Original Article

Effect Of Delirium Care Bundle On Pain And Sleep Promotion Among Icu Acquired Delirium Patients A Randomized Controlled Trial

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Abstract

Introduction: Delirium is characterized as rapid and unpredictable condition of impaired attention, consciousness, and comprehension. It is frequent in older adults at hospitals, especially those admitted to Intensive Care Units. Sleep deprivation and delirium are clinically associated with similar clinical characteristics. Moreover, elevated pain level has been identified as a predisposing risk factor for delirium. **Objective:** Aim of the study is to determine the effectiveness of a delirium care bundle on pain and sleep patternsamong ICU-acquired delirium patients with mechanical ventilation. **Materials and methods:** Randomized Controlled Trial was conducted to implement a delirium care bundle intervention. The bundle has been implemented daily for the seven days of ICU admission. The level of pain was assessed with Behavioural Pain Scale, and the sleep pattern Richards – Campbell Sleep Questionnaire. Statistical analysis was done by using SPSS 16.0 version. **Results:** The statistical mean scores revealed that there is a significant reduction of pain from day 1 to day 7 (8.14±2.01 to 3.64±0.12) in the experimental group than the control group (10.1±2.15 to 8.21±2.91). The sleep quality mean scores show that there is a significant improvement from day 1 to day 7 (32.5±3.01 to 71.89±3.09) in the experimental group than the control group (31.5±2.18 to 48.7±1.46). There is an overall effect of the delirium care bundle intervention on reducing the level of pain ($t_{(54)}$=-5.762, p<0.001*) and sleep quality ($t_{(54)}$=9.714, p=0.001*) among ICU acquired delirium patients. **Conclusion:** Delirium care bundle intervention has been marked to significantly reduce patient pain and improve sleep quality. Nurses play a significant role in identifying the risk factors, and symptoms of delirium at the initial stage.

Keywords ICU acquired delirium, delirium bundle care, quality of sleep, level of pain, Intensive care unit, mechanically ventilated patients.

Introduction

Delirium is a significant impairment of consciousness and cognitive function that manifests as short-term fluctuations in inattentiveness, cognitive difficulties, and disturbed perception(1), usually occurring frequently in critical care settings with a prevalence of approximately one-third, according to a large meta-analysis over 16,000 ICU patients. Delirium may occur in 20–50% of nonventilated patients and 60–80% of patients who are mechanically ventilated,(2)and it is associated with higher mortality and multiple serious complications, which

include extended intensive care unit (ICU) and longer hospital stays(3).Delirium may also result in functional impairment, early-onset dementia, and later cognitive problems, which ultimately increases the workload for healthcare professionals and raises total expenditures(4,5).Several risk factors might contribute to the development of hospital-acquired delirium, and they all function together to increase the risk(6-10).

Sleep deprivation, pain, agitation, shifting attention, disorientation, incoherence, and impaired cognition are the primary symptoms as well as depression, anxiety, and weakness are all typical symptoms among critically sick patients(11,12).Patients with more pain or discomfort could need more medical attention and screening, which would improve their sleep frequently or reduce the stress reaction, which could minimize the risk of hospital-acquired delirium(13).As a result, early identification, appropriate diagnosis, and disposition of delirious elderly patients may enhance patient health outcomes(14,10).The research findings suggest that a thorough and well-planned delirium medical management can reduce ICU-acquired delirium(14,15).

Methods and materials

A randomized control trial was conducted at a multi-specialty hospital with a 20-bedded ICU, and study participants were 56 mechanically ventilated patients diagnosed as ICU acquired delirium. The delirium bundle care was implemented to organize daily processes performed by the staff. A standardised Richards – Campbell Sleep Questionnaire (RCSQ) research instrument was used to assess the perceived sleep depth, sleep latency (time to fall asleep), number of awakenings, and sleep efficiency, noise, and quality. Each RCSQ item is scored on a visual analog scale ranging from 0 -100, poor sleep: 0 - 30,moderate sleep: 31 – 60, and good sleep: 61 - 100.

