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Research Article

Evaluation of Sedation Practices and Characteristics of Mechanically Ventilated Patients

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Abstract

Introduction: Mechanical ventilation is a form of life support. Standardized sedation practices must be followed in every intensive care unit (ICU) for patients who are mechanically ventilated. Length of mechanical ventilation increases due to excessively sedating the patients without following proper sedation protocols. **Aim:** This study aims to assess the current sedation practices in ICUs, to explore characteristics of patients on mechanical ventilator, and to correlate total amount of sedation used and length of mechanical ventilation. **Methodology:** Quantitative approach, descriptive survey was adopted. One hundred mechanically ventilated-sedated patients in ICUs using non-probability convenient sampling method were selected. Patients were evaluated using observational checklists and standardized RASS scale. **Results:** Result shows that maximum 25 (25%) patients were between the age group of 41 and 50 years and 62 (62%) of patients were male. Maximum 44 (44%) of patients got admitted due to respiratory conditions. Among 100 (100%) of patients, 51 (51%) of patients were heavily sedated and were unarousable on day 1. Maximum 15 (15%) of patients received highest amount of sedation for 4 days and 58 (58%) of patients went to shock on the 1st day. When 100 (100%) of patients are being considered, 86 (86%) of patients survived and 14 (14%) of patients died due to various reasons. **Conclusion:** A positive correlation coefficient can be seen between total amount of sedation and length of mechanical ventilation also with significant association between length of mechanical ventilation and outcome of patients.

Keywords: Sedation, Deep sedation, Mechanical ventilation, Complications, Adverse effects, adults, Evaluation study, Patients, Conscious sedation, Intensive care unit, Sedative agents

Introduction

Patients those who are facing seriously ill and life-threatening conditions are admitted in critical care units, as their situation demands constant care. Ventilator act as the main supportive system, which helps the critical patient to breathe when they are not able to do so by their own due to the critical ailment and lengthen the life by making their work of breathing easy.[1] There are some general characteristics of patients under mechanical ventilation such as organ failure, shock, kidney injury, liver damage, and gastrointestinal problems.[2]

Patients on mechanical ventilator experience anxiety and physiological stress as they are exposed to many procedures such as intubating with ET tube, ventilating mechanically, and insertion of arterial and central venous catheters.[3] In the act of ventilating the patient, it is important to maintain their nutritional balance by Ryles tube feeding, and electrolyte balance by providing intravenous fluids, and immediately initiate DVT prophylaxis and ulcer prophylaxis.[4]

In the current era, there are certain ways to measure the sedation levels and to understand whether the patients are oversedated or undersedated. Now, there are various sedation scales to figure out the sedation level of ventilated and sedated patients which help to prevent all the consequences arises due to over- and under-sedation.[5]

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Methods

Design and participants

For the present study, quantitative approach with a descriptive evaluative design was used. The study was conducted in the intensive care unit (ICUs) of the MGM Hospital, Kamothe, India. A total of 100 patients were selected as participants who were mechanically ventilated under sedation through non-probability convenient sampling.

Measures

For the assessment of the current sedation practices and characteristics of mechanically ventilated patients, RASS scale and observational checklists were used, which was validated by 13 experts of varied field of nursing, medical, and paramedical sciences. Reliability of the tool was assessed through inter-rater reliability. The reliability value of observational checklists used in this study are (r= 0.99, 0.78). RASS is a standardized scale. The tool was found to be highly reliable.

Procedure

Ethical consideration

1. Ethical approval was obtained from the Institutional Ethical Review Committee of MGM Institutes of Health Science, Kamothe (Appendix G).
2. Institutional permission was also obtained from medical superintendent of the hospital for data collection (Appendix H).
3. Before data collection, informed consent was taken from relatives of the sample (as the patient is undersedation).

Data collection process

A written permission was taken from the medical superintendent of MGM Hospital, Kamothe, Navi Mumbai. Data collection was done for a period of 4 weeks from January 20 to February 20, 2020. Sample was collected from EMS ICU, SICU, MICU, and CVTS ICU based on inclusion criteria. Patients who are under mechanical ventilation and sedation were selected. Demographic data which include the personal and clinical information are collected. Observational checklist which contains 18 elements to evaluate current sedation practices was used to know the practices following by the hospital when the patients are under sedation.

