



## What stops us from following sedation recommendations in intensive care units? A multicentric qualitative study ☆☆☆★



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### ABSTRACT

**Purpose:** The purpose of the study is to explore health care professionals' (HCPs) perceptions regarding sedation recommendations.

**Materials and Methods:** This is a qualitative study, using face-to-face semistructured interviews. Health care professionals from 4 Belgian hospitals were purposively sampled. We focused on recommendations involving strategies such as protocolized sedation, sedation scales, daily sedation interruption (DSI), and providing analgesia before sedation. Knowledge, perceived barriers, expected outcomes, and responsibilities were discussed for each recommendation. Two researchers independently performed content analysis, classifying quotes according to an interdisciplinary framework and creating new categories for emerging themes.

**Results:** Data saturation was reached after 21 HCPs (physicians, nurses, and physiotherapists) were interviewed. Quotes were related to HCPs, guidelines or the system. Barriers were diverse according to the type of HCP or level of experience. Task characteristics impairing implementation of protocolized sedation included lack of means communicating goals or tasks to all HCPs providing care, ambiguous responsibilities, and unclear methodology on how to execute the recommendation. Fear of adverse events and lack of clarity regarding contraindications impair implementation of DSI.

**Conclusion:** Barriers impairing implementation of sedation recommendations vary according to the type of HCP and the choice of strategy targeting light sedation (protocolized sedation vs DSI). Improvement strategies must target HCPs separately and tailored to specific recommendation choices.

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### 1. Introduction

Sedatives are commonly administered to critically ill patients. Analgesia, sedation, and delirium recommendations were published in North America and Europe, to guide health care professionals (HCPs) in the intensive care unit (ICU) [1–4]. Executing sedation recommendations may be associated with improved patient outcomes, including reduced mortality [5]. Despite this, adherence of

HCPs is suboptimal. Practices such as daily sedation interruption (DSI), monitoring of sedation using validated scales, and protocols are insufficiently implemented [6]. A recent Belgian survey showed that among ICU HCPs, 86% use sedation scales, whereas only 31% report using protocols and 78% report using DSI in less than 25% of the patients (unpublished data).

Implementation strategies may increase performance. Single interventions (e.g. reminders, educational materials) often result in small improvements, and whether multifaceted interventions are more effective is unknown [7]. A comprehensive analysis of local determinants of practice is recommended to tailor appropriate interventions before implementation [8].

Rapid evolution of care, heterogeneity and complexity of patients, multiple care providers, and lack of knowledge of patients' preferences may influence HCPs' practices. Specific factors influencing guideline adherence in the ICU were described [9]. Limited work has been carried out on the causes of such problems in the field of

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sedation. Quantitative surveys [10–12] and qualitative studies such as focus groups [13,14] are available from the North American perspective. No research has explored the European perspective, although barriers and enablers are likely different. Previous studies focused essentially on HCPs as individuals and lack a system-level view of the matter. We hypothesize that barriers or enablers depend on HCP and system characteristics. Furthermore, we anticipate that these likely depend on the type of recommendation stated in the guideline.

The aim of the present study is to identify factors influencing adherence of HCPs to sedation recommendations in Belgian ICUs. More concretely, we seek to explore barriers or enablers related to different HCP types or to specific recommendations and gain insight into organizational aspects of the matter.

## 2. Materials and methods

We used a qualitative study to address our research questions. This approach is valuable to identify organizational and cultural issues and to gain insight into social interactions, health care delivery processes, and communication [15]. Common concepts and specific definitions can be found in Appendix 1. We conducted face-to-face interviews, an appropriate method to assess issues related to interdisciplinary interactions.

The North American version of sedation recommendations published in 2002 was used as a reference [1], as no Belgian or European consensus was available. The recommendations presented to participants during interviews focused on strategies, rather than specific drug use (Appendix 2). We therefore selected

the following sedation recommendations: (1) providing analgesia and treating physiological causes for agitation, before using sedatives; (2) setting individual sedation goals and assessing response to therapy regularly; (3) using validated sedation scales; (4) using sedation protocols, and (5) titrating sedatives to defined end points using systematic dosage tapering or DSI. Strategies combining patient assessment using sedation scales and algorithms by which nurses adjust sedative dosages are further defined as protocolized sedation.

