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Competency Of Critical Care Nurses In Sedation Administration: A Cross-Sectional Survey In Saudi Arabia

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Abstract

Background: It is essential for critical care nurses to competently administer sedation practice within the defined ethical framework in nursing to meet a patient's needs in any healthcare setting. The administration and regulation of sedation are still challenging, and no consensus has been reached over its regulation. The study aims to investigate the critical care nurse's competency in the attitudes, practice, subjective norms, sedation orders and goals, and perceived behavioral control toward sedation administration and confidence in the administration of sedation and sedation-related complications.
Material and Methods: A cross-sectional survey design was utilized. A self-completion electronic questionnaire was used to collect data from participating nurses. A convenience purposive sampling was employed of 384 registered nurses who provide sedation or monitor patients who have received sedation, working in various healthcare institutions, forming a comprehensive dataset survey in Saudi Arabia, such as Armed Forces Hospital in Al-Hada and the King Fahad Medical City. Three tools were included in a questionnaire: Demographic Characteristics sheet (8 items); Nurse Sedation Practices Scale (27 items), and Confidence Managing Sedation Complications Scale (18 items). The nurses' responses were evaluated based on total scores that reflected stronger agreement with the nurses' attitude, practices, or confidence, and vice versa, by analyzing an Excel sheet of responses.
Results: The total mean scores for nurses' attitudes, subjective norms, and sedation commands and goals were (3.797), (3.869), and (3.931), respectively, reflecting high nurses' competency. Participated nurses reported a high mean of overall confidence in their ability to manage sedation-related problems by (M = 4.033, SD = 1.044). The results showed a highly significant impact of nurses' attitude toward sedation, subjective norms, sedation orders and goals, perceived behavioral control, nurses' sedation practices, confidence in managing sedation, and the education level of nurses as predictors on the nursing sedation competency at p= (0.000, 0.00, 0.00, 0.00, 0.00, 0.00, and 0.019), respectively.
Conclusion: The majority of Saudi female highly educated critical care nurses' competency is highly impacted by their attitude, subjective norms, sedation orders and goals, perceived behavioral control, nurses' sedation practices, and confidence in managing sedation as predictors of the nursing sedation competency.

Keywords: Critical care, nurses' competency, sedation administration, nurses confidence.

INTRODUCTION

In nursing and healthcare settings, it is common practice to subject patients to sedation during painful operations [1]. Sedation is often recommended to alleviate anxiety and fear associated with surgeries, diagnostic tests, or interventions, thereby enhancing patient comfort and cooperation during medical procedures [2]. Lack of competency among critical care nurses in administering sedation can have detrimental effects on patient health and safety. It might lead to inadequate sedation levels, such as undersedation resulting in patient discomfort or awareness during procedures. While oversedation poses several risks to patient safety, including respiratory depression, effects on the cardiovascular system, airway obstruction, hypoventilation, and allergic reactions [3].
It is imperative for nurses to competently administer healthcare nursing practices within the defined ethical framework in nursing. According to Miles & Shah [4], competency is perceived as a nurse's

ability to integrate complex nursing knowledge, working attitude, and practical skills to meet a patient's needs in any healthcare setting.

Despite sedation administration being a common nursing practice, it is still challenging, and no consensus has been reached over its regulations among critical care nurses [5]. The evolution of nurses' sedation administration practice competency, represented in their attitudes, perceived norms, and behavioral intentions, significantly influences sedation practices in intensive care settings, reducing the healthcare costs, elevating patient outcomes and satisfaction, fostering a culture of excellence in healthcare quality, and increasing nurses' satisfaction with the job [6, 7].