The level of pain was assessed with the help of a standardised Behavioural Pain Scale (BPS). This scale quantifies pain using body language and patient-ventilator interaction for intubated patients, such as facial expression, upper limb movements, and Compliance with mechanical ventilation. The BPS allows the assessor to derive a score between 3 (no pain) and 12 (highest pain score). The scoring was given as no pain: ≤ 3, mild pain: 4-6, moderate pain:7-9, and severe pain: 10-12. The ABCDE bundle was performed daily (usually during morning rounds). We have conducted a thorough chart review for each patient admitted to the medical ICU. The study included time each patient spent receiving MV, being intubated, and requiring sedation. After gathering all the information from the chart review, comparisons were made with chart data to the data collection sheets completed by ICU staff.

Statistical Analysis

The data was obtained using a standardized research instrument, RCSQ, and BPS; data were organized using Microsoft Excel, and statistical analysis was done using the SPSS program version 16.0. We have measured the rate of staff compliance with the ABCDE bundle. The mean value of sleep quality and level of pain was calculated from day 1 to day 7 of ICU admission in the control and experimental group. A 2-tailed t-test and repeated measures of ANOVA test were computed to determine the daily improvement of patient delirium status. P values less than .05 were considered statistically significant.

Results

A) Demographic variables

Out of 56 participants, most of the sample 11 (39.4%) belonged to 71 to 80 years of age in both experimental and control groups, the majority of samples 19 (67.8%) were males, and most of the samples 9 (32.2%) were females in both experimental and control groups.

B) Pain level among mechanically ventilatedpatients admitted to critical care units

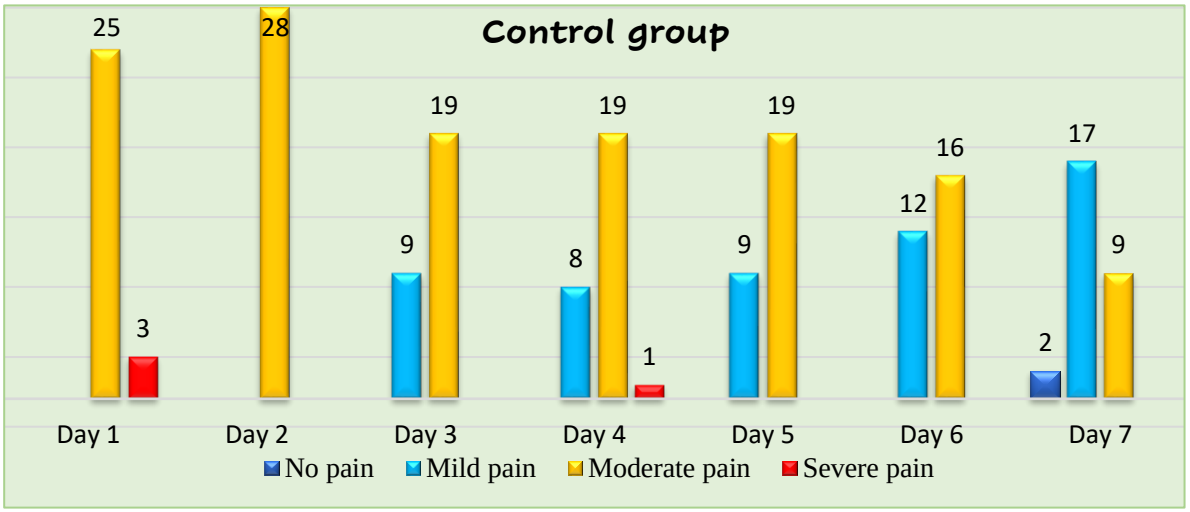

Figure 1.Percentage of pain level among mechanically ventilated patients admitted to intensive care units from day 1 to day 7 in the control group.

Figure 1 shows that in the control group, on day 1 majority of the sample 25 (89.28%) had moderate pain, and 3 (10.71%) sample had severe pain. On day 7, most of sample 17 (60.71%) had mild pain, 9 (32.14%) sample had moderate pain, and 2 (7.14%) had no pain.