A short questionnaire collecting data on hospital, ICU, and participant demographic characteristics and a semistructured interview guide using open-ended questions were compiled (Appendix 3). Participants were asked to comment on their awareness and familiarity with sedation recommendations. In addition, for each recommendation, participants were invited to discuss barriers and enablers, expected outcomes, and perceived responsibilities. Subsidiary prompts were available to discuss previously unaddressed topics (eg, environmental factors). Face validity was reviewed by a pharmacist (AS) and a health care sociologist (EB), both experienced in qualitative research, and an ICU physician (PFL).

We used purposive sampling to maximize variability within the sample according to the following characteristics: profession (physician, nurse, or physiotherapist), position, experience, academic status, and region of the hospital. We enrolled participants until data saturation.

An ICU pharmacist conducted the face-to-face interviews, which were audio taped. Participants were informed of the objectives of the study. Data were collected confidentially, and prior consent was obtained for publication of anonymous quotes. Interviews were held

**Table 1**  
Participant (HCP) and hospital characteristics

Participant (HCP) characteristics				
Profession	Physicians (n = 8)	Nurses (n = 10)	Physiotherapists (n = 3)	
Sex (women vs men)	3:5	6:4	1:2	
Experience in ICU (y)				
<2	3	3	1	
2–10	2	2	0	
10–20	2	5	1	
>20	1	0	1	
Hospital type (academic vs nonteaching)	6:2	6:4	1:2	
Region (Wallonia vs Brussels)	4:4	4:6	2:1	
Position (head of ICU vs other position)	2:6	4:6	1:2	
Training background				
Physicians: anesthesia vs internal medicine	1:7	/	/	
Nurses: ICU specialized training vs nonspecialized	/	5:5	/	
Hospital characteristics				
Center	1	2	3	4
Academic status	Yes	Yes	No	No
No. of beds				
Hospital	>750	250–500	>750	250–500
ICU	48	24	36	16
No. of ICUs	4	3	2	1
No. of ICU admissions per year	3900	2095	1900	873
Mean length of stay (d)	3.3	3.0	5.0	6.1
Proportion of patients cared for in the unit				
With mechanical ventilation	30%–40%	40%–50%	40%–50%	50%–60%
With elective surgery	40%–50%	80%–90%	50%–60%	40%–50%
Staff in FTE				
Senior physician vs junior physician vs nurse	8:12:118	4:8:64	10:2:75	5:0:33
FTE physicians/ICU beds	0.42	0.50	0.33	0.31
FTE nurses/ICU beds	2.46	2.67	2.08	2.06
Organization of daily multidisciplinary rounds	Yes	Yes	No	No
ICU sedation practices				
Type of sedation scale used	None	SAS	RASS	RASS
Use of DSI	Yes	No	No	No
Availability of a written protocol	No	Yes	No	No

FTE indicates full time equivalents; SAS, Sedation Assessment Scale; RASS, Richmond Assessment Sedation Scale.

in each participant's hospital, in quiet rooms, separate from ICU activity, and lasted 60 to 75 minutes on average.

Records were transcribed per verbatim. Before data analysis, we selected an interdisciplinary framework proposed by Gurses et al [16] to study guideline compliance and barriers and used it as a matrix to code data. Other models, from medical disciplines or adapted from other fields, provide theoretical frameworks looking specifically at guideline adherence [17–19]. Unfortunately, they focus on a limited number of specific perspectives (HCPs, guidelines, system, or implementation characteristics). The interdisciplinary framework is a compilation of 11 of these models, addressing the previous issue and allowing for a global view of factors influencing guideline adherence. An ICU pharmacist (BS) and a sociologist (EB) performed content analysis, selecting significant sections from participant statements, identifying themes explicitly, and classifying quotes independently according to the framework. When new themes emerged from the data and no appropriate category existed within the framework, additional categories were created and added to the model. Discrepancies were discussed until a consensus was reached.

Local ethics committee approved the research protocol.

### 3. Results

Twenty-one participants from 4 hospitals were approached, all agreeing to participate. Their characteristics are presented in Table 1. Emerging concepts were classified in 3 main categories: HCPs, guideline, and system characteristics (Table 2). Variations were found according to HCP and recommendation type (Table 3).

#### 3.1. Health care professionals' characteristics

We found barriers related to HCP were dependent on knowledge, conceptual agreement with guidelines, poor outcome expectancy, and lack of motivation (illustrative quotes are found in Table 4A).

