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INTEGRATIVE REVIEW ARTICLE

EAR AND EYE PROTECTORS IN THE PROMOTION OF SLEEP IN INTENSIVE CARE

PROTETORES DE OUVIDO E OLHOS NA PROMOÇÃO DO SONO EM CUIDADOS INTENSIVOS

PROTECTORES DE OÍDO Y OJOS EN LA PROMOCIÓN DEL SUEÑO EN CUIDADOS INTENSIVOS

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ABSTRACT

Objective: to analyze the contribution of ear protectors and eye masks to promote the sleep of the patient admitted to intensive care. ***Method:*** integrative review of the literature that led to the search in the EBSCOHost search engine, in the databases CINAHL Complete, MEDLINE Complete, Cochrane Central Register of Controlled Trials and Cochrane Database of Systematic Reviews, for the identification of studies published between 2014 and 2018. Four randomized controlled trials were selected. This review considered the PRISMA recommendation. Levels of evidence were secured by the levels of evidence from The Joanna Briggs Institute and methodological quality was analyzed using the Clinical Appraisal Skills Program. ***Results:*** all articles selected, point to the benefits of using these devices to promote the quality of sleep of the patient in intensive care. ***Conclusion:*** due to the safety and benefits associated with these devices, it is suggested that they be used to promote the quality of the patient's sleep in intensive care. However, due to the scarcity of studies on the subject and the limitations of the studies analyzed, it is suggested that more quantitative studies with more representative samples be carried out. ***Descritores*:** Ear Protective Devices; Eye Protective Devices; Sleep; Critical Care; Delirium.

RESUMO

Objetivo*:** analisar a contribuição dos protetores auriculares e das máscaras oculares para a promoção do sono do doente admitido em cuidados intensivos. ***Método*:** revisão integrativa da literatura que conduziu à pesquisa no motor de busca EBSCOHost, nas bases de dados CINAHL *Complete*, MEDLINE *Complete*, *Cochrane Central Register of Controlled Trials* e *Cochrane Database of Systematic Reviews*, para a identificação de estudos publicados entre 2014 e 2018. Foram selecionados quatro ensaios controlados randomizados. Esta revisão considerou a recomendação PRISMA. Os níveis de evidência foram assegurados pelos níveis de evidência do *The Joanna Briggs Institute* e a qualidade metodológica foi analisada com recurso ao *Clinical Appraisal Skills Programme*. ***Resultados*:** todos os artigos selecionados apontam para os benefícios da utilização desses dispositivos para a promoção da qualidade do sono do doente em cuidados intensivos. ***Conclusão: pela segurança e benefícios associados a esses dispositivos, sugere-se a sua utilização para a promoção da qualidade do sono do doente em cuidados intensivos. No entanto, pela escassez de estudos sobre o tema e pelas limitações dos estudos analisados, sugere-se a realização de mais estudos quantitativos com amostras mais representativas. ***Descritores*:** Protetores para Ouvido; Dispositivos de Proteção dos Olhos; Sono; Cuidados Críticos; Delírio.

RESUMEN

Objetivo: analizar la contribución de los protectores auriculares y de las máscaras oculares para la promoción del sueño del enfermo admitido en cuidados intensivos. ***Método:*** revisión integrativa de la literatura que condujo a la investigación en el motor de búsqueda EBSCOHost, en las bases de datos CINAHL Complete, MEDLINE Complete, Cochrane Central Register de Controlled Trials y Cochrane Database of Systematic Reviews, para la identificación de estudios publicados entre 2014 y 2018. Se seleccionaron cuatro ensayos controlados aleatorizados. Esta revisión consideró la recomendación PRISMA. Los niveles de evidencia fueron asegurados por los niveles de evidencia del The Joanna Briggs Institute y la calidad metodológica fue analizada con recurso al Clinical Appraisal Skills Programme. ***Resultados:*** todos los artículos seleccionados apuntan a los beneficios de la utilización de estos dispositivos para la promoción de la calidad del sueño del enfermo en cuidados intensivos. ***Conclusión*:** por la seguridad y los beneficios asociados a estos dispositivos, se sugiere su utilización para la promoción de la calidad del sueño del paciente en cuidados intensivos. Sin embargo, por la escasez de estudios sobre el tema y las limitaciones de los estudios analizados, se sugiere realizar más estudios cuantitativos con muestras más representativas. ***Descritores*:** Dispositivos de Protectores de Oídos; Dispositivos de Protección de los Ojos; Sueño; Cuidados Críticos; Delirio.