In the healthcare context, studies have demonstrated that clinicians and professional nurses who lack confidence in their abilities do not undertake the necessary actions for their patients. Therefore, nurses may not take actions to administer sedation-related complications if they lack confidence in their ability to complete the necessary tasks [14, 15, and 16].
The nurse's concern about the provision of sedation complications management practice reflects nurses' belief in their ability to manage sedation, and the problems follow accordingly. Confidence levels of critical care nurses can be addressed to improve the quality of health care and patient safety [16].
Despite the critical role nurses play in managing sedation, a significant gap in previous research is limited focus on exploring the specific aspects of sedation administration, such as nurses' attitude, practice, subjective norms, perceived behavior control, and practice reflecting critical care nurses' competency and its impact on nurses' confidence in Saudi Arabia. Additionally, there is a need for more comprehensive investigations into the strategies enhancing nurses' competency and confidence in sedation administration.
The study findings could gain the insight of healthcare policy makers, lead-nurses, and stakeholders about the current gaps in critical care nurses' attitude, knowledge, and practices to set research-based strategies that can improve nursing practices and patient outcomes in sedation treatment.
By evaluating the relationship between nurses' confidence and their competency in sedation administration practice, this study encompasses education, training, and practical experience of critical care nurses with sedation administration and supports the institution where the nurse works with the specific protocols for nursing sedation administration with maximum patient safety and quality and minimum costs for Saudi Arabia health care institutions, as well as enhancement of the central Saudi Arabia healthcare policies regulating sedative nursing practice.
However, several studies conducted within Saudi healthcare institutions highlight the inadequacy of sedation-related knowledge, attitude, and practice among ICU nurses [12, 17, 18, 19, and 20]. While Saudi Arabia has made significant strides in establishing competency frameworks for critical care nursing, persistent knowledge, attitude, and confidence level gaps remain especially regarding sedation protocols.
This study aims to investigate the critical care nursing ʿcompetency in the attitudes, practice, subjective norms, sedation orders and goals, and perceived behavioral control toward sedation administration and confidence in the administration of sedative and managing sedation-related complications.

Research Questions

1. What are the individual and workplace characteristics of critical care nurses who participated in the study?
2. What is the critical care nurses' self-reported competency in attitudes, practice, subjective norms, sedation orders and goals, and perceived behavioral control toward sedation administration?
3. What is the critical care nurses competency in confidence in managing sedation complications?
4. What are the correlations between the critical care nurses' self-reported competence indicators of the sedation practices domain and confidence in the administration of sedation and its complications?
5. What are the correlations between the critical care nurses' competency indicators and their characteristics?

MATERIAL AND METHODS

Research Design

A quantitative cross-sectional design was utilized to collect data from a sample population at a single point in time to examine the relationships between variables and test hypotheses. The study adopts the survey research method through administering an electronic questionnaire.

Settings

The study is approached by various healthcare institutions in Saudi Arabia, such as the Armed Forces Hospital in Al-Hada and King Fahad Medical City. Critical care units are distributed across the hospitals that were included.

Study population and selection process

A convenience purposive sampling method was utilized to select the study sample, which consists of 384 registered critical care nurses who met inclusion and exclusion criteria, working in the aforementioned settings, and invited to participate in the study; eligible participants were Registered Nurses (RNs) who provide sedation or monitor patients who have received sedation in critical care units. Nurses not directly involved in patient care or those without experience in managing sedated patients in critical care settings are excluded. Participants who complete fewer than 25% of the questionnaires or provide inconsistent or inaccurate responses are excluded.

Sample size and sampling method

The research population's entire number of registered critical care nurses working in the aforementioned institutions was about 100,000 nurses. Thus, the sample size has been estimated to be around 384 participants of the total population who completed the electronic survey and were recruited in the study, using the Cochran's sample size formula to achieve a 95% confidence level with a 5% margin of error, assuming maximum variability in responses [21].

Population N=100,000, Confidence level = 95% → Z=1.96

Margin of error = 5% → e=0.05

Proportion p=0.5 (most conservative estimate)

$$n = \frac{N \cdot Z^2 \cdot p(1-p)}{(N-1) \cdot e^2 + Z^2 \cdot p(1-p)}$$

$$n = \frac{100{,}000 \cdot (1.96)^2 \cdot 0.5 \cdot 0.5}{(100{,}000-1) \cdot (0.05)^2 + (1.96)^2 \cdot 0.5 \cdot 0.5}$$

$$n = \frac{100{,}000 \cdot 3.8416 \cdot 0.25}{99{,}999 \cdot 0.0025 + 0.9604} = \frac{96{,}040}{250 + 0.9604} \approx \frac{96{,}040}{250.9604} \approx \mathbf{383}$$

