



## Sedation

# Perceived barriers to the use of sedation protocols and daily sedation interruption: A multidisciplinary survey

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### Abstract

**Background:** Although use of sedation protocols and daily sedation interruption (DSI) improve outcome, their current use and barriers affecting their use are unclear.

**Methods:** We designed a multidisciplinary, Web-based survey to determine current use of sedation protocols and DSI and the perceived barriers to each, and administered it to members of the Society of Critical Care Medicine.

**Results:** The 904 responders were physicians (60%), nurses (14%), or pharmacists (12%); 45% worked in a university hospital. Of 64% having a sedation protocol, 78% used it for  $\geq 50\%$  of ventilated patients. Reasons for lack of protocol use included no physician order (35%), lack of nursing support (11%), and a fear of oversedation (7%). Daily sedation interruption was used by only 40%. Barriers to DSI included lack of nursing acceptance (22%), concern about risk of patient-initiated device removal (19%), and inducement of either respiratory compromise (26%) or patient discomfort (13%). Clinicians who prefer propofol were more likely to use DSI than those who prefer benzodiazepines (55% vs 40,  $P < .0001$ ).

**Conclusions:** Current intensive care unit sedation practices are heterogeneous, and the barriers preventing the use of both sedation protocols and DSI are numerous. These barriers should be addressed on an institutional basis to boost the use of these evidence-based practices.

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Sedation and analgesia therapy plays a key role in the management of mechanically ventilated patients in the intensive care unit (ICU) [1]. Interventions focused on how we administer sedation therapy, titrate and monitor it, and

discontinue it when it is no longer required will impact duration of mechanical ventilation and length of ICU stay [2-6]. Although most studies that have evaluated the impact of sedation protocol implementation in the ICU have found their use shortens the duration of mechanical ventilation, decreases length of ICU stay, and lowers sedation drug costs [2-8], 3 other studies have found that the use of sedation protocols do not improve patient outcome [9-11]. A strategy of daily sedation interruption will decrease the duration of

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mechanical ventilation, reduce the need for neurodiagnostic procedures, and lower the total amount of sedation administered but will not increase the number of unplanned extubations or lead to a greater incidence of posttraumatic stress disorder [12].

Although each of these strategies is advocated in the 2002 Society of Critical Care Medicine (SCCM) guidelines, physician survey data suggest that neither strategy is routinely used and that many challenges are associated with implementing each [1,7,8,13-17]. For example, one survey of Canadian intensivists found that only 29% used a sedation protocol in their practice, and of 40% practicing daily sedation interruption, only 63% do so for all patients [13]. A more recent French survey found that only 36% of ICUs had a sedation protocol in place and that no site was conducting daily interruption of sedation [15]. It is suspected that the perceived barriers to the use of protocols and a daily interruption strategy are likely numerous and may differ substantially among critical care nurses, pharmacists, and physicians. To successfully implement a sedation protocol in the ICU that incorporates a daily interruption strategy, these perceived barriers need to be identified and overcome at the institutional level. We sought to determine current use of sedation protocols and daily interruption of sedation for mechanically ventilated ICU patients and identify the perceived barriers toward use of each among critical care physicians, pharmacists, and nurses.

## 1. Methods

The survey instrument was developed through a deliberate stepwise process that included item generation and construction and then pilot testing and clarification. Components of the survey were initially identified by searching MEDLINE to identify reports of protocols, dosing strategies, and clinical practice guidelines relating to sedation in the ICU. Focus groups consisting of intensivists, critical care pharmacists, and nurses at Tufts-New England Medical Center (Boston, Mass) were used to refine the survey items. The survey instrument was structured in 4 sections. The first section was designed to collect demographic parameters of the respondents and their practice setting; the second on primary sedation agent choices; the third on frequency of use of sedation protocols, involvement in the development of sedation protocols, and perceived barriers to their use; and the fourth focusing on use of daily sedation interruption and perceived barriers to its use.