Lack of awareness and familiarity with sedation recommendations are reported by HCPs. Information is perceived as insufficient for nurses, physiotherapists, and junior physicians, impairing self-efficacy (judgment of own competence to complete a task) and willingness to execute recommendations. Conversely, senior physicians feel comfortable with their level of knowledge. Specific knowledge issues are widely present such as using nonanalgesic sedative drugs for pain or perception that DSI is applicable only for planned extubation or for neurologic examination. Lack of priority for the topic may also influence HCPs' knowledge. Lack of conceptual agreement with guidelines is present in various forms. First, HCPs acknowledge that lack of applicability of guidelines to all patients is a barrier, as they fear that protocolized sedation may limit clinical judgment. Second, senior physicians report that protocolized sedation and analgesia may limit their autonomy, as they must rely on objective tools vs their own experience to adapt their practice accordingly. This contrasts with junior physicians, nurses, and physiotherapists who perceive protocols as means to increase their autonomy. Finally, previous negative experience following execution of a recommendation decreases willingness to adhere to it. Expected patient outcomes while executing sedation recommendations are variable among HCPs. Some report unknown or questionable outcomes. Most report reduced volumes of sedation. Important patient outcomes (reduced ventilator time, length of stay, mortality) are inconsistently reported. Specifically for DSI, fear of adverse events (self-extubation, pulling lines and tubes, using restraints) and patient discomfort are present. These concerns were raised by all HCPs, although some experienced physicians reported the barrier as being present in their unit, not specifically stating it as a barrier in their own practice.

As for expected outcomes on nurse's workflow or their preference for patient care, HCPs reported that DSI and sedation scales may have deleterious consequences. The belief that a heavily sedated patient is

easier to take care of than a lightly sedated one was widely present among nurses, whereas senior physicians reported that nurses might have these concerns. Some nurses acknowledged these concerns may not be justified. Various incentives were discussed including that a lightly sedated patient may actually be easier to take care of for reasons such as decreased nursing workload in a patient participating in his own care. Other incentives discussed included perception of safe and effective culture, increased autonomy, or job satisfaction while caring for calm, collaborative and awake patients. Inertia and lack of motivation to change practices were also present.

**Table 2**

Determinants of adherence to sedation recommendations (themes and definitions)

#### I. Health care professional characteristics

Insufficient knowledge (lack of awareness, familiarity, and self-efficacy)

Lack of awareness: inability to correctly acknowledge the guideline's existence [18].

Lack of familiarity: inability to correctly answer questions about the guideline's content [18].

Lack of self-efficacy: perception that one is actually able to execute a behavior [18].

Lack of conceptual agreement with guidelines [18]

Several perceptions about guidelines may explain the latter barrier including:

Fear of oversimplification and limitation of clinical judgment

Lack of applicability to practice population

Reduced autonomy and/or self-respect

Previous execution associated with negative outcomes

Poor outcome expectancy

For patient outcomes: lack of confidence that executing a recommendation will succeed in achieving beneficial patient outcomes [18]. This concept may also include fear of adverse event or of impairing patient outcome.

For outcomes on nursing workflow: lack of confidence that executing a recommendation will succeed in improving nursing workflow or working preferences.

Inertia and lack of motivation to change practices [18]

#### II. Guideline characteristics

Compatibility

Consistency of the guideline with clinicians' values, norms, and perceived needs as well as with previously introduced or adopted ideas [17].

Trialability

Possibility for the HCP to test the guideline with relative ease [17].

Observability

Possibility for the HCP to observe other clinicians who use the guideline easily [17].

Poor strength of evidence, poor confidence in guideline developer

Exception ambiguity

Lack of clarity on when executing the recommendation has no advantage (poor relative advantage) or is contraindicated (risk outweighs benefits) [19].

#### III. System characteristics

Task characteristics

Workload

Task ambiguity

Lack of information on the daily goals for each patient: which tasks are to be completed, what has (or has not) already been done and when to complete these tasks [19].

Responsibility ambiguity

Lack of clarity as to who is responsible for a specific task/step of the recommendation, who has the authority to make a decision in regard to applicability of a guideline for a particular patient, and who is accountable for compliance [19].

Method ambiguity

Lack of clarity on how to complete a particular step of the recommendation, where to find the necessary information or supplies needed and who to contact for help [19].