Data collection tools

Three tools were used in the current study. Firstly, nurses' demographic characteristics, including age, gender, years of experience, level of education, certifications, and specialty area. Secondly, the Nurse Sedation Practices Scale (NSPS) was developed by [8] to assess nurses' self-reported practices in sedation administration across five subscales; it included 27 items: (1) attitudes toward sedation (7 items), (2) subjective norms (4 items), (3) sedation orders and goals (3 items), (4) perceived behavioral control (4 items), and (5) sedation practices (9 items). Responses were rated on a 5-point Likert scale from "strongly agree" to "strongly disagree". The NSPS has undergone content validity, construct validity, and criterion-related validity testing to ensure its accuracy, making it a valid instrument for assessing nurses' knowledge, behaviors, and clinical decision-making related to sedation in critical care settings. The NSPS has demonstrated good reliability for all subscales, ranging from 0.6 to 0.8 [9].

While the NSPS is not explicitly designed as a direct competency tool**,** it has been used as an indirect measure of competency in sedation practices in several studies that showed that higher NSPS scores are associated with greater clinical competence, education, and experience**,** while lower scores reflect

competency gaps requiring intervention [12, 22, and 23]. The scale assesses behaviors, decisions, and practices**,** which are recognized components of clinical competency in critical care nursing domains aligned with established definitions of nursing competency in critical care [24, 25].
It was mentioned in several studies utilizing the Nurse Sedation Practices Scale (NSPS), indicating the nurses' knowledge, attitude, and practice which were indicators for nursing competency [8, 9 and 10].
Thirdly, the Confidence in Managing Sedation Complications Scale (NC-MSCS): it consisted of 18 items and was used to measure nursing confidence in managing sedation-related complications [16]. The scale has three subscales: (1) Risk assessment; (2) Identifying and responding to cardiorespiratory complications; and (3) Technical airway skills. Cronbach's alpha was 0.95, and for each subscale was larger than 0.85. The NC-MSCS response scale ranged from 1 (strongly disagree) to 5 (strongly agree), with a total score ranged from 18 to 90 [16]. The scale has demonstrated strong validity as an instrument for measuring nurses' self-reported confidence in handling sedation-related complications. The psychometric findings of the scale by Conway [14] through its content validity, construct validity, and face validity indicate that the NC-MSCS is a valid and appropriate measure for assessing confidence among nurses involved in sedation practices.
Similarly, the findings across multiple studies consistently conclude that nurses with higher knowledge and clinical skills in sedation practices tend to report greater confidence in safely managing sedated patients, making accurate decisions, and handling potential complications, utilizing the confidence in managing sedation complications scale (NC-MSCS) [11, 12, and 13].

Data collection procedure and ethical consideration
The study proposal was submitted to the institutional review board at King Abdullah Bin Abdul-Aziz University Hospital to obtain ethical approval with log number (24-0120) before conducting the study. Second, an official letter with the link is submitted to the nurse in charge and managers at the selected settings. The hospitals that grant permission to collect the data are accessed at least two days per week until the required sample is collected. Eligible participants are provided with the study purpose and the duration of data collection to obtain their informed written consent before participation. Participants are informed that their participation is voluntary, and they have the right to refuse or withdraw their consent at any time. The confidentiality of participants' responses was maintained throughout the study, as no personally identifiable data was collected. Additionally, the collected data is saved on a secure, protected device accessible only to the research participants and researchers for the study aim only.

Data analysis plan
SPSS software was used. The descriptive analysis was used to describe the characteristics of participating nurses, nursing sedation practice domains, and their confidence in sedation administration. Inferential statistics such as independent t-test, correlation coefficients, ANOVA, and linear regression tests were used.

RESULTS

The descriptive analysis of study variables
It contains the frequency distribution of participant characteristics, nursing sedation practice domains, and confidence items, presented in tables 1, 2, and 3.
Table 1 shows that women make up the majority of critical care nurses (73.02%) polled were females. This distribution is in line with the general pattern of Saudi Arabia's nursing workforce, which is dominated by female nurses, especially in critical care units. Because nursing has historically been seen as a field dominated by women, cultural and societal issues may be a contributing factor to this gender disparity.
The age group of 26–35- years- old accounts for the biggest percentage of participants (45.08%), followed by the 36–40 year old group (27.94%). This implies that the majority of critical care unit nurses have mid-level experience, which may affect their ability to manage sedation. There are a lot of highly experienced individuals in the industry, as seen by the noteworthy 18.73% of responders who are over 40.
A bachelor's degree is held by the majority of participants (70.79%), which is in line with the educational criteria for critical care nursing practice. The fact that just (12.38%) of nurses have a diploma suggests that hiring nurses with more education is given priority in the healthcare industry.

