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REVIEW ARTICLE

A Systematic Review of Non-Pharmacological Interventions to Prevent Delirium at Intensive Care Units

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Abstract

Objective: It was aimed to systematically review non-pharmacological interventions used to prevent delirium at intensive care units.
Methods: A search was conducted for publications in the period of 2013-2020 by using keywords determined based on Medical Subjects Headings and Embase Tree on the databases of Cochrane, CINAHL, PsyInfo, PubMed and EMBASE. Quasi-experimental, experimental and randomized-controlled studies were included in the review.
Results: Thirteen studies meeting the criteria of this review were determined. The studies were categorized under the titles of multi-component, patient education, hormone intervention, physical environment, therapeutic intervention, automated preventive system, quitting daily sedation and exercise. It was determined that the interventions had important effects regarding delirium management, but only the multi-component intervention application was significant.
Conclusion: According to results of this systematic review, it is recommended to use multi-component interventions in delirium treatment.
Keywords: Delirium, Intensive Care Unit, Non-pharmacological, Prevention, Systematic Review

INTRODUCTION

Delirium is an acutely developing brain dysfunction syndrome which leads to changes on the level of consciousness and is characterized by illusion, hallucination and inappropriate behaviors (1,2). The prevalence of delirium at intensive care units (ICU) is in the range of 25-87% (1-3).

In literature reviews, the rate of observing delirium at ICUs was determined as 29% in patients receiving respiration support by ventilators (4). While mechanical ventilators trigger delirium, in patients developing delirium at an ICU, the duration of being under mechanical ventilation and intensive care becomes longer, extubation is delayed, and mortality and costs increase (3, 5, 6). As delirium causes cognitive disorders, it increases the risk of returning to the hospital after being discharged (7, 8).

Evidence-based interventions that aim to prevent the emergence of delirium at ICUs or reduce the duration of morbidity have a significant improvement potential in the short and long runs. Delirium-preventing interventions include pharmacological and non-pharmacological methods. Delirium is usually treated with different pharmacological methods at ICUs. In addition to the sedating effects of drug application to suppress delirium symptoms, these drugs may also trigger respiratory inhibition and aspiration pneumonia (9). Such side effects are a significant risk factor for mortality and morbidity for elderly patients and those with poor general status hospitalized at ICUs (9,10). This is why non-pharmacological methods for preventing or improving delirium at ICUs have great importance. These methods may be listed as supporting sleep quality, providing a light-dark cycle, reminding the place and time, frequent continuation of contact with familiar faces, prevention of noise in the environment, environment management, providing necessary information before surgery, neurological monitoring and activities to prevent social isolation (1, 9, 11-18).

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After making the diagnosis of delirium for patients, it is needed to investigate its etiology and eliminate supporting factors (1). Risk factors for delirium development include advanced age, existing dementia, coma, staying at ICU, history of emergency surgery or trauma and diseases with severe clinical prognosis (1). Other risk factors may be listed as application of blood transfusions and usage of benzodiazepines and other sedative drugs (1). Environmental factors such as usage of physical limitations that lead to immobility, social isolation, sleep deprivation and excessive light and noise are among the modifiable causes of delirium (1, 18-22).

In delirium management at ICUs, pharmacological methods had been usually utilized until 2013, but after October 2013, the literature started to include studies that utilized therapeutic practices such as sleep, provision of sleep quality, reduction of noise, light-dark cycle, patient mobilization, rehabilitation, exercise and non-pharmacological interventions to prevent delirium and investigated the effectiveness of these (23).

This study aimed to prepare a systematic review with articles published between October 2013 and March 2020 which tested the effectiveness of non-pharmacological interventions towards preventing delirium at adult intensive care units.

OBJECTIVES

This Systematic Review: followed the steps of the Preferred Reporting Items for Systemic Reviews and Meta-Analyses (PRISMA) (24).

Screening Process: Literature screening was carried out by using "('intensive' or 'critical care' and abbreviations, with the keywords of 'delirium', 'intervention', 'approach', 'nursing' or 'non-pharmacologic' or 'treat' or 'management' or 'prevention'). These keywords were determined based on Medical Subjects Headings (MeSH) and Embase Tree (EMTREE).

Relevant research articles published on the topic between 2013 and 2020 were included in the review process. As a result of searching, a total of 2420 articles from the databases of Cochrane (n=344), CINAHL (n=321), PsyInfo (n=228), PubMed (n=182) and EMBASE (n=744) were accessed.