Logistics

Middle managers, leaders, local referents

Informational technologies, checklists, reminders

Educational materials

Physical environment

Workspace, timing, noise

Organizational characteristics

Culture, teamwork, communication

Expectation ambiguity

Lack of clarity on expected standards or norms regarding compliance [19].

**Table 3**  
Potential barriers and enablers according to recommendation or HCP type

	Recommendation type			HCP type	
	Daily interruption of sedation	Sedation scales and protocolized sedation	Analgesia first	Senior physicians	Junior physicians, nurses, physiotherapists
<i>HCP characteristics</i>					
Insufficient knowledge (lack of awareness and familiarity)	B	B	B		B
Lack of conceptual agreement with guidelines in general					
Lack of applicability to all patients	B	B	B	B	B
Fear of oversimplification and limitation of clinical judgment		B		B	E
Reduced autonomy and/or self-respect		B		B	E
Previous execution associated with negative outcomes		B		B	B
Poor outcome expectancy					
Unknown or questionable patient outcomes	B	B	E		B
Not efficient on patient outcomes	B	B		B	B
Adverse effects for patients	B	E	E	B	B
Adverse effects for health care professionals	B	B/E	B/E		B/E
Inertia to previous practices, lack of motivation for change	B	B	B	B	B
<i>Guideline characteristics</i>					
Lack of compatibility	B	B/E		B	E
Lack of trialability	B	B		B	B
Lack of observability	B	B		B	B
Poor strength of evidence or confidence in guideline developer	B	B	B	B	
<i>Exception ambiguity</i>					
Lack of clarity regarding relative advantage	B	B	B	B	B
Lack of clarity regarding contraindications	B				B
<i>System characteristics</i>					
<i>Task characteristics</i>					
Important workload	B	B/E	B/E		B
Task ambiguity		B			B
Responsibility ambiguity		B			B
Method ambiguity		B			B
Logistics	E	E	E	E	E
Poor physical environment	B			B	B
Poor organizational characteristics (culture, teamwork, communication)	B	B	B	B	B

B indicates barrier; E, enabler; B/E, may be one or the other depending on HCP or recommendation type.

### 3.2. Guideline characteristics

Barriers inherent to the guidelines are compatibility, trialability, observability, and exception ambiguity (illustrative quotes are found in Table 4B).

All types of HCPs reported compatibility, trialability, and observability as enablers to implementation, whereas poor strength of evidence was a barrier for physicians only.

Exception ambiguity is when a guideline fails to specify absolute or relative contraindications to recommendations [19]. The wide heterogeneity in reported exceptions or contraindications illustrates this concept. For DSI, HCPs report contraindications such as hemodynamic or intracranial pressure instability and acute respiratory distress syndrome. Junior physicians, nurses, and physiotherapists report wider contraindications or instability at any level as contraindications. Light sedation, short or prolonged length of stay, and agitation were perceived as reducing relative advantage of using sedation scales.

### 3.3. System characteristics

System characteristics include tasks, logistics, physical environment, and organizational constraints (illustrative quotes are found in Table 5).

Task characteristics include workload and task, responsibility, or method ambiguities.

Workload was reported as a barrier in various forms (insufficient nurse-to-patient ratio, sick and demanding patients, and other patient priorities). All participants agreed workload was a barrier to DSI, which was perceived as likely difficult to implement by nurses (considering 3:1 nurse-to-patient ratios) as nursing surveillance

would be required during awakening trials. For sedation scales, nonusers of the latter expressed fears the strategy would increase workload (timing required for evaluation and documentation), whereas those using them describe that their use is feasible. Task ambiguity is when means to communicate goals and tasks to complete for each patient, to all HCPs providing care, are absent or inadequate [19]. No formalized communication of daily goals is organized in most ICUs. In addition, several HCPs report that orders such as “target sedation to a calm collaborative and comfortable state” are used in their ICUs, instead of validated sedation score targets. Such practices are reported as impairing team communication and achievement of goals.

Responsibility ambiguity occurs when it is unclear which HCP is responsible for making decisions and executing each step of a recommendation [19]. This applies to the titration of analgesics or sedatives according to daily goals. Some physicians report not setting daily goals, whereas others mention nurses do not target them even when set. Conversely, some nurses argue that a physicians' prescription is required to achieve these goals. Others report that physicians do not modify drug dosages, despite nurses' usage of scales to monitor analgesia. Similarly, the type of HCP responsible for initiating DSI was unclear, although most participants felt that only physicians should order it.