However, only a tiny fraction of nurses continue further study in the sector; (12.38%) have a master's degree, and (4.44%) have a PhD.

The workforce has a solid basis in nursing practice, as evidenced by the fact that nearly half of the participants (47.62%) have ten or more years of experience. Conversely, (18.25%) of the sample have between 5 and 9 years of experience, and (24.13%) have less than 5 years. This distribution shows that there is a wide range of expertise levels, which could affect sedation administration ability.

Only (9.84%) of nurses are employed in private hospitals, with the majority (50.79%) working in public hospitals and military hospitals (39.37%) coming in second. This is probably because these sectors have access to cutting-edge medical facilities and government backing.

The majority of volunteers (53.33%) work in intensive care units, with cardiac or cardiovascular units coming in second (30.79%). The study appears to have predominantly concentrated on nurses from intensive care and critical cardiac units, as seen by the low representation of nurses in emergency (11.74%), and endoscopic (4.13%) units.

A sizable fraction of the sample (39.05%) had fewer than five years of procedural sedation experience, compared to (34.92%) who have five to nine years and (26.03%) who have ten or more years. This implies that even while a large number of nurses have a great deal of experience administering sedation, many may still need more training.

A favorable sign of readiness in this area is the fact that most participants (74.29%) stated having had formal sedation instruction. A knowledge gap that could affect patient safety and the efficacy of sedative techniques is highlighted by the fact that (25.71%) have not received formal training.

Table 1. Demographic characteristics of participants

	Count	Column n %
Gender		
Female	230	73.02
Male	85	26.98
Age		
20-25 years old	26	8.25
26-35 years old	142	45.08
36-40 years old	88	27.94
More than 40 years old	59	18.73
Education level of nurses		
Diploma	39	12.38
Bachelor's	223	70.79
Masters	39	12.38
PHD	14	4.44
Years of experience in nursing		
Less than 5 years	76	24.13
5 to 9 years	89	18.25
10 years or more	150	47.62
Type of hospital		
Private	31	9.84
Public	160	50.79
Military	124	39.37
Type of critical care unite that you work at.		
Cardiac or cardiovascular	97	30.79
emergency	37	11.74
ICU	168	53.33
Endoscopy	13	4.13

Years of experience with sedation procedure		
Less than 5 years	123	39.05
5 to 9 years	110	34.92
10 years or more	82	26.03
Received formal sedation course.		
No	81	25.71
Yes	234	74.29

Tables 2.1, 2.2, 2.3, 2.4 and 2.5 show the mean scores for five domains of the nursing sedation practices scale. The overall mean of each domain means a high competency level when the mean is above 3.75, which is above 75% of the total mean of the scale (5 points), and when the overall mean of the domain is between 2.5 and 3.75, which is between 50% and 75% means an average competency level, but when mean below 2.5 which is below 50%, means low competency level.

Table 2.1 shows the mean scores and standard deviations for the statements pertaining to nurses' views on attitude toward sedation domain, given that the statement "Sedation is necessary for patient comfort" had a high mean score (3.923), it is clear that most nurses concur that sedation is essential to maintaining patient comfort in critical care situations. The standard deviation (1.306), however, points to a rather wide range of answers, which might reflect varying viewpoints influenced by personal experiences and institutional regulations.

The statement "It is easier to care for an alert intubated patient" received a high mean score of (3.837), indicating that nurses have a modest preference for ventilated patients who are alert. The very high standard deviation (1.151), indicates that there are differing views.

The majority of nurses would personally prefer to be sedated if they needed mechanical breathing, according to the high mean score (3.861) for the question "Would you prefer sedation if you were ventilated?" This data demonstrates their comprehension of patient experiences and the significance of sedation in reducing distress and higher competency in their attitudes toward sedation, which is consistent with their belief that mechanical ventilation is both uncomfortable (recorded a high mean by 3.917) and stressful (3.943) and also reflected in high competency scores toward nurses' attitude.