Observational checklist to assess the characteristics of patients on mechanical ventilator is used in which the modes of ventilator are specified, type, and amount of sedation. After the selection of patients, written consent was taken from the relative of patient by explaining the purpose of the study. Patients were evaluated and observed as long as the patients are undersedation. The number of days varies according to each patients, it depends on how many days they are under sedation.

Demographic information

Section 1.1: Distribution of patients based on sociodemographic characteristics

Table 1 shows that maximum 25 (25%) of patients were between the age group of 41 and 50 years and only 6 (6%) of patients between the age of 18 and 30 years. Out of 100 patients, 62 (62%) of patients were male and 38% of patients were female in the study.

Section 1.2: Distribution of patients based on clinical characteristics

Table 2 shows that 44 (44%) of patients were admitted due to respiratory conditions, and only 3 (3%) of patients were admitted due to gastrointestinal and cardiac disorders. Out of 100% of patients, 40 (40%) of patients were put on ventilation for their work of breathing and 10 (10%) of patients were ventilated for their airway protection in the study. On the 5th day, maximum number 31 (31%) of patients got weaned off from mechanical ventilator and 3 (3%) of patients got weaned off on the 7th and 2nd days. Among 100% of patients who got admitted in ICU and were mechanically ventilated undersedation, 86 (86%) of patients were recovered, whereas 14 (14%) of patients died due to various reasons.

Table 1: Distribution of patients based on sociodemographic characteristics *n*=100

Demographic variables	F	%
Age group (years)		
18–30	6	6.0
31–40	20	20.0
41–50	25	25.0
51–60	22	22.0
61–70	18	18.0
71+	9	9.0
Gender		
Female	38	38.0
Male	62	62.0

Table 2: Distribution of patients based on clinical characteristics *n*=100

Clinical variables	F	%
Reason of admission		
Respiratory	44	44.0
Cardiac	3	3.0
Organ support	0	0.0
Gastrointestinal	3	3.0
Neurological	29	29.0
Hemodynamic	12	12.0
Mixed (MODs)	9	9.0
Reason for ventilation		
Airways protection	10	10.0
Oxygen requirement	30	30.0
Ventilation	20	20.0
Work of breathing	40	40.0
Length of mechanical ventilation (days)		
8	4	4.0
7	3	3.0
6	7	7.0
5	31	31.0
4	30	30.0
3	22	22.0
2	3	3.0
Outcome		
Alive	86	86.0
Dead	14	14.0

Section 1.3: Hourly distribution of death of mechanically ventilated patients undersedation

Table 3 depicts that 14 (100%) patients death occurred more than 72 h after getting admitted to ICUs.

Results

Section 1.4: Distribution of current sedation practices followed in ICU

Table 4 depicts that 40 (40%) of patients were assessed for measuring ET cuff always. Only 51 (51%) of patients were watched for secretions in ET tube always. About 45 (45%) of patients were always suctioned on regular intervals. Among 100 (100%) of patients, 61 (61%) of them were monitored for GCS sometimes in 4–6 h. All the patients were properly handed over by the staff in the ICU. The staff who was assigned to the patients followed the instructions clearly about the sedative drug calculations from intensivist. This table shows that most of the sedation practices were followed and patients were monitored in the ICUs carefully. Only the sedation assessment scale was not used for measuring sedation level.

Section 1.5: Distribution of patients based on their sedation level

Table 5 shows that maximum 35 (35%) of patients were deeply sedated and 16 (16%) of patients were unarousable on day 1.

Table 3: Hourly distribution of death of mechanically ventilated patients undersedation *n*=14

Hours	F	%
<12	0	0.0
12–24	0	0.0
25–48	0	0.0
49–72	0	0.0
>72	14	100.0

On day 2, 32 (32%) of patients were under deep sedation and 15 (15%) of patients were unarousable. From this table, it is clearly understood that on day 3 and day 4, 3 (3%) and 2 (2%) of patients are unarousable.

Section 1.6: Distribution of patients based on their feeding pattern undersedation

Figure 1 depicts that 61 (61%) of patients were on NBM on day 1 which reduced to 3 (3%) on day 3. Parenteral feeding was given to 91 (91%) of patients on day 2. Enteral feeding was given to 63 (63%) of patients on day 2.