The draft survey was then distributed to a multidisciplinary group (n = 12) of critical care professionals with a known practice or research expertise in ICU sedation including physicians (n = 5), pharmacists (n = 5), and nurses (n = 2). These experts were asked to comment on the relevance of each survey item and the clarity and distinctiveness of each response option. The feedback and results of the pre-pilot survey were used to further refine the survey instrument. The

**Table 1** Characteristics of survey responders

	% of responders
Profession	
Physicians	69
Nurses	15
Pharmacists	16
Years in practice	
1-3	18
3-10	26
10-20	30
>20	21
Type of hospital	
University	46
Non-university teaching	26
Community	27
Veterans Affairs	2
No. of ICU beds in the institution	
100+	10
100-70	14
69-50	16
49-30	21
29-10	31
<10	8
No. of beds in respondent's ICU	
21+	23
16-20	26
11-15	27
6-10	21
<5	3
Proportion of patients mechanically ventilated in respondent's ICU	
100%-76%	25
75%-51%	37
50%-26%	29
25%-1%	9

final survey instrument was then further examined by experts in the field of clinical research in critical care medicine having formal training in survey development who were asked to comment on the clarity of each survey item, the distinctiveness of response items, and ease of completion.

After approval was obtained for the survey from the institutional review board of Tufts-New England Medical Center, the survey was distributed through blast email to 12 994 physician, nurse, and pharmacist members of SCCM. The survey was not distributed to members of SCCM's pediatric or respiratory care sections. A reminder e-mail was sent to the same list serve approximately 4 weeks later. All responses were anonymous, and no incentive or compensation was offered to respondents. Costs associated with the survey were covered by departmental research funds.

The survey was constructed and distributed using Web-based survey software (Survey Monkey Inc, Seattle, Wash). Results were downloaded into a relational database (Microsoft Access, Seattle, Wash). Results were stratified by a number of demographic variables including type of primary ICU, hospital size, type of profession, and years of clinical

**Table 2** Barriers to the use of sedation protocols in the intensive care unit

Barrier	All	Physicians	Pharmacists	Nurses
	N = 728 (%)	n = 449 (%)	n = 104 (%)	n = 149 (%)
Lack of physician order	38	28	54	63
Lack of nursing acceptance	15	17	13	6
Prefer more control than a protocol offers	11	14	7	5
Use may cause oversedation	8	11	6	5
Protocol not accessible when needed	6	6	7	4
Protocols are difficult to use	6	6	4	3
Inconvenient to coordinate	4	5	3	3
Not appropriate for select patients <sup>a</sup>	4	3	2	5
Possibility for undersedation	3	3	0	2
No proven benefit	2	3	1	1
Other	3	4	3	3

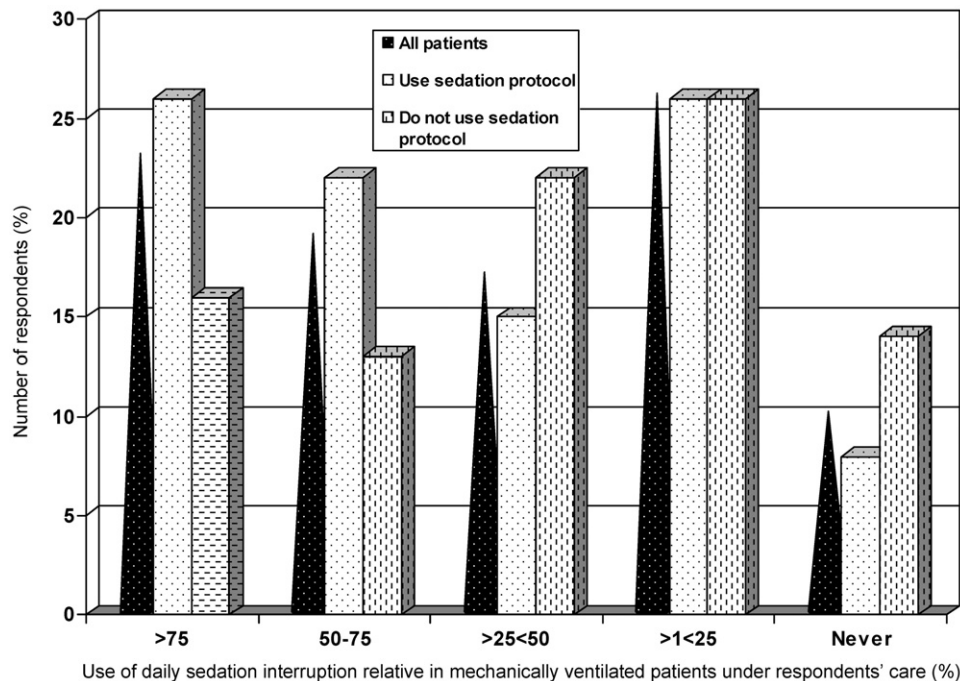
<sup>a</sup> Responders cited examples such as neurosurgical, head trauma, and pediatric patients.