There is considerable disagreement, but a mean score (3.801) for "Limiting patient recall of ICU experience as a desired outcome" indicates that most nurses are in favor of reducing patients' recollections of ICU stays.

The statement "All patients receiving mechanical ventilation should be sedated" had the highest mean score (3.966), indicating that nurses strongly believe sedation should be a routine procedure for patients on ventilators reflected also high competency. The standard deviation (1.001), on the other hand, indicates some disagreement, most likely as a result of the growing use of lighter sedation techniques or daily sedation breaks to enhance patient results. The total mean score for nurses' attitudes reflects high competency by means of (3.797).

Table 2.2 shows that the mean score for statements pertaining to nurses' subjective views on norms domain toward sedation, reflected that mean of (3.577) and a standard deviation of (1.152) for the item "influence of other nurses' knowledge on sedation practices," nurses acknowledge that their colleagues' knowledge has an impact on their sedation practices, which demonstrated average competency of nurses. With a smaller standard deviation (0.931) and a higher mean score (4.065) for the item "influence of other nurses' attitudes on sedation practices". It was clear that colleagues' attitudes had a greater influence on sedation practices and reflected higher competency. This implies that nurses in critical care units (ICUs) operate in a team-oriented setting.

Nurses notice family requests for sedation, although they are not always decisive, according to the item "patient family requests sedation," which had a high a mean score (3.868) and a standard deviation (0.964) reflected high nurses' decisional competency. Although nurses do take family input into account, clinical evaluations and procedures probably still influence their decisions rather than just family wishes. It was consistent with a high mean score (4.055) and a standard deviation (0.926) for the item "influence of patient's family on sedative administration," indicated a greater influence of the family on sedation administration. The total score suggests that the subjective norms domain reflected high competency of nurses with a mean of (3.869) in sedation administration.

Table 2.3 sheds light on the means of sedation orders and goals domain and the average mean score (3.579) of the item "sedation orders and goals: physician considers nursing assessment for sedation order?" This suggests that there is a moderate degree of agreement that doctors use nurses' evaluations when prescribing sedatives. This finding implies that there is potential for improvement in terms of guaranteeing that nurses' evaluations are regularly taken into account when issuing sedative orders.
The high mean score for the item "broad parameters with sedation orders" was (3.948), while the standard deviation was (1.031). Although there is significant variance in the degree to which these parameters are stated, this score indicates that sedative orders are typically issued with broad guidelines. Although nurses may feel that the sedative orders are clear, there may be some confusion or variation amongst cases. Although sedation orders are frequently worded with general recommendations, the degree of specificity may vary depending on particular physicians or institutional regulations, as seen by the moderate variety in responses.
With a high mean score of (3.937) and a standard deviation of (1.025), the item "clear nurse-physician communication of sedation goals" indicates that, on the whole, there is a good degree of communication between nurses and doctors regarding the aims of sedation. Safe and efficient sedation techniques depend on these two groups having a clear knowledge of each other's sedation objectives. Despite the very high mean score, the standard deviation shows some unpredictability, indicating that communication may occasionally break down or that the team engaged may have an impact on how clear the communication is.
With a standard deviation of (1.004), the total mean score for the sedation commands and goals domain is (3.931), reflecting high nurses' competency. This total score suggests that sedative instructions and objectives in the intensive care unit are typically viewed favorably.