The criteria for inclusion in the systematic review were as 1) Published in a national/international refereed journal, 2) Published between October 2013 and March 2020, 3) Quasi-experimental, experimental or randomized-controlled study, 4) Samples containing patients hospitalized at secondary or tertiary institutions' adult ICUs. Based on the inclusion criteria, the review included 13 studies.

Data Extraction: For the data to be summarized, the author developed a standardized data extraction form, and the data were evaluated based on this form. The content of the data extraction form included information on the studies' authors, year, design, sample characteristics, data collection tools/examined parameters, type of intervention and applied intervention.

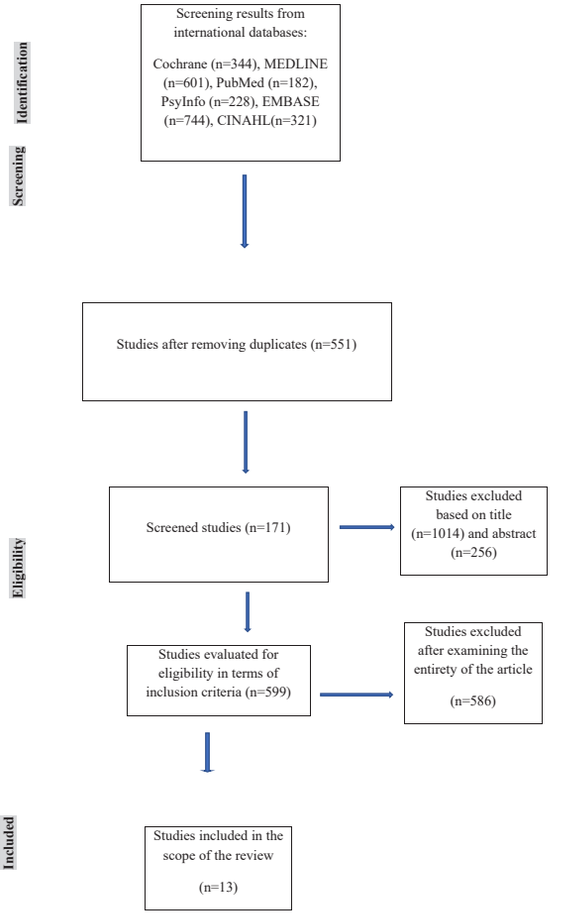

Figure 1. Study Selection. Source: Moher et al., The PRISMA Group. Preferred reporting items for systemic reviews and meta-analyses: the PRISMA statement. PLOS Med 2009.

RESULTS

The characteristics of the studies included in the scope of the systematic review are presented in Table 1. It was determined that the studies that were included were conducted between 2013 and 2020, 3 were quasi-experimental studies, 1 was an experimental study, and 9 were randomized-controlled studies. The sample size for the experiment group varied between n=30 and n=440, while that for the control group varied between n=30 and n=373.

It was determined that the scales of the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) (25), the Richmond Agitation Sedation Scale (RASS) (26) and the Intensive Care Delirium Screening Checklist (ICDSC) (27) were used to collect data (Table 1.).

Table 2 shows the data obtained from the studies included in the scope of the systematic review. The types of interventions that were used in the studies were categorized under 8 titles as multi-component, patient education, hormone intervention, physical environment, therapeutic intervention, automated preventive system, quitting daily sedation and exercise.