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INTRODUCTION

It is known that sleep is a fundamental necessity for all human beings. It is a complex process, influenced by biological and environmental factors, whose physiological purposes are not yet fully understood.[1]

It is revealed that, for the patient who is admitted to intensive care, sleep and sleep quality are of extreme importance for the survival and recovery of the critical illness, [2-3] especially if it is considered that the critical illness is a situation of great vulnerability and that sleep and rest are, for the most part, fundamental to achieving good results.[1]

It is understood that, over the last decade, there have been numerous publications aimed at the study of sleep disorders in this population.[2] Compared to healthy adult sleep, studies that use polysomnography to characterize the sleep of the critically ill patient, point it out as the most recommended method for evaluating sleep, because it allows it to be characterized in terms of duration, continuity and architecture, [4] qualifying it as a scarce, fragmented sleep, with an increased, inefficient sleep times and frequent awakenings. [1-3] In addition to these particularities, several studies characterize the critical patient's sleep as a sleep that does not follow a regular circadian rhythm, in which there is an increase of the N1 and N2 stages, to the detriment of the N3 and rapid eye stages movement, which may be reduced or even absent.[1-5] It should be noted that N3 and rapid eye movement play a key role in many physiological functions at the level of the central nervous, cardiovascular, endocrine, respiratory and immune systems.[3]

It is understood that the evidence that sleep disturbances in the patient admitted to intensive care are common and contribute to various adverse effects is increasingly clear and consistent.1,6 Of the adverse consequences associated with sleep, characterized by being reduced and fragmented, there is a greater tendency for intrinsic stress factors and a greater pre-disposition for delirium.[3,7] However, several authors report that sleep disorders in the critically ill patient contribute to other aspects detrimental to the recovery of critical illness. At a respiratory level, for example, there is a close relationship between sleep disorders and the decrease in inspiratory muscle performance that directly affects the weaning processes of mechanical ventilation and contributes to the increase of failure rates in mechanical ventilation.[2-3]

It should be emphasized that intensive care units are services endowed with physical, material and human resources aimed at the monitoring, surveillance, support and treatment of the critical patient, a patient who usually presents vital functions that are threatened or in bankruptcy.[8] In this context , these units are provided with the latest diagnostic methods and medical and surgical therapies, [8] attributes that often contribute to their presentation with various environmental characteristics that may contribute to the patient's sleep disorders admitted in this context, since excessive noise, excessive illumination, intensive therapies and factors associated with the interventions of health professionals are evidenced.[1-3,9-10] It is also pointed out that the administration of some types of drugs may have a negative impact in sleep and its quality such as vasopressors, antibiotics, analgesics and sedatives.[1]

It is considered that some environmental mechanisms, even if they can be modified from a theoretical point of view, are truly difficult to change or reduce, since it is quite often that there are very high levels of human activity during the night shift. Noise and excessive light, two of the most frequent complaints of patients admitted to intensive care, may result from the admission of new patients or simply from alarms that, for safety reasons, remain adjusted to the patients' clinical situation.[1,3]

It is noted that, although noise tolerance varies from individual to individual, most adults tolerate maximum noises between 50 and 55 decibels during the daytime period and between 40 and 45 decibels during the night time period. The World Health Organization recommends a sound limit of 35 decibels

for hospital daytime sound levels during daytime and night time periods, and the recommended limit is 40 decibels for sound peaks. [2-11] However, most studies evaluating sound levels in intensive care refer to 80-decibel sound peaks during regular practice of care.[1-2] The latest scientific evidence holds that, in enclosed spaces, a noise of 30 decibels and noise peaks 45 decibels may adversely affect sleep and result in sleep disturbances, and noise above 70 decibels may lead to vasoconstriction, increased heart rate, hypertension, and cardiac arrhythmias.[2]

It is emphasized that excess light is another harmful and disruptive factor that directly affects the synchronization of circadian rhythm and is a peculiarity frequently mentioned by patients admitted to intensive care.[1-2]

It is recalled that there are also physiological and psychological factors that may contribute to the reduction of sleep quality of the patient admitted to intensive care, from which pain, disease, critical illness pathophysiology, stress and the anxiety are highlighted.[1,9,12]

It is generally argued that low quality sleep contributes directly to the length of hospital stay and to a decrease in the quality of life in the post-hospitalization period in intensive care.[2-3]

Some existing devices can now be used to improve sleep and sleep quality, some of which are associated with very low cost and very simple and safe to use. One of the suggested strategies for protecting the patient from excessive noise includes the use of ear protectors. With regard to patient protection for exposure to excessive light, one of the strategies suggested is the use of eye masks.