Method ambiguity occurs when the procedure to execute 1 particular step of the guideline is unclear [19]. Considering protocolized sedation, nurses felt information on how to titrate dosages to target goals was lacking.

Logistics are mentioned as enablers increasing adherence. Middle managers, serving as both reminders and consultants, are perceived as useful. Acute pain service teams, anesthetists, reference nurses, and pharmacists were identified as potential middle managers.

**Table 4**  
Quotes illustrating barriers related to HCPs and to the guideline

<p>A. Barriers related to health care professionals</p> <p>Specific knowledge issues</p> <p>Limits between analgesia and sedation are unclear</p> <p>“Even today, sadly, the two things are often confused: OK, the patient is sedated, he isn't in pain. It's true that you can still find that with both doctors and nurses, even though the opposite is true...” (Nurse 3—head of ICU)</p> <p>DSI is warranted only if extubation is warranted</p> <p>“What is the point of waking the patient up every day, if he cannot be weaned from respiratory support...” (Physician 2—senior physician)</p> <p>Lack of conceptual agreement with guidelines</p> <p>Guidelines are “too cookbook—to rigid to apply”</p> <p>“If it was as simple as A, I do this, and B, I do that, and then I have a result, all's well, and I can go to bed... Often you have to tailor things more to the individual.” (Physician 3—senior physician)</p> <p>Challenge to autonomy</p> <p>“It's a limiting of one's autonomy... Which means, because a scale says you have overdone it, then you have to reduce the sedation...” (Physician 5—senior physician)</p> <p>Poor outcome expectancy</p> <p>Unknown or questionable patient outcomes, not efficient on patient outcomes</p> <p>“In the end, I don't see that much benefit [of using sedation scales] for patients, I see more for us...” (Nurse 1)</p> <p>Adverse effects for patients</p> <p>“For the patient, it can't be very pleasant to be woken up, put to sleep, woken up again, put to sleep again... There's an issue of patient comfort there. Yes, because if I was intubated myself, I'm not so sure I would like people waking me up every day, knowing that I have this tube in my mouth and that they will have to put me to sleep again...” (Nurse 1)</p> <p>“The fear of self-extubation [following DSI], that's, well ... Yes, if my patient self-extubates, that's going to be a disaster, eh... That's really a major barrier...” (Physician 3—senior physician)</p> <p>Adverse effects for HCPs</p> <p>“Of course, for us, it's easier to have a patient who is completely groggy than a patient you have to communicate with and maybe reassure, talk to, sometimes that's enough.” (Nurse 9)</p> <p>Motivation/inertia of previous practice</p> <p>“That's the real barrier: the willingness to change... Time and the willingness to change...” (Physician 5—senior physician)</p> <p>B. Barriers related to the guideline</p> <p>Compatibility and observability</p> <p>“What's really hard is to change habits that have been fixed for 20 years... There were psychological barriers too, because they had never seen anyone who was comfortable being woken up with a tube in place and it's possible with a minimum of sedation; it seemed cruel and inhuman to them. It was difficult to get over that, because at first I was seen, maybe not as a monster, but as someone inhumane, because they had never seen...but now it doesn't shock them anymore; before, however, that did frighten and shock them.” (Physician 7—senior physician)</p> <p>Exception ambiguity</p> <p>Some indications reduce relative advantage (eg, light sedation)</p> <p>“Yes, but as we have patients who sleep less and less and there are some who are on a tube with very little sedation but who respond, we no longer need daily sedative interruption...” (Nurse 6)</p> <p>Lack of clarity regarding contraindications</p> <p>“If you know the patient is unstable or is not going to improve, there is really no point, as you're going to say to yourself: we will leave him asleep—from the respiratory point of view and sometimes from the point of view of renal function or from the point of view of liver problems, you say to yourself you cannot go waking him up for this or that.” (Physician 1—junior physician)</p>
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Standardized prescriptions, checklists, and informational technologies are perceived as useful communication tools and reminders. Availability of educational materials for HCPs is reported as essential, as multiple system failures impair knowledge. First, nurses, physiotherapists, and junior physicians report insufficient background training. Second, insufficient access to information was raised as an issue. Third, gaps in knowledge transmission at the bedside exist. Although senior physicians feel responsible for educating nurses and junior physicians, they report failing to do so. Lack of self-efficacy, workload, and assumption that their team's knowledge is adequate could explain these gaps. Finally, the lack of a shared vision on sedation recommendations between different senior physicians of the same unit confuses other HCPs in their learning process.

