



Effect of daily sedation interruption and the patient's outcome who are under mechanical ventilation: A mini systematic review

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Conflicts of Interest: Nil

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DOI: <https://doi.org/10.32553/ijmsdr.v4i12.714>

Abstract:

Continuous administration of sedatives to the intensive care unit may increase the duration of mechanical ventilation, extend the patient's stay in the intensive care unit, and, subsequently, to the hospital. The objective was to improve the outcome of intubated patients in terms of the total duration of mechanical ventilation, the stay of these patients in the intensive care unit (ICU), and their mortality. This systematic review was conducted using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The literature search was conducted in October 2020. Articles were searched in the PubMed and Cochrane Library online databases. Data were extracted from all included research studies and analyzed thematically. The search duration was between 2008 and 2018. The studies do not document statistically significant differences with the parameters under study (total duration of mechanical ventilation, the total length of stay in the intensive care unit (ICU), and mortality), for a better outcome of intubated patients. The application of the daily sedation interruption (DSI) did not appear to affect the duration of Mechanical Ventilation, the length of stay in the ICU, and mortality in intubated patients.

Keywords: Daily sedation interruption, intubated patients

Introduction:

Mechanically ventilated patients often receive sedative drugs to manage anxiety, agitation, and ventilator dyssynchrony. First of all, the reason why sedation is necessary should be determined and the need for co-administration of analgesia or muscle relaxation should be considered to select the appropriate agent.¹ Sedation in the intubated patient is the administration of drugs, usually in a continuous infusion, for the patient to remain calm, cooperative, and at the same time, safe during mechanical ventilation. Also, all intubated patients receive medication to relieve pain and anxiety.^{1,2} Commonly combinations of sedatives and analgesics are used. The most common substances are benzodiazepines such as Midazolam and opioids such as Propofol, Fentanyl, and Remifentanyl.^{3,4} Doses for these classes of drugs are set according to the desired depth of sedation for patient safety. Deeper sedation is required in patients with a critical illness such as cerebral edema, severe respiratory failure with difficulty ventilating.⁵

Side effects of sedation

When administering sedatives and analgesics, the patient should always be evaluated for signs that indicate the occurrence of side effects, to be treated immediately. The patient may experience the following side effects, such as the difficulty of neurological assessment, negative psychological

sequelae after critical illness, the duration of mechanical ventilation is prolonged and at the same time leading to ventilator-associated pneumonia (VAP), probability of Delirium increases and hospitalization in the ICU and hospital is extended.^{1,3} For this reason, the provision of optimal and appropriate sedation is one of the most important as well as serious aspects of nursing care for patients receiving mechanical ventilation in intensive care units.^{3,6}

Objective

The objective of the systematic review is to investigate the improvement of the outcome of intubated patients to the total duration of mechanical ventilation, the stay of patients in the intensive care unit (ICU), and their mortality.

Method

Literature search strategy

This systematic review was conducted using Prisma guidelines.⁷ A literature search was conducted in October 2020 by both reviewers with search duration between 2008 and 2018, to identify research studies about the effect of daily sedation interruption and the patient's outcome who are under mechanical ventilation. Articles were searched in the Pubmed and Cochrane Library online databases with the following keywords: "Daily Sedation Interruption".

Inclusion and exclusion criteria

In the systematic review criteria for the inclusion of the studies were the English language, the thematic focus of the studies, and the researches concerning adult intubated patients (> 18 years old). The search duration was between 2008 and 2018. There were no location restrictions all research conducted globally was included in this review. The sample consisted of three primary surveys and two meta-analyzes. The exclusion criteria of the studies were: studies that did not have as their main objective the investigation of the relationship between the implementation of the daily sedation interruption and the outcome of intubated intensive care unit patients and studies with other additional interventions.

Data extraction and synthesis

Both reviewers extracted data from all the included research studies which included the author (s), year of publication, the title of the study, main findings, and the country where the study was conducted (Table 1). Data were analyzed by both reviewers.