It is noteworthy that, although the deleterious effects associated with insufficient sleep characteristic of the critical patient admitted to intensive care have been recognized for several decades, few studies have been done on these strategies to promote patient sleep in this environment.

Therefore, in this study, the intention is to analyze the contribution of the ear protectors and the eye masks to the promotion of sleep of the patient admitted to intensive care.

METHOD

It is an integrative review of the literature that included the development of the research question, the research in scientific databases, the analysis and interpretation of the articles selected and the synthesis and presentation of the results obtained. The strategy included the search of articles published in English between January 2014 and January 2018, via the EBSCOHost search engine, in the following databases: CINAHL Complete, MEDLINE Complete, Cochrane Central Register of Controlled Trials and Cochrane Database of Systematic Reviews.

It should be noted that the research included the descriptors Earplug, Eye Mask, Sleep and Critical Care and used the word "and" as the Boolean operator. Inclusion criteria defined for the selection of studies comprised: (1) patients aged 18 years or over; (2) patients admitted to intensive care; (3) experimental group submitted to the use of ear protectors and ocular masks at night time; (4) control group that was not submitted to the use of ear protectors and eye masks at night time.

Six articles of which duplication was found were identified. After reading the title and abstract, an article was excluded because it did not comply with the first inclusion criterion. The remaining four articles were selected for analysis and included four randomized controlled trials. After reviewing the articles by the three authors, the decision to include them in this review was unanimous not only because they all respond to the research question, but also by the level of evidence demonstrated.