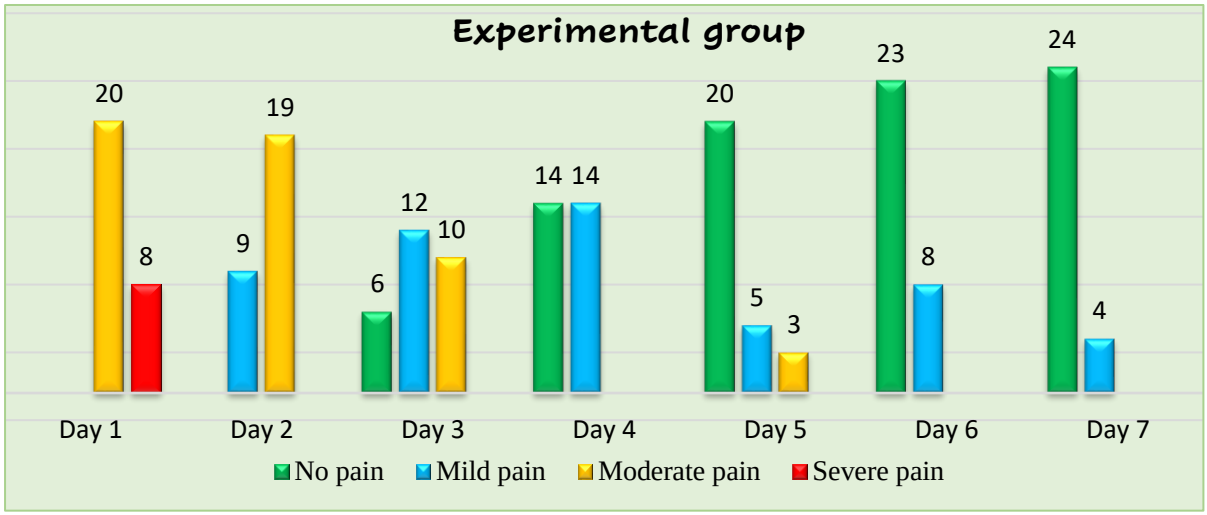

Figure2.Assessment of pain level among mechanically ventilated patients admitted to intensive care units from day 1 to day 7 in the experimental group.

Figure 2 shows that in the experimental group, on day 1 majority of the sample 20 (71.42%) had moderate pain, and 8 (28.57%) sample had severe pain. On day 7, most of the sample 24 (85.71%) had no pain, and 4 (14.28%) had mild pain.

Table 1: Comparison of pain scores between experimental and control groups.(N= 56)

Performance status	**Days**	**Mean ± SD**	**Repeated Measures ANOVA**		
			df	**F-Ratio**	**P-value**
Control group (n=28)	Day 1	10.11 ±2.15	6	3.024	0.95* NS
	Day 7	8.21 ± 2.91			
Experimental group	Day 1	8.14 ± 2.01	6	6.045	0.001* S

(n=28)	Day 7	3.64 ±0.12			
Comparison of means	**Days**	**Mean ± S D**	**Independent sample 't' test**		
			df	**'t' value**	**P-value**
Control group (n=28)	Day 7	8.21 ± 2.91	54	5.762	0.001* S
Experimental group (n=28)	Day 7	3.64 ± 0.12			

*<p=0.005, S – Significant, NS- Non-Significant

The data presented in table 2revealed that there is no statistically significant difference between the control group mean scores and standard deviation (F (6,162) = 3.024, p=0.95),and a significant difference was found between the experimental group mean scores and standard deviation (F (6,162) = 6.045, p<0.001*) on pain levels from day 1 to day 7 of ICU admission. The independent sample't' test results ($t_{(54)}$=-5.762, p<0.001*) an overall effect of the delirium care bundle intervention on reducing pain among mechanically ventilated patients admitted to ICU.