**Table 5**  
Quotes illustrating barriers related to the system

<p>Task characteristics</p> <p>Workload</p> <p>“You must remember, too, that the workload can vary from one moment to the next and that when the unit is relatively calm and everything is purring along, it can afford to have patients who are less sedated, that is to say, calm and cooperative, but when the workload becomes more intense, blunter techniques come into play; sometimes, moreover, you have to accept that the patient will be more sedated, asleep, so as not to take risks, because clinical surveillance is further reduced...” (Physician 4—senior physician)</p> <p>“When one morning you have three patients, let's say you would have two intubated and one who isn't, the problem is that if...me, anyway, I like to be at the patient's side when the sedation is stopped, because a patient whose sedation is stopped suddenly, sometimes he is extremely agitated, he could even pull out his tube, so there are risks for the patient. So the barrier for me would be when there are too many patients, serious cases that would mean we wouldn't have the time to do it and wouldn't have the time to do it properly, because stopping someone's sedation, it's a big deal...” (Nurse 8)</p> <p>Task ambiguity</p> <p>No formalized communication of goals exists.</p> <p>“There is a score, but you don't know what score you are aiming for. You do the calculation, but afterwards, if it's too high, or if it's too low, what are you going to do about it? It's still not clearly defined... and that's a problem because... You have the impression that you are measuring something for nothing.” (Nurse 6)</p> <p>Not using adequate or validated pain and/or sedation scales for setting goals is a barrier</p> <p>“[The physicians] do the treatment every day, and on their prescriptions then there are some who put down [...] use midazolam or morphine for “CCC”. That means ‘calm, comfortable, and cooperative.’ But that could mean anything or nothing! It's pretty subjective.” (Nurse 10)</p> <p>Method ambiguity</p> <p>“We need clear “guidelines” for sedation. Or else, clear prescriptions. Because now, you have propofol for a RASS of –1 or 1. There you have it. [We should] impose limits on ourselves: For example, I don't know, 1 cc of propofol and you always arrive at a RASS of, I don't know, 3 or 4.” (Nurse 2—head of ICU)</p> <p>Logistics</p> <p>Middle managers, reference persons, leaders</p> <p>“What could make it easier to use the scale properly [...] would be someone who could get the message across to the nurses about the importance of the proper use of that scale...” (Physician 2—senior physician)</p> <p>Educational materials: multiple reasons for knowledge problems were identified at the system level (eg, gap in knowledge transmission at the bedside by senior HCPs)</p> <p>“I don't know whether those in charge think that it's all meant to be known; maybe nobody ever told them that it is not, so they have never thought about teaching it systematically. Because we, in any case, in internal medicine, we have no courses on sedation.” (Physician 6—junior physician)</p> <p>Physical environment</p> <p>“As this is a big unit, the problem could be that I would be at bed three and my other patient is on the other side, I turn off my sedation and I can't observe him... OK, I can't turn it off today because I'm too far away and I wouldn't be able to monitor rightly...” (Nurse 7—head of ICU)</p> <p>Organizational characteristics—culture, teamwork, and communication</p> <p>Protocolized sedation is a way of formalizing culture</p> <p>“That's my outlook, because the attitude to be taken will be clearly set out for everyone, both younger people and those with more experience; we must take the same attitude: it is clearly set out and you know who does what, when, where, and how. So for me it's maybe with my outlook, as you said, on managing staff and the work, for me a protocol is the ideal.” (Nurse 3—head of ICU)</p> <p>Absence of consensus between physicians</p> <p>“You learn on the job and above all from the information you get from the assistant doctors you work with, and in our own case here those in charge all have their own habits, which differ from one to another.” (Physician 6—junior physician)</p> <p>High turnover of nursing teams</p> <p>“The teams are huge, with a massive turnover; we don't know people well enough anymore, there is a lack of trust!” (Nurse 6)</p> <p>Impaired communication between physicians and other HCPs</p> <p>“But I don't think you have much effect as a physio on the nurse and the doctors. I can't see myself telling them how to treat patients, it wouldn't really be my field.” (Physiotherapist 1)</p> <p>Discrepancies in perception amongst different HCPs (eg, discrepancies on long-term outcomes)</p> <p>“The nursing team has a much more day-to-day and short-term outlook, so it is harder for them to imagine that a scale of this kind could be linked to benefits in terms of duration of stay, length of time spent on ventilation, infectious complications...” (Physician 5—senior physician)</p>
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Physical environment characteristics such as availability of materials at the bedside, workspace, timing, and noise influence adherence. For example, DSI is found to be difficult to execute for nurses in charge of more than 1 patient; therefore, proximity of patients cared for by a single nurse is essential. Timing of DSI while activities are reduced is also essential, although there was no consensus on optimal schedule. In addition, noise and patient burden (examinations, stimulations, etc) must be minimized to increase patient comfort, ensuring adequate awakening conditions.

