordancias casi perfectas. **Conclusión:** A partir de los resultados, es evidente que los evaluadores, después de la capacitación para la evaluación de la córnea, son capaces de llevar a cabo el examen de la córnea en pacientes adultos en la unidad de cuidados intensivos, y que la concordancia interevaluadores es un paso importante de validación para se utilizar en la calibración de profesionales para la evaluación o análisis adicional.

Descriptor: Córnea; Unidades de cuidados intensivos; Reproducibilidad de resultados; Evaluación en enfermería; Enfermería.

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INTRODUCTION

The care at intensive care units (ICUs) is one of the most complex in the health system. Generally, patients admitted to these units require the use of high technology, require the assistance of specialized human resources, with technical ability, clinical competence and dexterity with rapid decision making and the implementation of appropriate and immediate conduits⁽¹⁾.

The eye care of critical patients is a care that has been neglected at ICUs and that needs further studies to implement practices based on strong evidence. This fact can occur for several reasons, such as the need for understanding and assistance of a multiprofessional team, the nurse's lack of knowledge about ocular evaluation and the care to be implemented in order to reduce problems⁽²⁻⁶⁾.

In most cases, patients admitted to ICUs are sedated, in coma, in the use of mechanical ventilation, in the use of several drugs and with the mechanisms of protection of the impaired eyes. These may be factors associated with impairment of the eye protection mechanism, appearance of corneal lesions, and other more serious damage if there is extensive impairment⁽³⁻¹⁴⁾.

The most common corneal alteration in patients admitted to ICUs is superficial corneal abrasion or punctate-type corneal lesion⁽⁴⁻⁵⁾, with an occurrence between 8.7% and 60%^(4-5,8-9).

One method used to evaluate ocular surface damage is the fluorescein test. The test is indicated for evaluation of the cornea^(7,15). Fluorescein has the property of penetrating dead or degenerate epithelial cells, blushing them⁽¹⁵⁾. A previously trained nurse can perform the ocular evaluation for the identification of changes in the cornea, but this is difficulty at ICUs, since rarely there are professionals trained at these units for the ocular examination⁽⁴⁻⁵⁾.

Once a professional goes through the qualification process to perform evaluations, such as the ocular evaluation for the identification of changes in the cornea with fluorescein, the inter-rater reliability test needs to be performed. For this test, there must be an exam or evaluator considered gold standard, that is, recognized as appropriate for comparison purposes. The reliability test will allow verifying the degree of

equivalence, accuracy among isolated evaluations of two or more professionals⁽¹⁶⁻¹⁷⁾.

The present study is justified due to the lack of nursing professionals trained to perform the corneal evaluation of critically ill patients with the fluorescein test. In addition, recognition of changes and damages of the cornea surface may point to the need for implementation of clinical treatment and nursing care aimed at a higher quality of ocular interventions implemented in patients hospitalized in ICUs.

The present study aimed to establish the degree of inter-rater reliability in the evaluation of the cornea of critically ill patients hospitalized in an intensive care unit of a public hospital through the fluorescein test.

METHODS

This is a cross-sectional study, with a descriptive approach, performed from the inter-rater reliability test. There were comparison between the examinations of a nurse with experience and training in corneal evaluation of patients hospitalized in ICUs and a nurse-researcher; and between the nurse-researcher and a nurse of research technical support and two nursing students, in the evaluation of the cornea of adult patients hospitalized in an ICU of a public hospital in Belo Horizonte, Minas Gerais.

The hospital, the study scenario, is a large general hospital, and, currently, has 30 intensive treatment beds for adults available to the community.

The inclusion criteria were: aged 18 years old or older; not presenting with dry eye at admission; ICU stay for at least 24 hours; consent to participate in the research or having the participation authorized by the person responsible through the Informed Consent Form (ICF).

The established sample was by convenience. The study participants were those admitted to the ICU during the selected data collection periods, 50 patients between June and August 2013 and another 35 patients hospitalized from January to February 2014, thus totaling 85 participants. The study occurred at two moments: at the first one, the inter-evaluators assessment was performed between the nurse-researchers and the nurse (gold standard) with experience and training in the evaluation of the cornea of patients hospitalized in ICUs; and, at the second

one, between the nurse of the research technical support and the two nursing academics in relation to the nurse-researcher (gold standard).

The data collection used an instrument that included patient identification and clinical information such as registry, gender, age, marital status, hospitalization bed, comorbidities, medical diagnosis identified at ICU admission, and the fluorescein test result.

Before the beginning of the data collection (June to August 2013 and January to February 2014), the evaluators underwent a qualification for the examination of the cornea of critically ill patients. In June 2013, the nurse with experience and training in corneal evaluation trained the nurse-researcher; in January 2014, the nurse-researcher trained the nurse of the research technical support and the two nursing academics. The training consisted of theoretical explanation about corneal injury and practical training of ocular evaluation, besides reading articles and texts on the subject.