Table 1. Characteristics of studies included in systematic review

No	Authors, year/country	Research characteristics	Sample characteristics	Data collection tools/examined parameters
1	Balas et al., 2014/USA	Quasi – experimental, conducted at internal and surgical ICU	Exp. 150 (mean age 55.6), control 146 (mean age 59.2) persons	CAM-ICU/delirium development and duration, hospitalization duration, mortality
2	Bounds et al., 2016/USA	Quasi – experimental, conducted at ICU	Exp. 79 (mean age 65.3), control 80 (mean age 67.2) persons	ICDSC/ delirium development and duration, hospitalization duration
3	Chevillon et al., 2015/USA	Randomized controlled, internal and surgical cardiovascular ICU	Exp. 63 (mean age 63), control 66 (mean age 55) persons	CAM-ICU/ delirium development and duration, hospitalization duration
4	Ford et al., 2019/Australia	Randomized controlled, cardiovascular surgery ICU	Exp. 84 (mean age 69), control 82 (mean age 67.6) persons	CAM/ delirium development and duration, hospitalization duration
5	Giraud et al., 2016/UK	Randomized controlled, cardiovascular surgery ICU	Exp. 115 (mean age 77.4), control 108 (mean age 77) persons	CAM-ICU/ delirium development and duration, hospitalization duration
6	Guo & Fan, 2016/China	Experiment control, ICU	Exp. 59 (mean age 54), control 63 (mean age 52) persons	CAM-ICU/ delirium development
7	Guo et al., 2016/China	Randomized controlled, surgical ICU	Exp. 81 (mean age 73.3), control 79 (mean age 73.7) persons	CAM-ICU/ delirium development and duration
8	Karadaş et al., 2016/Turkey	Randomized controlled, internal ICU	Exp. 47 (mean age 75), control 47 (mean age 72.6 persons	CAM-ICU/ delirium development and duration
9	Khan et al., 2013/USA	Randomized controlled, conducted at ICU	Exp. 30 (mean age 74.2), control 30 (mean age 75.1 persons	CAM-ICU/ delirium development, hospitalization duration
10	Khan et al., 2014/USA	Quasi – experimental, conducted at internal and surgical ICU	Exp. 440 (mean age 75), control 262 (mean age 55.4 persons	CAM-ICU/ delirium development
11	Moon et al., 2015/Korea	Randomized controlled, conducted at ICU	Exp. 60 (mean age 70.4), control 63 (mean age 69) persons	CAM-ICU/ delirium development, hospitalization duration
12	Naghibi et al., 2020/Iran	Randomized controlled, conducted at ICU	Exp. 82 (mean age 47.15), control 82 (mean age 45.57) persons	CAM-ICU and RASS/ delirium development and duration, hospitalization duration, mortality
13	Simons et al., 2016/ Netherlands	Randomized controlled, conducted at ICU	Exp. 361(mean age 66.3), control 373 (mean age 64.4. persons	CAM-ICU/delirium development and duration, hospitalization duration, mortality

Table 2. Data obtained from studies included in systematic review

No	Authors, year	Type of Intervention	Applied Intervention
1	Balas et al., 2014	Multi-component	Wakefulness and Respiration Coordination, Delirium Monitoring/Management and Early Exercise / Mobilization package
2	Bounds et al., 2016	Multi-component	Wakefulness and Respiration Coordination, Delirium Monitoring/Management and Early Exercise / Mobilization package
3	Chevillon et al., 2015	Patient education	Individualized multi-dimensional pre-operation education on "what can you expect from your ICU stay" using visual, tactile, kinesthetic and auditory instruction methods
4	Ford et al., 2019	Hormone application	3 mg melatonin was given orally or enterally for 7 nights starting from 2 days before surgery
5	Giraud et al., 2016	Physical environment	Structured mirror intervention to preserve optimum sensory stimulation
6	Guo & Fan, 2016	Multi-component	Nurse-led preoperative multidisciplinary intervention program "nurse education – protection of a safe environment – provision of social support – increasing sleep quality"
7	Guo et al., 2016	Multi-component	"Multi-component non-pharmacological interventions" – personnel: systematic psychological education and counselling – pre-operation patient education: psychological counselling, visiting surgical ICU, introduction of permanent catheter – 3-time stimulation of cognitive activities – orientation device: calendar, watch, mobile phone, radio, glasses, hearing aids – improvement of effective communication – a good sleep – continuation of wakefulness cycle – patient status, not allowing usage of permanent catheters – asking for music preference – nasogastric feeding at the shortest time
8	Karadaş et al., 2016	Exercise	ROM exercises 10 times for approximately 30 minutes in a supine position
9	Khan et al., 2013	Automated preventive system	GOPHER Physician Order Entry System (clinical decision support system): While entering orders, the system electronically sends these to the workstation of nurses at the patient unit, and requests are printed at appropriate places
10	Khan et al., 2014	Quitting daily sedation	Daily quitting of sedation, spontaneous respiration work at 7 in the morning
11	Moon et al., 2015	Multi-component	Tailored ICU delirium prevention protocol" – delirium risk monitoring and screening – cognitive assessment and direction – environment, early therapeutic intervention
12	Naghibi et al., 2020	Therapeutic intervention	Music therapy: -Patient control -Slow-paced, relaxing music Audio book
13	Simons et al., 2016/ Netherlands	Physical environment	Circadian rhythm to support dynamic light application therapy

Assessment of methodological Quality

Methodological quality assessments were made for the 13 studies that were included in the systematic review. In this study, the MAStARI (Meta-Analysis of Statistics Assessment and Review Instrument) critical assessment instrument recommended by the Joanna Briggs Institute (JBI-MAStARI) was used as the methodological quality assessment instrument (28). As a result of the assessment, the highest and lowest scores given to the studies were respectively 9 and 7. For interrater reliability, the agreement analysis – kappa value in the SPSS 25 software was calculated. The kappa value obtained in this study was 0.81, and the interrater agreement rate was determined to be substantially high.