experience. In some instances where results were spread over multiple categories, responses were collapsed into 2 categories to permit comparisons among various demographic and practice variables. Responses were analyzed using standard statistics including the Student *t* test,  $\chi^2$ , or Mann-Whitney *U* test where appropriate using SPSS version 11 (SPSS, Chicago, Ill). A *P* value of .05 or less was deemed to be statistically significant.

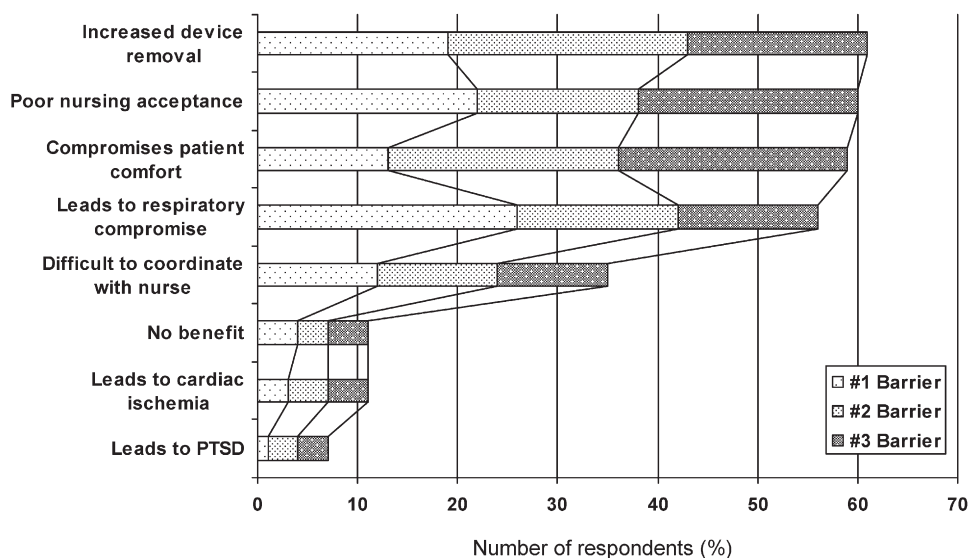
## 2. Results

Of the 12 994 SCCM members surveyed, 916 (7.1%) responded. Most of the respondents were physicians (69%),

followed by pharmacists (16%) and nurses (15%). More than half of the respondents had 10 years or more of ICU experience, 45% practiced in a university hospital and 62% in large ICUs ( $\geq 11$  beds) where 50% or more patients were mechanically ventilated. The demographics of respondents are outlined in Table 1. Most respondents (64%) practiced in ICUs where sedation protocols were implemented with 67% having participated in the development the protocol. Availability of protocols did not differ between university (64%), non-university teaching (64%), and community hospitals (65%) but was lower in Veteran Administration hospitals (37%). Sedation protocols were more likely to be used in larger ( $\geq 20$  beds) than smaller ( $\leq 5$  beds) ICUs (72 vs 43%, *P* = .03). More pharmacists (81%) were involved in



**Fig. 1** Use of daily interruption among all respondents, among respondents who use a sedation protocol, and among respondents who do not use a sedation protocol.