In the first phase of data collection (June to August 2013), the nurse with experience and training in corneal evaluation was considered the gold standard for performing the ocular evaluation through the fluorescein test. During the second stage of data collection (January to February 2014), the nurse-researcher was considered the gold standard.

For the evaluation of the cornea, each eye of the patient received a drop of fluorescein and, after 1 to 2 minutes, under low light conditions, the cornea was examined with the aid of an ophthalmoscope with cobalt blue filter and magnifying glass for better visualization of possible corneal alterations. The evaluators individually evaluated the corneas of each patient and, at the same time, each evaluator documented the findings in their respective data collection instrument.

There was the blinding of information. The evaluators were instructed not to consult the results and not to discuss the evaluation during the collections in order not to influence the answers.

Later, at the end of the data collection periods, the data was doubled in the Epi Info program, version 3.5.1, and, after verifying their consistency, the data were exported to the Statistical Package for Social Science (SPSS), version 19.0. The kappa⁽⁷⁾ coefficients were

calculated to establish the degree of reliability among the evaluators for the variable *result of the fluorescein test - positive or negative*. For this analysis, the significance level adopted was $p < 0.05$. Descriptive analysis (simple and percentage frequencies) was also carried out in order to obtain the frequency of variables, gender, age, marital status, comorbidities and medical diagnosis identified at the admission to the ICU.

For the analysis of the results of the evaluations about the reliability between the professionals, the denominated Kappa Coefficient has been used in several studies^(4-5,16-19). In this way, there is an attempt to ensure the uniformity of the evaluation or classification process in order to control or minimize biases in the conclusions and/or subsequent analyses.

The reliability degree of the categorical data measures established by the Kappa coefficient is represented as follows: values less than 0.00, insignificant; between 0.00 and 0.20, weak; between 0.21 and 0.40, good; between 0.41 and 0.60, moderate; between 0.61 and 0.80, substantial; between 0.81 and 1.00, almost perfect⁽¹⁷⁾. This study considered inter-rater reliability values between 0.81 and 1.00 acceptable, that is, almost perfect reliability degree.

The study complies with Resolution 466/12, which deals with researches with humans. The project was sent to the Research Ethics Committee of the Federal University of Minas Gerais and obtained a favorable opinion under the protocol CAAE - 15616313.4.0000.5149.

RESULTS AND DISCUSSION

Among the 85 patients admitted to the ICU during the study periods, 52% were women. The age ranged from 20 to 90 years, with an average of 57 years and standard deviation of 17.22. Most are married (56%). The most prevalent comorbidities among the patients were heart disease (35%), metabolic diseases (24%) and renal diseases (13%).

The main medical diagnoses identified in the individuals at admission to the unit were categorized in relation to external causes (32%), cerebrovascular diseases (30%) and pulmonary diseases (20%) (Table 1).

Table 1 – Profile of the patients hospitalized in the ICU of a public hospital - Belo Horizonte, Minas Gerais (2013 and 2014).

Characteristics	N (=85)	%
Gender		
Male	41	48
Female	44	52
Age group (Years)		
20 – 30	5	6
30 – 40	8	10
40 – 50	22	26
50 – 60	7	8
60 – 70	14	16
70 – 80	24	28
80 – 90	5	6
Marital status		
Unmarried	27	32
Married	48	56
Widow(er)	10	12
Comorbidities		
Heart Disease	18	35
Metabolic Disease	13	24
Renal Disease	7	13
Other	9	17
Medical Diagnosis Identified at the ICU Admission		
External causes	27	32
Cerebrovascular disease	26	30
Pulmonary disease	17	20
Other	15	18

Source: Data extracted from the master's dissertation "Risk and incidence prediction for dry eye in critically ill patients".

Among the patients, 50% are 60 years old or older. As the person grows older, he/she becomes more vulnerable to the appearance of non-communicable chronic diseases, especially cardiovascular and metabolic diseases⁽¹⁸⁾, with a consequent increase in hospital admissions.

Due to the seriousness of the clinical conditions, severely ill patients, such as those who are unconscious, in coma, using various drugs, in mechanical ventilation therapy and with alterations in systems considered vital (cardiovascular, respiratory and neurological), are hospitalized in ICUs. As a consequence of such conditions, the orbicularis muscle contraction can reduce, often resulting in ineffective eyelid closure, which, together with the damage to the tear film stability, may lead to impairment of the ocular protection mechanism and appearance of corneal lesions^(3-5,8-14).