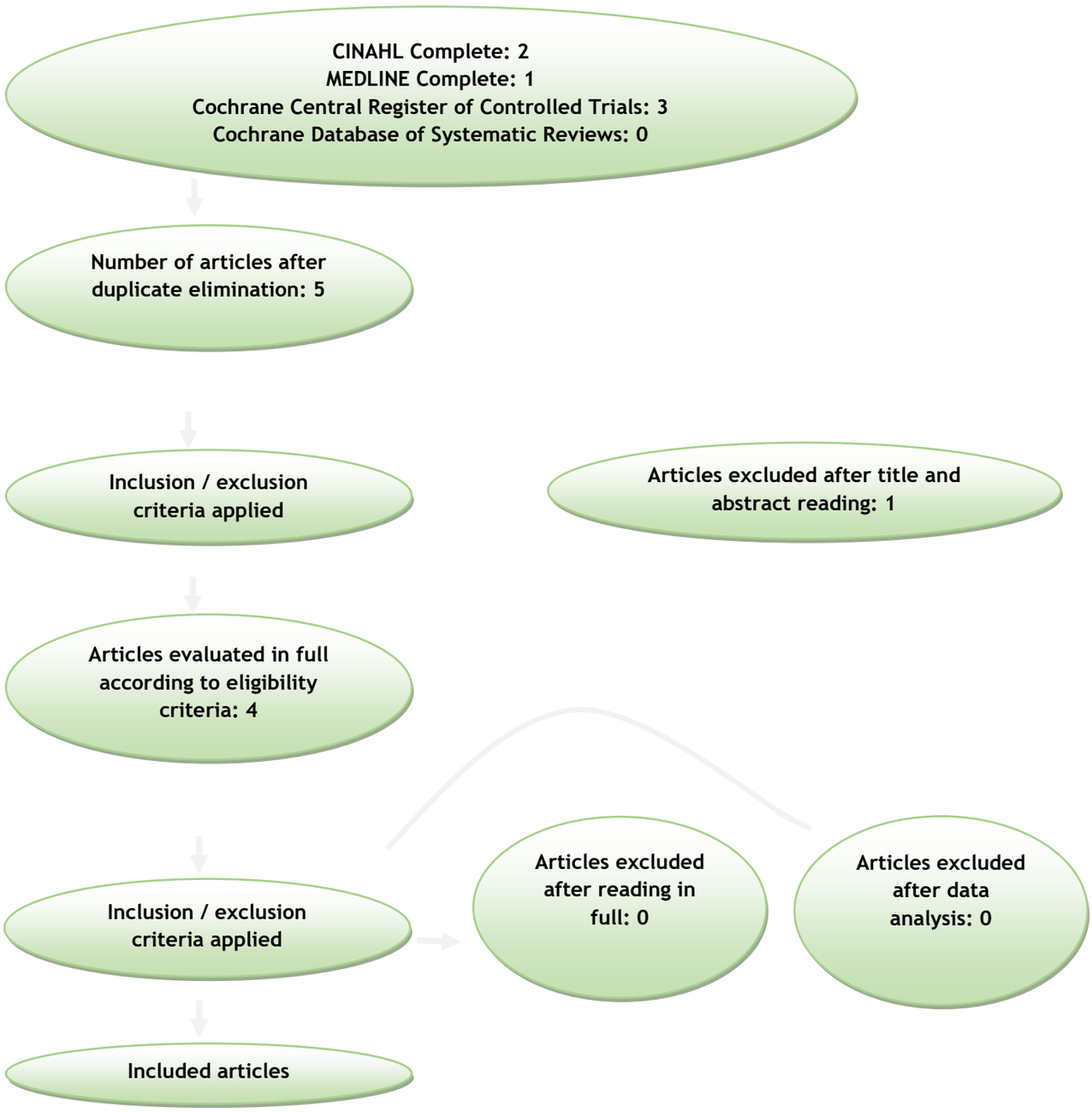

Figure 1. PRISMA diagram for the presentation of the research methodology. Beja, Portugal, 2017.

It is evidenced that the levels of evidence from the selected studies for this integrative review were evaluated based on the levels of evidence from The Joanna Briggs Institute. The methodological quality was analyzed using the Clinical Appraisal Skills Program, which allows the classification of studies at two levels: level A for studies with good methodological quality and reduced bias, with a score between six and 11 points; level B for studies with satisfactory methodological quality, but with increased bias potential, with a minimum score of five points.

The levels of evidence and the methodological quality are presented in figure 2.

Title/Year	Level of evidence	Methodological quality
Effects of earplugs and eye masks combined with relaxing music on sleep, melatonin and cortisol levels in ICU patients: a randomized controlled trial. (2015)	1.c – Randomized controlled trial	Level A
Impact of earplugs and eye mask on sleep in critically ill patients: a prospective randomized study. (2017)	1.c – Randomized controlled trial	Level A
Effects of earplugs and eye masks on perceived quality of sleep during night among patients in intensive care units. (2015)	1.c – Randomized controlled trial	Level A
Earplugs and eye masks vs routine care prevent sleep impairment in post-anesthesia care unit: a randomized study. (2014)	1.c - Randomized controlled trial	Level A

Figure 2. Levels of evidence and methodological quality of the studies analyzed. Beja, Portugal, 2017.

RESULTS

Table format (Figure 3) was chosen to present the results with a view to facilitating and simplifying the interpretation of these results by analyzing the articles included in this integrative literature review.