Organizational characteristics include culture and expectation ambiguity.

Culture includes norms, tacit values, beliefs, and behaviors (local practices and policies) shared by a group of people [16]. Culture, teamwork, and multidisciplinary are mentioned as essential factors enabling guideline adherence. Unfortunately, views of sedation recommendations are heterogeneous among HCPs from the same unit. First, lack of consensus within physicians working in the same unit impairs shared team values, considering physicians' leadership position. Second, high turnover of nursing teams impairs the viability of a team culture, as its integration is a lengthy process, requiring training. Thirdly, some nurses and physiotherapists do not feel entitled to question physicians on practices because of hierarchical structure. Fourth, interprofessional variability is present for perceived outcomes and pain. Nurses take care of a small proportion of patients and work at their bedside, whereas physicians are responsible for all patients within the ICU, therefore spending less time with each one. Consequently, nurses may not perceive as well as physicians, the positive effects of executing sedation recommendations (reduced ventilator time, length of stay, or mortality). Similarly, nurses feel that physicians do not often take pain into account, whereas the latter report "overtreatment" of pain by nurses.

Expectation ambiguity is when standards regarding compliance lack clarity [19]. At this point, enablers such as auditing, feedback, and clarifying the departments' standards were mentioned.

#### 4. Discussion

The present study provides valuable information on barriers explaining low adherence to sedation recommendations. Barriers arise from HCPs, guideline, and system characteristics. Key factors influencing adherence include (1) profession (nurse/physiotherapists vs physician), level of experience, and (2) type of recommendation (eg, DSI vs protocolized sedation).

Lack of shared understanding of sedation practices is present in ICU teams, as reported by previous qualitative research [13,14]. We showed that variations in barriers were associated with profession and level of experience. For example, effects of protocols on perceived autonomy contrasted according to the type of HCP. Previous research showed that, especially for physicians, preference of more control than protocols can offer is an important barrier to sedation recommendations [10]. In addition, fear that protocols may substitute or impair clinical judgment was present, especially among physicians, although exposure to sedation protocols does not actually reduce clinicians' performance [20]. Shaping protocols is commonly considered a physician's role, but the latter barriers may result in reluctance to transfer responsibilities to nurses. Consequently, written protocols are scarcely available in Belgium, although these may resolve task, responsibility, and method ambiguities, which are barriers for other HCPs (junior physicians, nurses, and physiotherapists). Considering that barriers vary according to the type of HCP (experience, profession), dividing them according to their specific needs and customizing implementation strategies for each group are desirable. For example, educational sessions may be valuable for nurses, physiotherapists, and junior physicians, whereas senior physicians may not benefit from them.

Barriers hindering compliance differ according to the type of recommendation. From the HCPs' perspective, lack of conceptual agreement with guidelines hinders compliance with protocolized sedation. Despite evidence to the contrary [5,21], fear of adverse effects is an essential barrier to DSI, as reported previously [10]. From the guidelines' perspective, contraindications for DSI lacked clarity. Miller et al [13] conducted a series of focus groups exploring attitudes to DSI in US hospitals, showing the latter barrier may impair implementation. They found significant overlap between different professions, whereas we observed significant variability. Our multicentric design and scarce use of collaborative approaches increasing interprofessional variability may explain our results. Among system characteristics, perceived increased nursing workload was reported for DSI, consistent with previous research [22,23], whereas for protocolized sedation, it was only reported for HCPs not using scales. Task, responsibility, and method ambiguities were mainly present for protocolized sedation showing suboptimal nurse empowerment in adapting drug dosages according to their measurements. Interestingly, this was not reported for DSI, although previous research has reported lack of consensus on procedure for DSI as a barrier [13]. Daily sedation interruption was standard practice in only 1 of the 4 participating hospitals. We hypothesize that method ambiguity may occur postimplementation of DSI as a standard in ICUs. Considering that barriers are specific to individual recommendations, addressing these according to local strategy choices is essential.