Since trained and qualified, the nurse can perform the corneal examination of critical patients⁽⁴⁻⁵⁾ with the purpose of implementing interventions that minimize possible corneal and

visual changes. However, after the training, in order to evaluate the reliability degree in certain classification or evaluation, the inter-rater reliability should be performed. The reliability degree between the evaluators provides a limit of precision in subsequent evaluations⁽¹⁶⁻¹⁷⁾.

In the present study, the evaluators examined 85 patients, totalling 170 corneas. The kappa coefficient value found in the reliability between the nurse with experience and training in corneal evaluation of patients hospitalized in ICUs and the nurse-researcher was 0.84. Between the nurse-researcher, the nurse of the research technical support and the two nursing students, the values were, respectively, 0.86, 0.93 and 0.93 in the corneal evaluation.

The Confidence Interval (CI) allows verifying that the Kappa coefficient ranged from 0.53 to 1 with 95% confidence. For the kappa coefficient, the closer to 1, the higher the inter-raters' reliability degree and the statistical significance (Table 2).

Table 2 - Reliability degree among the evaluators in the corneal evaluation - Belo Horizonte, Minas Gerais (2013 e 2014).

Evaluator	Kappa Coefficient (95%CI)	P value
Nurse-researcher	0.84 (0.56 – 1.0)	<0.001
Nurse of technical support	0.86 (0.53– 1.0)	<0.001
Student A	0.93 (0.60– 1.0)	<0.001
Student B	0.93 (0.60– 1.0)	<0.001

Source: Data extracted from the master's dissertation "Risk and incidence prediction for dry eye in critically ill patients".

Researchers have used inter-rater reliability as an important validation step in their studies^(3-5,19-20), a statistical strategy for measurement of errors/correctness and to be used in the calibration of professionals to apply clinical classification or evaluation instruments.

In the study conducted by Simão, Caliri, and Santos⁽¹⁹⁾, twenty-two care nurses at four ICUs at a university hospital used the Braden scale for evaluation and risk rating of patients for pressure ulcer. For the reliability assessment, the score obtained by the researcher, a specialist nurse were considered as a gold standard. Results for the Braden scale total score ranged from zero to 0.86. There were differences of reliability between care nurses and differences in the classification of patients at different levels of risk.

A study⁽⁵⁾ performed with 35 patients to evaluate corneal lesions verified that, after the training and qualification of an intensive care nurse by an ophthalmologist, considered a gold standard for corneal evaluation, the nurse was able to perform the corneal evaluation, since the inter-raters' reliability degree obtained was 0.88.

In the study⁽²⁰⁾ with 12 nurses whose objective was to evaluate the consistency of the diagnoses of pressure ulcer staging from two-dimensional images among the participants, the Kappa coefficient varied between 0.45 and 1. The results indicate that the reliability levels obtained through the evaluation of two-dimensional images were lower than those obtained in the clinical practice.

In the present study, the result of the kappa coefficient obtained in the reliability test between the nurse with experience and training in corneal evaluation and the nurse-researcher was 0.84 in the corneal evaluation. Between the nurse-researcher and the nurse of the research technical support and the two nursing students, the values were, respectively, 0.86; 0.93 and 0.93 in the corneal evaluation, that is, almost perfect reliability degrees.

This study shows that, in order to achieve kappa coefficient indexes between 0.81 and 1.00, that is, almost perfect reliability degree, in large part, a high degree of training and qualification of the professionals who carry out the evaluation is necessary.

Obtaining inter-rater reliability in studies that include clinical evaluations is essential as it allows avoiding biases and errors, acquiring reliable measurements of comparable data and ensuring the accuracy maintenance in obtaining information in clinical studies.

Finally, a limitation of the present study was its development in critical patients, characterizing a particular profile of individuals. In turn, it contributes to knowledge in the field of intensive care nursing and demonstrates the importance of obtaining inter-rater reliability among nurses in clinical assessments.

CONCLUSION

Interrater reliability is essential to establish which measures obtained in clinical trials are reliable approximations of the true results of the attributes being measured.

In the present study, the evaluation of the reliability degrees among the evaluators revealed kappa coefficients with almost perfect reliability degrees, so the objective of professional qualification to proceed with reliable assessments of the corneas' integrity of critically ill ICU patients was reached.

Researchers are becoming increasingly aware of the need and importance of reliability studies as sources of validation of data obtained in clinical evaluations and that these are important for the minimization and/or correction of collection errors, since training and qualification, followed by measurement of measures obtained with acceptable reliability, provide subsidies for increasingly reliable assessments.

The nurse training for corneal evaluation in patients admitted to ICUs is fundamental so that future studies with critical patients can collaborate, indeed, representing clinical judgments about the set of patients' responses to real or potential problems and that, consequently, contribute to a higher quality nursing care.

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