Section 1.7: Distribution of patients based on their ulcer prophylaxis and DVT prophylaxis undersedation

Figure 2 depicts that 100 (100%) of patients received ulcer prophylaxis and DVT prophylaxis which gradually decreased to 99 (99%) on day 2, 50 (50%) on day 3, and 15 (15%) on day 4.

Section 1.8: Distribution of patients according to their organ dysfunction undersedation

Table 6 shows that 58 (58%) of patients went to shock on day 1 and day 2 of mechanical ventilation. On day 2, 22 (22%) of patients had kidney problems, and 11 (11%) of patients had liver issues and maximum 15 (15%) of patients went to MODS which got decreased to 3 (3%) on day 4.

Section 2.1: Correlation of total amount of sedation used and length of mechanical ventilation

Table 7 clearly represents that there is a positive correlation coefficient between total amount of sedation and length of mechanical ventilation, which means, when the amount of sedation increases according to the days, length of ventilation also can increase.

Table 4: Distribution of current sedation practices followed in ICU *n*=100

Content	Always		Sometimes		Rarely	
	f	%	f	%	f	%
Obtaining of consent from patient/explaining relative prior the procedure	100	100.0	0	0.0	0	0.0
Assessment of patients physiological parameters (2–6)						
Heart rate	100	100.0	0	0.0	0	0.0
Blood pressure	100	100.0	0	0.0	0	0.0
Temperature	100	100.0	0	0.0	0	0.0
Respiratory rate	100	100.0	0	0.0	0	0.0
Oxygen saturation	100	100.0	0	0.0	0	0.0
Following any standardized sedation scoring scale careful assessment of aspiration risk	0	0.0	0	0.0	100	100.0
Measuring ET cuff pressure	40	40.0	41	41.0	19	19.0
Watch for secretions in ET tube	51	51.0	39	39.0	10	10.0
Suctioning on regular intervals	45	45.0	45	45.0	10	10.0
Titration of sedation rate as and when required as per clinician's order	100	100.0	0	0	0	0.0
Monitoring sedative effect objectively	4	4.0	29	29.0	67	67.0
Monitoring GCS of patient						
Every 2 hourly	0	0.0	0	0.0	0	0.0
4–6 hourly	18	18.0	61	61.0	21	21.0
More than 10 h	0	0.0	0	0.0	0	0.0
Standard documentation of events	100	100.0	0	0.0	0	0.0
Following instructions for drug calculations as per clinician's/intensivist's order	100	100.0	0	0.0	0	0.0
Proper hand over given to the next duty staff about the patient	100	100.0	0	0.0	0	0.0

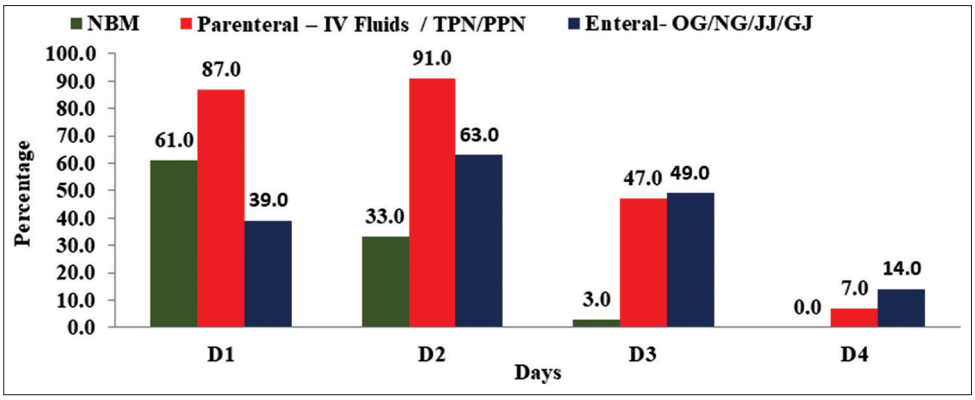

Figure 1: Distribution of patients based on their feeding pattern undersedation. *n*=100