Recently updated guidelines recommend targeting light sedation using DSI or protocolized sedation [2]. Which strategy is most appropriate remains questionable, as international variation may influence transferability. In Belgium, most ICUs are closed and led by intensivists. Nurse-to-patient ratios are lower (1:2 or 1:3), whereas physician staffing is usually higher than in North American ICUs [24,25]. Beneficial impact of DSI was demonstrated essentially in North American settings [5,26]. One study exploring lack of adherence to DSI from cultural and institutional levels found that staff receptivity to change, intensivist staffing, collaborative efforts, and leadership driving safety culture were all associated with increased use [12]. Similarly, a recent survey has shown that only addressing sedation in rounds and incorporation of DSI into unit culture are associated with increased DSI use [23]. Regrettably, we showed that failures impair the shaping of an effective culture and collaborative approaches including lack of physician consensus (impairing leadership), high nursing team turnovers, communication gaps, and discrepant attitudes among different professions. Implementing DSI in settings where protocolized sedation is standard practice showed no additional impact, suggesting protocolized sedation alone may be sufficient as HCPs are reluctant to execute DSI [22]. Nurse-directed protocolized sedation may not be beneficial in settings with 1:1 nurse-to-patient ratios or where sedation minimization is targeted, but positive effects were shown in most contexts, including settings similar to Belgium [27,28]. Therefore, it may be an appropriate strategy for Belgian ICUs. Unfortunately, we showed prerequisites are lacking, including interdisciplinary care and nurse empowerment reducing treatment delays by eliminating the need for physician orders.

Difficulty, cost and timing to implement potential improvement interventions are variable. We recommend prioritizing simple interventions targeting numerous ambiguities, as compared with costly and challenging actions targeting HCP or guidelines. For example, exception ambiguity for DSI may be resolved relatively easily, as many eligible patients may not receive it because of ambiguous contraindications [6,29]. Local protocols must properly address this issue, as the recently updated version of the guideline failed to specify contraindications [2]. Similarly, responsibilities of each HCP, for each recommendation step must be defined. Even though using prescribing goals such as "target to a calm, comfortable and collaborative state"

have been advocated by some [30], we recommend using validated scales to set goals and measure sedation, clarifying task ambiguities.

Our study has several limitations. First, generalization of data out of the context studied is questionable, as for all qualitative research, which objectives are hypothesis generating. We involved a limited number of stakeholders from only 4 hospitals, in 2 of the 3 regions of Belgium. However, multicentric design, data saturation, and redundancy of barriers identified across different ICUs give strength to our findings. Second, we only carried out interviews, not triangulating methods. Nevertheless, this method is most appropriate, as respondents felt free to talk about sensitive issues such as problems related to teamwork. Last, an updated guideline was published, since data collection for the present study [2]. However, this is of minor relevance as targeting light sedation by using DSI or sedation scales continues to be recommended.

Our study has several strengths. Firstly, researchers involved in data analysis were of complimentary backgrounds (ie, clinical pharmacist and sociologist), allowing understanding of clinical context and social interactions between participants. In addition, the interviewer (a pharmacist) had a different professional background than participants involved in the study. As few pharmacists are involved in Belgian critical care teams, we hypothesize that HCPs felt free to discuss topics related to multidisciplinary, communication, and interprofessional relations with the interviewer. Third, to our knowledge, the present study is the first providing qualitative data, from a European perspective, on reasons explaining suboptimal performances for sedation. Finally, we analyzed the data according to an interdisciplinary framework, allowing for identification of barriers not only from the HCPs' but also from the guideline and system's perspectives. In addition, we analyzed the perspectives of different HCPs (source triangulation) to generate a more comprehensive set of findings, also allowing a system perspective of the matter.

## 5. Conclusion

From a European perspective, multiple barriers impair effective implementation of sedation recommendations. These vary according to the type of HCP (profession, level of experience) and the local strategy choice to target light sedation. Strategies for improvement must target HCPs separately and, specifically, tailoring to specific recommendation choices.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.jcrc.2013.11.004>.

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