Before this study was sent to the journal, it was sent to a neuroscientist (Ph.D) and a specialist intensive care nurse (MSc.) for review, after which the article was revised in line with their recommendations.

Effects of Preventive Interventions on Delirium

The studies examined the effects of interventions made towards preventing delirium on delirium development, duration, ICU hospitalization duration and/or reduction/ prevention of mortality. Moreover, the results of the studies included that all interventions that were applied were effective. It was determined from the results of the studies that the delirium reduction/prevention interventions that were statistically significantly effective were multi-component interventions. As seen in Table 2, the delirium prevention interventions at ICUs were categorized under the titles of multi-component, patient education, hormone intervention, physical environment, therapeutic intervention, automated

preventive system, quitting daily sedation and exercise. The articles that used multi-component interventions covered most of the interventions that were used in the single-intervention articles. In the review, there were 2 studies where the interventions of wakefulness-respiration coordination, exercise, mobilization and delirium monitoring/management were combined into a delirium care package. In other studies, differently, cognitive applications, education and therapeutic interventions were added to delirium monitoring. In the single-component studies, therapeutic intervention, education, environmental organization and quitting sedation were applied separately. While the hormone application in the study by Ford et al. is an intervention that is not frequently encountered in the literature, as it was not applied alongside the interventions of place and time orientation, therapeutic communication, education, mobilization and exercise, it rises a contradiction regarding its appeal to patient psychology, which is why it is not adequate by itself.

DISCUSSION

This systematic review which was prepared with studies where the effects of non-pharmacological interventions were investigated included a total of 13 studies. The reason for selecting the studies included in this review from the year 2013 on was that non-pharmacological methods started to gain momentum in that year, and studies that matured in this sense started to appear in the literature (23). As a result of this review, it is seen that, in eliminating delirium at ICUs, improving the cognitive status of the patient, achieving their orientation, organizing the physical environment well and exercise/mobilization/therapeutic interventions are highly important.

In this review, it was determined that mainly CAM-ICU was used to determine delirium. There are opinions that using a scale to determine delirium at ICUs is an unreliable method (29-31). In addition to this, rather than using CAM-ICU only, it may be used alongside RASS. Moreover, some researchers do not accept usage of scales as a reliable method as it is subjective, and they recommend making sure to obtain an objective diagnosis by using electroencephalography (EEG) (32, 33). Among the studies included in this systematic review, it was determined that only Naghibi et al. used RASS.

One of the reasons why using scales in determining delirium at ICU is not found adequate is the risk of confusing delirium symptoms with encephalopathy. That is, the fact that scales do not have the capacity to distinguish these two clinical conditions is seen as a significant problem. It is believed that the most effective method in presenting the difference between delirium and encephalopathy is EEG (34,35).

While EEG examination is a field that neuroscience experts and neurologists are more concerned about today, it is an important requirement for ICU physicians and nurses to receive training in taking EEGs and reading the results. This is because, as scale usage is a subjective method, overestimation of delirium imposes a responsibility on delirium scales that surpasses their capacity.

Another conflict in determining delirium is that ICU professionals may try to diagnose delirium or other psycho-neurocognitive conditions without using any measurement instrument or by using measurement instruments that do not contain psychometric data (36,37). Indeed, there is information in the literature that determination of delirium is unsuccessful to a large extent (1-3, 18-22).

Hospitalization at an ICU covers a difficult process for all patients which leads to stress, emotional emptiness and social problems. The ICU experience causes patients to be shaken from all aspects and bear destruction from many perspectives. For this reason, rather than expecting one intervention to prevent delirium, performing multi-component interventions supports more control over the delirium sources of patients. Likewise, it was also found in this study that multi-component interventions are more effective.

CONCLUSION

Studies including non-pharmacological interventions for preventing intensive care delirium were systematically reviewed. In this review, the interventions were categorized as multi-component, patient education, hormone intervention, physical environment, therapeutic intervention, automated preventive system, quitting daily sedation and exercise. It is seen that these interventions that aim to prevent ICU delirium are effective in reducing the duration and occurrence of delirium. However, the mortality rate was not examined in all studies. Additionally, it was seen that, although all interventions are effective, they are not adequate. Accordingly, it is recommended to apply multi-component methods. There is a need for new studies by researchers who are interested in the topic.

Authors' Contribution: Design of the study,

acquisition of data, and drafting of the manuscript: Serdar Saritas; interpretation of data and critical revision of the manuscript for important intellectual content: Sultan Tarlaci; design of the study and critical revision of the manuscript for important intellectual content: Serdar Saritas and Sultan Tarlaci.

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