C) Sleep promotion among mechanically ventilated patients admitted to critical care units

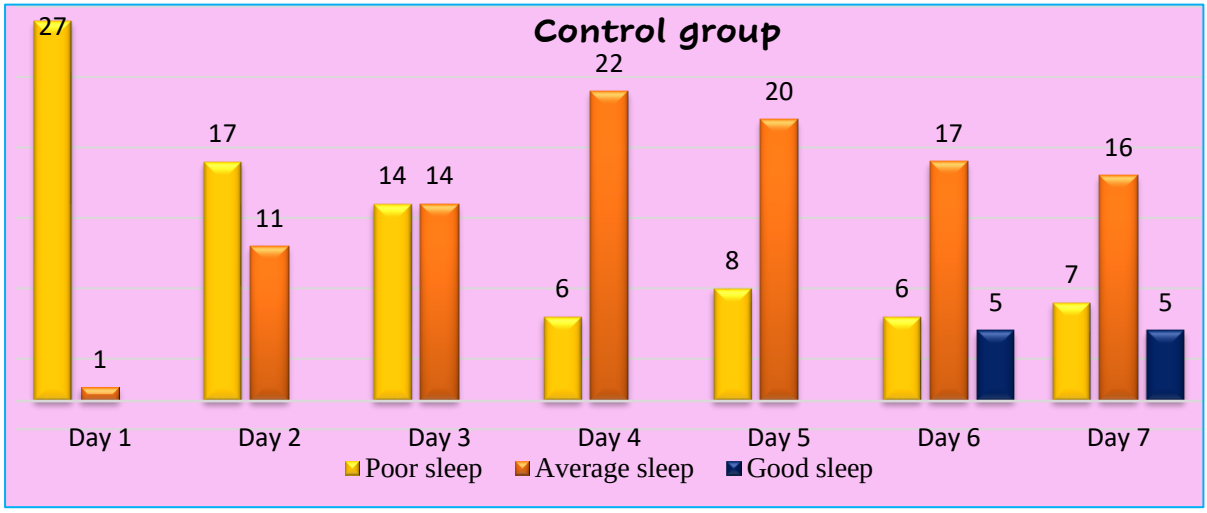

Figure3. Assessment of sleep promotion among mechanically ventilated patients admitted to intensive care units from day 1 to day 7 in the control group.

Figure 5 shows that in the control group, on day 1 majority of the sample 27 (96.42%) had a poor sleep, and 1 (3.57%) sample had an average sleep. On day 7, most of the sample 16 (57.14%) had an average sleep, 7 (25%) had poor sleep, and 5 (17.85%) had a good sleep.