**Fig. 2** Respondents' first, second, and third greatest perceived barriers to the use of daily interruption of sedation therapy. PTSD indicates posttraumatic stress disorder.

developing these protocols than either nurses (50%,  $P = .03$ ) or physicians (68%,  $P = .04$ ). Patient populations deemed not be candidates for management using a sedation protocol included patients admitted to neurology/neurosurgery (23%), cardiothoracic surgery (5%), and trauma (5%) services. Most ( $\geq 70\%$ ) of these respondents worked an ICU that would primarily care for the patients they stated should not be managed with a sedation protocol.

Of the respondents who had a sedation protocol in place, the 3 most common primary perceived barriers preventing its use was a lack of a physician order for the protocol (38%), a nursing preference not to use the protocol (15%), and situations where the ICU caregiver would like more control of sedation than a protocol can afford (11%) (Table 2). When asked about preferred sedation regimens, 26% chose a regimen that contained propofol and 66% chose a regimen that contained a benzodiazepine (midazolam [43%], lorazepam [23%]). For clinicians using a sedation protocol in 50% or more of their mechanically ventilated patients vs those that did not, the proportion who preferred propofol (31% vs 22%,  $P = .27$ ) or a benzodiazepine (63% vs 68%  $P = .41$ ) did not differ.

Use of a daily sedation interruption strategy was used in 50% or more of mechanically ventilated patients by 40% of respondents, although use varied widely with 23% of total respondents using it frequently ( $\geq 75\%$  of mechanically ventilated patients) but 37% of respondents rarely or never using it ( $\leq 25\%$  of mechanically ventilated patients). The number of clinicians who had never heard of daily interruption of sedation therapy was low (5%). Compared to pharmacists (35%), nurses (50%,  $P = .007$ ) and physicians (44%,  $P = .03$ ) were more frequent users of daily sedation interruption (ie, use in  $\geq 50\%$  of mechanically ventilated patients). Use between nurses and physicians was not different ( $P = .17$ ). Respondents from institutions with a

sedation protocol was in place were more like to use a strategy of daily sedation interruption (Fig. 1).

The 3 most common primary perceived barriers to the use of daily sedation interruption included the potential for respiratory compromise (26%), the lack of nursing acceptance (22%), and concern about patient-initiated device removal (20%) (Fig. 2). Respondents whose primary sedative choice was propofol were more likely to use daily sedation interruption than those whose first choice sedation regimen contained a benzodiazepine (55% vs 40%,  $P < .0001$ ). However, the barriers to daily sedation interruption that were identified did not differ between these sedative agent preferences.

### 3. Discussion

Clinical guidelines and protocols, based on best available evidence and usually developed through multidisciplinary consensus, are increasingly being used in the ICU to guide the management of a number of different conditions such as pneumonia, hyperglycemia, and sedation [18]. Implementing new protocols in the intensive care unit is challenging and requires a multidisciplinary collaboration from physicians, nurses, respiratory therapists, and pharmacists [19]. After implementation, a number of factors may affect clinician adherence to guidelines including their underlying knowledge and attitudes, the incentive for them to change practice, and the organizational culture in which they practice [20]. The results of this multidisciplinary survey identifies for the first time a number of important barriers to sedation protocols and the use of a daily sedation interruption strategy. These barriers will be important for ICU caregivers to address before attempting to implement or

optimize the use of a sedation protocol that may or may not include the daily interruption of sedation in their unit.

Although our survey demonstrates a higher self-reported use of sedation protocols than previous surveys, the barriers to their use are wide ranging [13,15,16]. There appears to be a lack of a multidisciplinary consensus regarding the recommendations in these protocols or guidelines. For example, the absence of a specific order from the physician was cited as the primary barrier to use of a protocol by 54% of pharmacists and 63% of nurses. On the other hand, 17% of physicians perceived a lack of acceptance by nurses for the sedation protocol to be the primary barrier to its use and therefore may have been reluctant to order it for their patients. These results highlight the importance of involving more intensivists and nurses in the protocol development process to boost their support for the protocol after implementation, the need to develop educational efforts aimed at increasing protocol use, and the implementation of strategies (eg, preprinted order sheets) to increase the use of any implemented protocol in more patients. It is interesting that the number of clinicians who listed the lack of proven benefit of sedation protocols as a barrier to their use was extremely low given that there was 2 published studies demonstrating a lack of benefit with sedation protocol implementation at the time the survey was distributed [9,11].