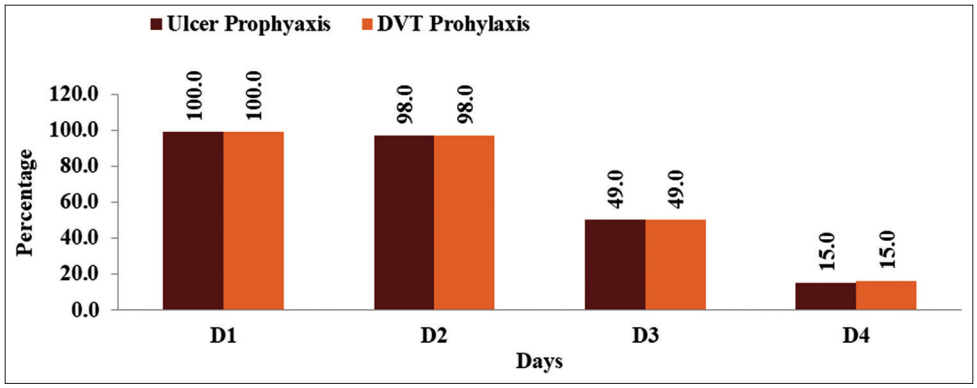

Figure 2: Distribution of patients based on their ulcer prophylaxis and DVT prophylaxis undersedation. *n*=100

Table 5: Distribution of patients based on their sedation level *n*=100

Number of days patient received sedation	Alert and calm (0)		Awakens to voice more than ten sec (-1)		Light sedation (-2)		Moderate sedation (-3)		Deep sedation (-4)		Unarousable (-5)	
	F	%	F	%	F	%	F	%	F	%	F	%
D1	4	4.0	6	6.0	19	19.0	20	20.0	35	35.0	16	16.0
D2	4	4.0	8	8.0	19	19.0	21	21.0	32	32.0	15	15.0
D3	1	1.0	3	3.0	15	15.0	22	22.0	5	5.0	3	3.0
D4	1	1.0	-	-	4	4.0	8	8.0	-	-	2	2.0

Table 6: Distribution of patients according to their organ dysfunction under sedation *n*=100

Organ dysfunction	D1		D2		D3		D4	
	F	%	F	%	F	%	F	%
Shock	58	58.0	58	58.0	28	28.0	11	11.0
Liver dysfunction	7	7.0	11	11.0	9	9.0	7	7.0
GI issues	10	10.0	9	9.0	7	7.0	4	4.0
Kidney dysfunction	22	22.0	22	22.0	16	16.0	7	7.0
MODS	4	4.0	15	15.0	10	10.0	3	3.0

Table 7: Correlation of total amount of sedation used and length of mechanical ventilation *n*=100

Parameters	Pearson's correlation coefficient "r" value	*P*-value	Significance at 5% level
Length of mechanical ventilation Total amount of sedation	0.530**	<0.001	Yes

***P*<0.001, it is statistically highly significant at 5% level. It is positively correlated. The Pearson correlation coefficient (r) is 0.530**

Section 2.2: Association between length of mechanical ventilation, total amount of sedation, organ dysfunction, feeding pattern, and outcome of patients

Section 2.2.1: Association between length of mechanical ventilation (in days) and outcome of patients (alive or dead)

Table 8 depicts that there is a significant association between length of mechanical ventilation (in days) and outcome of patients. As the length increases, there may be a chance for the mortality due to various other reasons.

Section 2.2.2: Association between feeding pattern and outcome of patients

Table 9 depicts that there is a significant difference patients on NBM and there outcome. However, there is no significant

Table 8: Association between length of mechanical ventilation (in days) and outcome of patients (alive or dead) *n*=100

Length of mechanical ventilation (days)	Outcome		Chi-square test	*P*-value	Significant at 5% level
	Alive	Dead			
8	0	4	63.256**	<0.001	Yes
7	0	3			
6	3	4			
5	28	3			
4	30	0			
3	22	0			
2	3	0			

Table 9: Association between feeding pattern and outcome of patients *n*=100

Feeding	Outcome		Chi-square test	*P*-value	Significant at 5% level
	Alive	Dead			
NBM			7.196	0.007	Yes
No	29	10			
Yes	57	4			
Parenteral					
No	2	0	0.332	0.564	No
Yes	84	14			
Enteral					
No	21	2	0.698	0.403	No
Yes	65	12			

difference between patients on parenteral and enteral nutrition and their outcome.