Results

From the search, based on the keywords, 160 articles emerged, and based on the inclusion and exclusion criteria, it was deemed appropriate to include five, of which two were prospective randomized studies, one randomized clinic test and two meta-analyzes. The search period of the studies was 2008 to 2018. The characteristics and results of the studies used in this systematic review are presented in Tables 1, respectively. Finally, the final selection of studies was four studies by Pubmed and one study by Cochrane. The steps followed for the selection of the studies are described with the flow chart in Figure 1.

A total of 2715 patients were included in the systematic review of the selected studies. In the first study, the researchers aimed to compare the effects of nursing-implemented sedation protocol and daily interruption of sedative infusion on the duration of mechanical ventilation. For that reason, they selected randomly fifty patients who received mechanical ventilation and required sedation in the intensive care unit. One group (Group P) which consisted of twenty-five patients received daily sedation interruption protocol and the other group (Group N) received nursing-implemented sedation protocol. The results showed that in Group P, duration of sedation and mechanical ventilation were significantly shorter than in Group N. Light sedation was seen more frequently

in Group P and deep sedation in Group N.⁸ In the second study researchers carried out a randomized controlled trial from November 2004 to March 2006 with 97 patients receiving mechanical ventilation and continuous infusion of sedative drugs in an intensive care unit in Greece. The outcomes measures were the duration of mechanical ventilation, length of intensive care unit stay, length of hospital stay, overall mortality, total doses of sedative and analgesic medicines, and Ramsay scores and duration of cessation of sedative infusions per day. The results showed that the median duration of mechanical ventilation was 8.7 days vs. 7.7 days ($P = 0.7$). The length of intensive care unit stay and in the hospital was similar between the intervention and control groups.⁹

In the next study, the researchers conducted a meta-analysis that included 7 studies (randomized clinical trials), with the objective of the comparison of a mild target sedation protocol with daily sedation interruption. They included seven studies with a total number of 892 patients. Results showed that hospital mortality, duration of mechanical ventilation, intensive care unit, and hospital length of stay did not differ between the groups either and that only sedation protocols were associated with an increase in the number of days free of mechanical ventilation.¹⁰ In another study the researchers conducted a secondary analysis of a randomized trial in 16 North American medical-surgical ICUs. In a total number of 423 patients, nurses applied a validated sedation scale hourly to titrate benzodiazepine and opioid infusions for achieving a light level of sedation. Using that drugs compared dosages administered during the night (19:00 to 07:00) and day (07:00 to 19:00) shifts. The study showed no statistically significant differences between the two groups in terms of the duration of Mechanical Ventilation and the duration of stay in the intensive care unit but shown a statistically significant increase in the nursing workload.¹¹

The final study included in the systematic review was a meta-analysis from the Cochrane Library. The researchers in this study compared the sedation protocol without and with DSI in terms of duration of Mechanical Ventilation, length of stay in the ICU, and mortality. The study included 9 randomized controlled trials with a total number of 1282 patients. The study showed that there were no statistically significant differences between the two groups in terms of the parameters under study, but the results may not be

entirely accurate due to the heterogeneity of the studies and intensive care units involved.¹²