Authors/ Date	Population	Interventions/ Phenomena of Interest	Results	Limitations of the Study
Hu RF, Jiang XY, Hegadoren KM, Zhang YH. (2015)	50 people, older than or equal to 40 years of age, underwent primary and elective cardiac surgery in which the presence of at least two nights in cardiac intensive care was anticipated.	50 participants randomly divided into two groups of 25 participants. Control group: standard care of the night shift. Experimental Group: standard care of the night shift, putting on ear protectors, face mask, from 9:00 pm until the following morning, and listening to 30 minutes of relaxation music. Sleep quality was assessed using the Chinese version of the Richard Campbell Sleep Questionnaire and the Pittsburgh Sleep Quality Index Questionnaire.	Data was analyzed from 45 patients, 20 from the experimental group and 25 from the control group. The experimental group presented better results in terms of the following variables: sleep depth, latency (time to fall asleep), number of awakenings, efficiency (percentage of time agreed), subjective sleep quality, subjective noise perception.	The lack of an objective evaluation of sleep; the specificity of the population, which conditions the generalization of the results for other patients admitted to intensive care.
Demoule A, Carreira S, Lavault S, Pallanca O, Morawiec E, Mayaux J, et al. (2017).	64 people, aged 18 years and over, admitted to intensive care.	64 participants randomly divided into two groups of 32 participants. Control group: standard care of the night shift. Experimental Group: standard care of the night shift, putting ear protectors and eye mask in the period between 10 pm and 8 am. Sleep quality was assessed by means of polysomnography.	In the 21 patients (70%) of the experimental group who tolerated the placement of ear protectors and ocular masks during the whole night period, the following results were verified, compared to the results of the control group: - The proportion of N3 stage was higher [21 vs. 11]; - The duration of the N3 stage was higher [32-106 vs. 7-76 minutes]; - The number of prolonged periods of wakefulness was lower [21 periods of 19-26 minutes vs. 31 periods of 21-47 minutes].	The intolerance of about 30% of participants in the experimental group to the placement of the devices.
Dave K, Qureshi A, Gopichandran L. (2015)	50 people, aged between 20 and 70 years, who were admitted to intensive care for a period of two to seven days.	50 participants randomly divided into two groups of 25 participants (Groups A and B). Group A: wearing ear protectors and face mask on the first night of admission, between 9:00 p.m. and 6:00 p.m., and standard care of the night shift on the second night. Group B: standard care of the night shift on the first night and wearing ear protectors and face mask on the second night, from 9:00 p.m. to 6:00 p.m. Sleep quality was assessed using the Richard Campbell Sleep Questionnaire and through a standardized interview.	On the first night, group A had an average sleep time of 70.26 ± 5.89 minutes and, on the second night, an average sleep time of 45.86 ± 4.86 minutes. On the first night, group B had an average sleep time of 43.06 ± 7.31 minutes and, on the second night, a mean sleep time of 68.74 ± 6.54 minutes.	The data collection in only one night of intensive care hospitalization and the reduced size of the sample.
Le Guen M, Nicolas-	50 people undergoing non-	50 participants randomly divided into two groups	Data was analyzed from 45 patients, 23 from the	The lack of determination of patients'

Robin A, Lebard C, Arnulf I, Langeron O. (2014)	cardiac major surgery, without neurological and / or respiratory failure.	of 25 participants. Control group: standard care of the night shift. Experimental Group: standard care of the night shift and putting on ear protectors and face mask. Sleep quality was assessed using: MOSS Scale and Spiegel Scale; evaluation of behavior performed intermittently by an external nurse; evaluation of the wrist motor activity performed through the evaluation of the non-dominant wrist, started at 20h and scheduled for monitoring every five seconds in the twelve hours after placement.	experimental group and 22 from the control group. On the night prior to surgery, there were no significant differences in the subjective sleep quality of the two groups. On the night after surgery, compared to the evaluation performed the night before surgery, the following results were observed: - Better results in the self-evaluation of sleep in the experimental group compared to the results of the control group: better sleep latency [31 vs. 46 minutes], plus effective sleep time [319 vs. 30 minutes]. 253 minutes], less sensation of interruption of sleep [56 vs. 95%], less difficulty in falling asleep [27 vs. 25]. 55%], less subjective sleep interruption [4 vs. 7 patients], less sensation of need of rest [50 vs. 95%]; - Higher percentage of nursing interventions without awakening the patient [42 vs. 9%]; - Absence of significant differences in the motor activity of the wrist; - Less incidence of disorientation in the postoperative period in the experimental group [0 vs. 14%]; - Fewer patients without postoperative opioid administration.	sleep pattern, prior to surgery, by the method of actigraphy; the absence of a study using the double-blind method, impossible to apply in a study of this nature.

Figure 3 - Synoptic of the analyzed studies. Beja, Portugal, 2017.

DISCUSSION

The existence of few studies on the benefits of the use of ear protectors and eye masks to promote the sleep of the patient admitted to intensive care are confirmed. It is understood that, in fact, although the sleep and sleep disorders of the patient admitted in this context are a concern of the health professionals of these units and are part of a theme that has been studied for several decades, with several studies identifying the main etiologies of sleep disorders in this population and their main deleterious effects, there is little scientific evidence of the benefits that these devices can have for promoting the quality of sleep in intensive care, especially in the last five years.

It should be emphasized that the studies included in this review present significant differences in the methods used to evaluate the benefits of these devices, especially in the methods used for the evaluation of sleep quality, with only one using the polysomnography method, one of the most current methods and advanced techniques available for the evaluation of sleep quality. It appears, however, that the samples used are very similar in all studies and that the conclusions reached by the authors are very similar and all support the use of ear protectors and eye masks during the night in patients admitted to intensive care.