The major stated reasons for not using daily sedation interruption were patient safety, respiratory comfort, and a concern that the incidence of patient self-extubation might rise. It is interesting that these concerns appear to exist despite multiple studies demonstrating the safety of daily sedation interruption [21-23]. However, the study showing a decrease in the duration of mechanical ventilation with the use of daily sedation interruption was conducted at a single institution, and the subsequent studies showing improved morbidity related to this sedation strategy were also performed at this same institution. It is conceivable that the patient population studied at this institution is different from patient populations cared for by providers who are reluctant to use daily sedation interruption. Studies have shown that abrupt sedation interruption may be complicated by withdrawal syndromes, which may be an explanation and a factor we did not assess [24,25].

The difficulty in coordinating an observer to conduct a sedation interruption is also another major challenge to this practice. It appears that this concern may be partly overcome for those clinicians who primarily use propofol-based sedation regimens in their patients [26]. The survey by Mehta et al [13] reported that 86% of the intensivists interrupt infusions before or during morning rounds. It may be challenging to coordinate daily sedation interruption with physicians' schedules. This barrier appeared to be more prevalent at university hospitals where care decisions surrounding sedation therapy are more likely to depend on multidisciplinary rounds than at community-based institu-

tions. Our survey presents multiple barriers that are important to address when attempting to implement evidence-based sedation practices.

The survey also identified ICU populations that should be evaluated for alternative sedation strategies. The fact that respondents' stated a sedation protocol was inappropriate in neuroscience and trauma ICUs may stem from the fact that sedation protocols have not yet been formally evaluated in these populations [27]. Although we did not specifically investigate clinician concerns about the use of daily sedation interruption in patients with alcohol and other drug use disorders, it is important to note that critically ill neurosurgery and trauma patients are at increased risk of having these substance disorders [28-31]. Studies have shown that patients with alcohol and other drug use disorders are not only more likely to require sedation but also require larger doses [32,33]. The hesitancy to interrupt sedation may also be related to the potential sequelae of agitation in some patient populations (eg, elevated intracranial pressure in a patient with a traumatic brain injury) [34].

Several limitations of this survey deserve mention, the most important of which is the response rate of only 7.1% that raises the possibility of response bias and the fact that the responses we report may not be representative of all critical care clinicians. Although the percentage of responders is low, the actual number of responders (>900) is high and similar to other large Web surveys of critical care providers [35,36]. The fact that a post hoc analysis revealed that the proportion of each profession who responded relative to their membership within in SCCM was similar across the 3 professions who were surveyed suggests that response bias, at least by the type of professional who responded, was minimal. Inherent in any stated practice defined through a written survey instrument, our results may have been influenced by highly motivated responders (ie, responder bias) who are more engaged in sedation practices in the ICU and thus may overestimate sedation practices compared to that which exists in actual clinical practice. However, this should not affect the perceived barriers to the use of sedation protocols or daily sedation interruption that were identified. In addition, despite our efforts to garner responses on an equal basis from each profession, the high proportion of physicians that were included in the survey compared to nurses and pharmacists may have influenced the conclusions we have made. Given the anonymous nature of the survey, it was impossible to know if more than one clinician from the same ICU responded to the survey. Lastly, respondents may have been constrained in having to choose among multiple choices and thus were unable to provide feedback on each of the sedation practices that were evaluated.

#### 4. Conclusion

Current ICU sedation practices are heterogeneous, and the barriers preventing the use of both sedation

protocols and daily sedation interruption are numerous. These barriers should be addressed on an institutional basis to boost the use of these evidence-based strategies in daily practice.