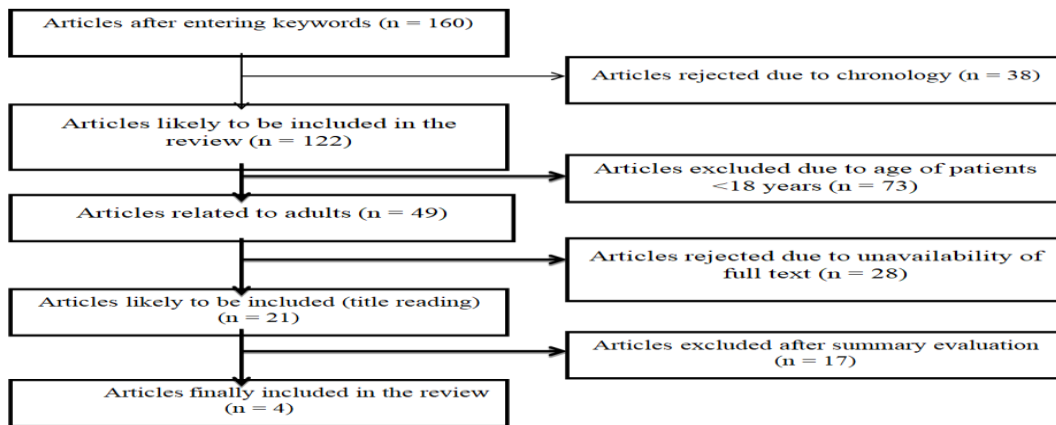


Figure 1: Flow diagram of the search process

Table 1: Articles Characteristics of included studies

No.	Author	Title	Purpose	Methodology	Sample	P-value	Conclusion
1.	Yilmaz et al (2010) Turkey	The effect of nursing-implemented sedation on the duration of mechanical ventilation in the ICU	Evaluation of the DSI in relation to the total duration of the Mechanical Ventilation	Perspective randomized study	n = 50 25 protocol of sedation 25 DSI (without sedation protocol)	<0,05	DSI reduced the duration of mechanical ventilation, but not the total stay in the ICU, nor mortality
2.	Anifantaki et al (2009) Greece	Daily interruption of sedative infusions in an adult medical-surgical intensive care unit: randomized controlled trial	Evaluation of DSI in terms of the total duration of Mechanical Ventilation, and secondarily in terms of ICU stay and overall mortality, in relation to normal practices (interruption of sedation when deemed possible)	Perspective randomized study	n=97	NS	No statistically significant differences between the two groups in terms of the parameters under study
3.	Nassar et al (2016) Brazil	Sedation protocols versus daily sedation interruption: a systematic review and meta-analysis	Comparison of DSI with a simple protocol of mild sedation in terms of the total duration of Mechanical Ventilation, length of stay in the ICU, and mortality.	Meta-analysis 7 studies (randomized clinical trials)	n=892	NS	No statistically significant differences between the two groups in terms of the parameters under study
4.	Mehta et al (2014) Canada and United States	Variation in diurnal sedation in mechanically ventilated patients who are managed with a sedation protocol alone or a sedation protocol and daily interruption	Comparison of sedation protocol without and with DSI in terms of the duration of Mechanical Ventilation and the duration of stay in the ICU.	Randomized clinical trial	n=430 n=214 with DSI n=209 without DSI	NS	No statistically significant differences between the two groups in terms of the duration of Mechanical Ventilation and the duration of stay in the ICU, but a statistically significant increase in the nursing workload.
5.	Burry et al (2014)	Daily sedation interruption versus no daily sedation interruption for critically ill adult patients requiring invasive mechanical ventilation	Comparison of sedation protocol without and with DSI in terms of duration of Mechanical Ventilation, length of stay in the ICU, and mortality	Meta-analysis 9 studies (randomized clinical trials)	n=1282	NS	There are no statistically significant differences between the two groups in terms of the parameters under study. However, the results may not be entirely accurate due to the heterogeneity of the studies and ICUs involved.

Discussion

This systematic review advocated that there are not any differences between sedation protocols and daily sedation interruption regarding mortality, duration of mechanical ventilation, and length of patient's stay in the intensive care unit. A total of 2715 patients were included in the systematic review of the selected studies. Only in two studies was a DSI protocol which included 2 teams of patients with and without DSI. With the use of sedation protocols, the number of free days of mechanical ventilation was higher and the hospital stay was shorter. The results of this systematic review were based on a small number of studies, in the case of time free of mechanical ventilation, and were marked by high heterogeneity within the two results. Finally was no strong evidence that the application of daily sedation interruption (DSI) alters the duration of Mechanical Ventilation, the length of stay in the ICU, and mortality in intubated patients.

Conclusion

Daily reduction of sedation may, however, be a significant advantage for patients under mechanical ventilation because it will result in early awakening, reduced dependence of the patient on doses of sedatives as a result of faster patient intubation, and a better outcome. Finally available evidence has shown DSI to either reduce, not alter, or prolong the duration of mechanical ventilation.

Strength and limitation

Since the sample size of our study is small, it is not possible to generalize these results for the effect of DSI and the outcomes on the patients in ICUs.

Suggestions

More studies may be needed to formulate the most appropriate sedation protocol for ICU patients.

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