In the study[2], the authors did not limit the interventions to the use of these devices and also included 30 minutes of auscultation of relaxation music. The evaluation methods used included the evaluation of subjective sleep quality, using the Richard Campbell Sleep Questionnaire and the Pittsburgh Sleep Quality Index Questionnaire, and the evaluation of melatonin and cortisol levels. Although the interventions were not limited to the use of the devices under review in this review, the short period of listening to relaxation music to which participants were subjected, which was limited to thirty minutes, but especially for the conclusions that the researchers presented, was chosen by its inclusion in this review because it is believed that its results contribute to the confirmation that these devices are beneficial for the promotion of sleep quality and contribute directly to the limitation of the adverse effects associated with sleep disorders. The authors were not able to conclude whether there were benefits associated with these interventions regarding cortisol and melatonin levels, which remained the same in the experimental and control groups.

It is also evidenced[3] promoted the only study included in this review in which sleep quality was assessed objectively using the polysomnography method, which allowed the conclusion that there are benefits of using these devices for the promotion of sleep quality of the patient admitted to intensive care. Although the results are considered to be consistent, it is emphasized that the study with the smallest sample of all the studies analyzed was the result of some participants not having tolerated the placement of the devices, which led the authors to conclude that these devices are beneficial when tolerated as they contribute to the increase in stage N3 and to the reduction of long-term waking periods of the person admitted to intensive care.

In the study, [9] the particularity of having the devices under study been applied to two groups of participants at different times of hospitalization. The results presented were very similar in both groups and, although the authors consider that the reduced sample size and the fact that the devices were restricted to one night were limitations that should be considered, they concluded that there are significant benefits in the use of these devices to promote the sleep of patients admitted to intensive care. Participants in this study identified noise and excessive lighting as the factors that most disturbed sleep quality. It is also mentioned that more than 70% of the participants mentioned that the ear protectors and the face mask are comfortable.

In the study,[10] the fourth study included in this review, the authors concluded not only that there are benefits of the use of these devices, in intensive care units and in post-anesthetic care units, for the

preservation of sleep quality, but also found benefits in terms of the incidence of disorientation in the postoperative period and in the level of administration of opiates, which was lower in the experimental group. The authors consider that, due to the simplicity of use, low cost and safety, the use of these devices should be generalized in intensive care and postoperative units.

It is inferred that, in general, all studies analyzed conclude that the use of ear protectors and eye mask are beneficial for the promotion of sleep and sleep quality of the patient admitted to intensive care.

CONCLUSION

It is difficult, if not impossible, even in intensive care units where state-of-the-art care is provided and where there is evidence of the latest technological resources for monitoring, surveillance and treatment of the critical patient in the light of current technology and the usual care given to patients of this nature, to eliminate all characteristic environmental factors from such units that contribute to sleep disorders such as excessive noise or excessive light during the night period, only to enumerate those most frequently identified by patients experiencing hospitalizations in these contexts. As far as noise is concerned, this conviction increases following the results of a study carried out in five intensive care units in the United Kingdom confirming that, in units of these characteristics, sound levels are higher than those recommended by the World Health Organization. In this study, the mean noise obtained was 45 decibels and, during 50% of the day, values were obtained between 52 and 59 decibels.

It should also be noted that the sonorous peaks, which had an equal prevalence during the day and night periods, occurred 16 times per hour, with peaks reaching values above 85 decibels.[11] The authors of this study concluded that care, monitoring and therapies practiced in these units, the values recommended by the World Health Organization for sound limits are currently impossible to achieve in intensive care. Nevertheless, they can be minimized, with the recommendation of the authors being the use of ear protectors for the reduction of noise perception and for the promotion of sleep quality.[11]

Similar results regarding the direct benefits that the use of ear protectors and eye masks can have for the promotion of sleep of the patient admitted in intensive care were presented, through the studies analyzed and included in this review. However, despite the fact that they are randomized clinical trials, the sample sizes are considered to be small, analyzing the number of patients currently admitted to intensive care, especially in polyvalent intensive care units, the reason why authors of this review are unanimous in the recommendation that more studies should be carried out on the subject not only to confirm the benefits of these devices but also to identify the ideal moment for their placement and the ideal time for them to remain in place.

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