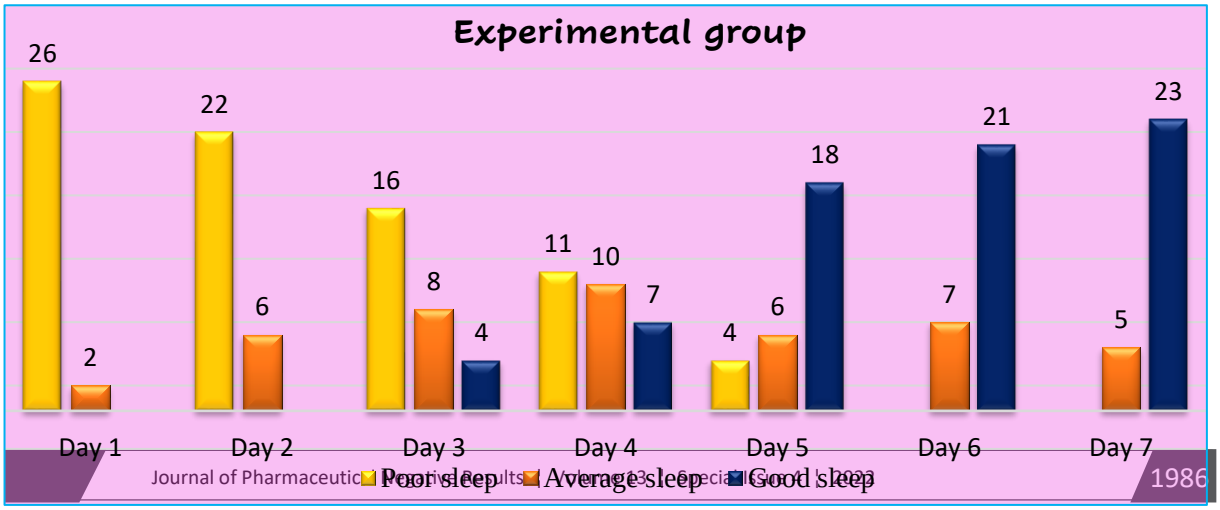

Figure 4: Assessment of sleep promotion among mechanically ventilated patients admitted to intensive care units from day 1 to day 7 in the experimental group.

Figure 6 shows that in the experimental group, on day 1 majority of the sample 26 (92.85%) had poor sleep, and 2 (7.14%) sample had an average sleep. On day 7, most of the sample 23 (82.14%) had a good sleep, and 5 (17.85%) sample had an average sleep.

Table 2: Comparison of quality of sleep scores between experimental and control groups.

(N= 56)

Performance status	**Days**	**Mean ± S D**	**Repeated Measures ANOVA**		
			df	**F-Ratio**	**P-value**
Control group (n=28)	Day 1	31.56± 2.18	6	3.081	0.07NS
	Day 7	48.71 ± 1.46			
Experimental group (n=28)	Day 1	32.54± 3.01	6	11.91	0.001* S
	Day 7	71.89± 3.09			
Comparison of means	**Days**	**Mean ± S D**	**Independent sample 't' test**		
			df	**'t' value**	**P-value**
Control group (n=28)	Day 7	48.71 ± 1.46	54	9.714	0.001* S
Experimental group (n=28)	Day 7	71.89 ± 3.09			

*<p=0.005, S – Significant, NS- Non-Significant

The data presented in Table 3 revealed that there is no significant difference was found between the control group mean scores and standard deviation (F (6,162) = 3.08, p=0.09) and statistically significant difference was found between the experimental group mean scores and standard deviation (F (1,162) = 11.91, p=0.001*) on quality of sleep from day 1 to day 7 of ICU admission. The independent sample 't' test results ($t_{(54)}$=9.714, p=0.001*) shows an overall effect of delirium care bundle intervention on increasing sleep quality among mechanically ventilated patients admitted toICU.

Discussion

Several research evidence supporting, highlighted that routine delirium assessment is most essential and strongly recommended in all critically ill patients throughout the ICU admission(15). In our study, the majority (89%) of the participants had pain on day one, almost half experienced considerable pain at least once, and one-third experienced significant pain in at least half of the evaluations. These findings emphasize the need for recommendations even though patients are particularly susceptible in ICU settings and continue to experience pain.

The present study has revealed that day one 89% after implementing delirium bundle care, on seventh day 60% had mild pain, 32% had moderate pain, and 7 % had no pain. Statistical analysis($t_{(54)}$=-5.762, p<0.001*)shows an overall effect of the delirium care bundle intervention on reducing the level of pain among mechanically ventilated patients admitted to ICU. A similar study has stated that an effective strategy to combat delirium requires implementing effective delirium bundle care and non-pharmacological methods such as re-orientation, early mobility, and incorporating family inpatient care(16). Another large prospective quality improvement initiative trial involving similar multiple bundle components (ABCDEF bundle) showed significant improvement in reduction of pain and other significant symptoms of delirium in ICU patients.(17).

Current study reported that experimental group, day 1 majority of sample 92% had a poor sleep, and 7.14% sample had an average sleep. On day 7, most of the sample 82% had a good sleep, and 17% sample had an average sleep. Statistical analysis revealed that test results ($t_{(54)}$=9.714, p=0.001*) shows an overall effect of

delirium care bundle intervention on increasing sleep quality among mechanically ventilated patients admitted in ICU. Similar experimental study has reported that bundle of interventions led to an increased mean and SD sleep efficiency before (60.8± 3.5) and after intervention (75.9± 2.2) p< 0.031; reduced number of awakenings caused by care activities overnight before (11.0 ±1.1) and after intervention (9.0 ±1.2) p<0.003.