## Appendix A. Survey Instrument

### Evaluating sedation practices in the intensive care unit

1. What is your primary critical care clinical role?

Physician  
Nurse  
Pharmacist  
Physician Assistant  
Clinical Nurse Specialist

2. If you practice in the United States, in what region of the country do you practice?

Northeast  
Midwest  
Southeast  
South  
Northwest and Alaska  
Southwest and Hawaii  
Do not practice in the United States

3. Years in clinical critical care practice? (post training)

I am still training  
1-3 years  
4-6 years  
7-9 years  
10-12 years  
13-15 years  
16-19 years  
20+ years

4. What is the setting of your primary intensive care unit?

Medical intensive care unit  
Coronary intensive care unit  
Surgical intensive care unit  
Mixed medical-surgical intensive care unit  
Trauma intensive care unit  
Cardiothoracic intensive care unit  
Neuroscience intensive care unit  
Burn intensive care unit  
Stepdown/intermediate/telemetry ICU  
Long-term acute-care unit

5. How would you characterize the primary hospital where you practice?

University hospital  
Non-university teaching hospital  
Community hospital  
Veteran Affairs hospital

6. What percentage of patients in your primary ICU do you estimate are mechanically ventilated?

100-76%  
75-51%  
26-50%  
0-25%

7. How many beds are in the main (or primary) ICU in which you practice?

21+  
16-20  
11-15  
6-10  
Less than 5

8. How many total critical care beds do you estimate are in your primary hospital?

100+  
100-70  
69-50  
49-30  
29-10  
Less than 20

9. From the following list of sedation regimens, please choose the five regimens that are most frequently used for your intubated and mechanically ventilated patients (with no. 1 being the most frequently used and no. 5 the fifth most frequently used regimen)

	1	2	3	4	5
Morphine; as a single agent					
Fentanyl (Sublimaze); as a single agent					
Lorazepam (Ativan); as a single agent					
Lorazepam (Ativan) + morphine					
Lorazepam (Ativan) + fentanyl					
Midazolam (Versed); as a single agent					
Midazolam (Versed) + morphine					
Midazolam (Versed) + fentanyl					
Propofol (Diprivan); as a single agent					
Propofol (Diprivan); and morphine					
Propofol (Diprivan); and fentanyl					
Dexmedetomidine (Precedex); as a single agent					
Dexmedetomidine (Precedex); and morphine or fentanyl					
Remifentanyl (Ultiva); as a single agent					
Other agent(s)—please indicate in box below					

10. In your opinion, is there an association between sedation administered and patient outcome for mechanically ventilated patients in the intensive care unit?

Yes  
No

11. How often is a once daily interruption of sedation therapy employed for mechanically ventilated patients under your care in the ICU?

100-76%  
75-51%  
50-26%  
25-1%  
Never

I am not familiar with this strategy

12. List the three (3) most important reasons that a once daily interruption of sedation therapy is not utilized for all mechanically ventilated patients under your care in the ICU?

Inconvenient to coordinate with observers' availability

No proven benefit

Possibility of patient-initiated device removal

Possibility of cardiac ischemia

Possibility of posttraumatic stress disorder

Possibility of respiratory compromise

Possibility of compromising patient comfort

Nursing acceptance

Other (please specify)

13. Does your ICU have a sedation protocol? (\*answer required)

Yes

No

14. The sedation protocol is used for what percentage of mechanically ventilated patients under your care?

ALL

99-76%

75-51%

50-26%

25-0%

15. Were you involved in the development of this protocol?

Yes

No

16. In your opinion, which of the following populations of mechanically ventilated ICU patients should NOT be managed with a sedation protocol?

Cardiothoracic ICU patients

Medical ICU patients

Neurological ICU patients

Neurosurgical ICU patients

Neonatal ICU patients

Pediatric ICU patients

Trauma ICU patients

All ICU populations should be managed with a sedation protocol

Other (please specify)

17. What is the main reason that a sedation protocol is not utilized for all the mechanically ventilated patients under your care?

Inconvenient

No proven benefit

I like more control of sedation use

Patients get oversedated

Patients get undersedated

Not readily ordered by the physician

Often difficult to use when ordered

Nursing staff preferences

Other (please specify)

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