Discussion

The current study announced that maximum (25%) of patients who got mechanically ventilated undersedation comes in between 41 and 50 years of age. A similar study was recorded by Karthikeyan *et al*.'s that the mean age of patients on mechanical ventilator was 40 plus or minus 17 years.[6]

The current study shows that, among (100%) of patients, maximum (62%) of patients were male. The majority (44%) of patients got admitted to ICU were due to respiratory distress. A similar study was noted by Tang *et al*.'s that the majority (57%) of patients were male and the maximum (34.7%) patients got admitted and ventilated to ICU due to respiratory distress.[7]

The current study shows that most of the sedation practices were followed by the hospital, but none of the standardized sedation scales are used for measuring the sedation level of the patients. The maximum (51%) of patients got deeply sedated, which increased their mechanical ventilation's length. A similar study was directed to assess the effect of using RASS on patients who are on mechanical ventilator and the type and amount of sedation used in ICUs.[8]

The current study shows that assessing the characteristics of mechanical ventilator patients undersedation plays a key role in good prognosis of the patient. In the study, the characteristics taken were modes of ventilator, amount of sedation, organ dysfunction of patients, their feeding pattern, and ulcer and DVT prophylaxis. Association is not seen between the organ dysfunction and outcome of the patients in this study. A similar study was conducted to observe and identify the clinical characteristics of mechanically ventilated patients and their outcomes. In this study, the ICU mortality rate of patients on mechanical ventilator patients was 28.6%.[9]

The current study shows that oversedation levels can increase the days on mechanical ventilator and days in ICU. A similar study has been conducted on this topic, which also showed that over sedation can prolong the days of critical patients on mechanical ventilator and their days in ICU.[10] Another article shows the impact of protocols for sedation and their outcomes in patients. This article mainly focused that following proper sedation guidelines and weaning can improve the patients who are critically ill.[11]

Conclusion

Increase in the length of mechanical ventilation can worsen the outcome of the patients due to various other reasons. Hence, the study has pointed out that sedation assessment scales should be used in an ICU for providing a better outcome to the patients who are on mechanical ventilation undersedation.

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References

1. Tintinalli JE, Cameron P, Holliman J. EMS: A Practical Global Guidebook. Raleigh: PMPH USA; 2010.
2. Slutsky AS, Tremblay LN. Multiple system organ failure. Is mechanical ventilation a contributing factor? Am J Respir Crit Care Med 1998;157:1721-5.
3. Mutlu EA, Factor P. GI complications in patients receiving mechanical ventilation. Chest 2001;119:1222-41.
4. Epstein SK. Readiness testing and weaning predictors. In: A Practical Guide to Mechanical Ventilation. Hoboken, NJ: Wiley-Blackwell; 2011. p. 249.
5. Robertson LC, Al-Haddad M. Recognizing the critically ill patient. Anaesth Intensive Care Med 2013;14:11-4.
6. Karthikeyan B, Kadhiravan T, Deepanjali S, Swaminathan RP. Case-mix, care processes, and outcomes in medically-ill patients receiving mechanical ventilation in a low-resource setting from Southern India: A prospective clinical case series. PLoS One 2015;10:e0135336.
7. Tang WM, Tong CK, Yu WC, Tong KL, Buckley TA. Outcome of adult critically ill patients mechanically ventilated on general medical wards. Hong Kong Med J 2012;18:284-90.

8. Yousefi H, Toghyani F, Yazdannik AR, Fazel K. Effect of using Richmond Agitation Sedation Scale on duration of mechanical ventilation, type and dosage of sedation on hospitalized patients in intensive care units. Iran J Nurs Midwifery Res 2015;20:700-4.
9. Berhe E. Clinical characteristics and outcomes of patients under invasive mechanical ventilation at Ayder comprehensive specialized hospital adult intensive care unit, Mekelle, Ethiopia. Eur Respir J 2018;52:PA333.
10. Marrero E, McEachern R, Patrissi G, Pike JL. Transforming the sedation practice of a medical intensive care unit: A case study describing protocol development, education, implementation, and impact on ventilator days and length of stay. J Emerg Med Intensive Care 2017;3:115.
11. Scott B, Eckle T. The impact of sedation protocols on outcomes in critical illness. Ann Transl Med 2016;4:33.

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