The evidence from various research does not support the routine administration of medication to prevent delirium unless if the patient is agitated(18). Though delirium is a distressing problem, bundle care provides careful attention to prevention, detection and minimizing the long-term impact on patient and their families(12). However, the intensive care community has emphasised the need for higher level evidence in several areas about delirium including pain, agitation, improving sleep quality(19). Recent studies highlighted that that a significant number of intensive care patients still receive outdated treatment because of inadequate guideline implementation. Researchers require to conduct the clinical trials and implement updated structured delirium care bundle in order to improve patient optimized care and bridge gap between theory and clinical practice(20).

Key components

- The delirium bundle care (ABCDEF bundle) is a research-based manual for physicians and other medical professionals to use when integrating multidisciplinary patient care in critical care units (ICU).
- Non-pharmacological management is the only currently known intervention associated with a decreased delirium. Moreover, it is widely recommended guidelines for implementing non-pharmacological treatment for patients in ICU before and after diagnosis of hospital acquired delirium.
- Evaluation of pain is the most crucial part in delirium bundle care, the present study has been adopted the most reliable Behavioural Pain Scale (BPS) to assess and plan the non-pharmacological pain management.
- Early identification of sleep deprivation and irritability are the pivotal risk factors for sleep disturbance is critically important since it a strong risk factor to increase agitation and irritability.to treat the patient.
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Implications for clinical practice

Current study findings and several clinical trials emphasize that nursing staff and other health care members can play a significant role in early identification ICU acquired delirium and prevent. Nursing staff need to be trained on delirium care bundle (ABCDEF) and a firm orientation must be given on the importance of guidelines and implementation procedures. The results of the study highlighting that the nurses and other healthcare professionals can incorporate the early prevention strategies such as reduction in unit noise, modification of the ICU environment to promote sleep, minimize the risk factors for pain and agitation among critically ill patients.

Limitations of the study

The study enrolled specially ventilated patients with ICU acquired delirium. However, our findings should be interpreted in light of limitations. The non-controlled design of this study raises the possibility of confounding variables that may have influenced study outcomes. Because our study did not include patients with brain injuries, our findings may not be generalizable to neurological or trauma ICUs that care for patients with these injuries. Furthermore, our study cannot be generalized to long-term ventilator care units. The purpose of this study was to implement a delirium bundle care intervention with ICU acquired studies, so the incidence of delirium could not be assessed, and study sample size was limited due to randomized controlled trial. Our study included only adults, and the results should not be extrapolated to children.

Conclusion

Study reported that delirium bundle care has effectiveness on reducing pain and improving sleep quality. This multicomponent non-pharmacological delirium bundle care interventions likely present the best strategies for incidence of hospital acquired delirium, prevention of delirium and improving patient positive health outcomes by minimizing the length of hospitalization. Treatment of delirium should focus on identifying and managing the causative medical conditions, providing supportive care, preventing complications, and reinforcing preventive interventions. Preventive interventions such as early pain management and ensuring appropriate sleep patterns, early and recurrent mobilization have all been shown to reduce the incidence of delirium, regardless of the care environment. Study findings have recommending that health care team members should assess, screen, and

diagnose risk factors of delirium every shift and highlighting the delirium care bundle have significant effect on prevention of hospital acquired delirium among ICU patients.

Ethical clearance

Ethical clearance was obtained from the institutional ethical committee Pushpagiri Institute of Medical Sciences and Research Centre (PIMSRC/E1/388A/47/2015). Administrative permission was received from the hospital authority. Confidentiality was maintained by retaining all information properly and excluding their names from the questionnaires.

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Conflict of interest

The author declares no conflicts of interest in this research work.

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