Table 2.4 shows the perceived behavioral control domain for nurses. The mean score for the item "use sedation because of patient communication difficulty?" is (3.409), and the standard deviation is (1.132). This score indicates a modest level of agreement that nurses' decisions to employ sedation are influenced by patients' communication challenges. This variation suggests that protocols or training on when and how to employ sedation in these situations may need to be clarified further.
The mean score for the question "Nurse- to- patient staffing ratio influenced sedation practice?" was (3.952), and the standard deviation was (1.041). With a tendency toward agreement, this score shows that a higher nurse-to-patient staffing ratio is perceived as a factor influencing sedation practices. When staffing ratios are below ideal, nurses may feel pressured to sedate patients in order to properly manage other nursing duties. The comparatively low standard deviation indicates that respondents' perceptions of this are consistent. It suggests that a lack of staff could result in more people using sedation.
The item with the highest mean score (4.021) and standard deviation (0.967) was "sedative administered to complete other nursing functions?" This finding strongly implies that sedation is viewed by many nurses as a tool to help them accomplish other nursing activities. The ethical ramifications of using sedation for convenience rather than just for patient care are called into question by this.
With a mean score of (4.011) and a standard deviation of (1.031) for the item "agreement with physician regarding sedation level," nurses and doctors generally agree on the right amount of sedation for patients. This comparatively high mean score indicates that there is generally good communication and cooperation between nurses and doctors regarding sedative levels.
The perceived behavioral control domain has an overall average mean score of (3.758) and a standard deviation of (1.028), reflecting average competency. This implies that while critical care nurses typically have some control over the sedation process, they may encounter internal (like communication issues with patients) and external (like staffing ratios) limitations that affect their capacity to properly manage sedation.
Table 2.5 shows means and standard deviations for the nurses sedation practices domain, which indicated that nurses are less likely to recognize indicators of over-sedation than those of under-sedation. The absence of the cough reflex (M = 3.703, SD = 1.347) had the lowest mean score for detecting over-sedation, followed by the patient responding primarily to unpleasant stimuli (M = 3.716, SD = 1.141) and disobeying orders (M = 3.772, SD = 1.131). These findings imply that although nurses recognize decreased responsiveness as a sign of over-sedation, they might be more aware of behavioral reactions than physiological ones.

The most common indications of under-sedation, on the other hand, were tachypnea recorded at a higher mean (M = 4.072, SD = 0.984) and raised heart rate or blood pressure (M = 4.011, SD = 0.922), which nurses were more aware of. Given that these symptoms are more readily apparent and linked to patient discomfort or distress, our findings imply that nurses are more sensitive to physiological indicators of insufficient sedation.

Higher mean scores also for detecting under-sedation when the hands and feet are moving (M = 3.901, SD = 1.027) and when the trunk and legs are moving (M = 3.835, SD = 1.050) further demonstrated the nurses' great awareness of spontaneous limb movement. Nonetheless, patients grasping for endotracheal tubes or catheters were comparatively less recognized (M = 3.559, SD = 1.166), indicating that certain agitation-related behaviors may be under recognized as indicators of insufficient sedation.

Results showed that critical care nurses have a moderate level of competency in sedation management practice, as indicated by their total mean score of domain by (3.284). Although nurses are better at identifying signals of under-sedation, they seem to be less conscious of those of over-sedation, especially when it comes to severe sedation symptoms like absent reflexes. It implies that controlling agitation and pain is prioritized over avoiding over-sedation.

Table 2. Nurses Sedation Practice Scale

2.1 Attitude toward sedation domain	Mean	SD
Sedation necessary for patient comfort?	3.923	1.306
Easier to care for alert intubated patient?	3.837	1.151
Prefer sedation if they were ventilated?	3.861	1.131
Limit patient recall of ICU as desired outcome?	3.801	1.057
Mechanical ventilation as uncomfortable?	3.917	1.040
Mechanical ventilation as stressful?	3.943	1.004
All patients receiving mechanical ventilation should be sedated?	3.966	1.001
Overall	3.797	1.145
2.2. Subjective norms domain	Mean	SD
Influence of other nurses' knowledge on sedation practices?	3.577	1.152
Influence of other nurses' attitudes on sedation practices?	4.065	0.931
Patient family requests sedation?	3.868	0.964
Influence of patient's family on sedative administration?	4.055	0.926
Overall	3.869	1.004
2.3. Sedation orders and goals domain	Mean	SD
Sedation orders and goals physician consider nursing assessment for sedation order?	3.579	1.121
Broad parameters with sedation orders?	3.948	1.031
Clear nurse-physician communication of sedation goals?	3.937	1.025
Overall	3.931	1.004
2.4. Perceived behavioral control domain	Mean	SD
Use sedation because of patient communication difficulty?	3.409	1.132
Nurse to patient staffing ratio influenced sedation practice?	3.952	1.041
Sedative administered to complete other nursing function?	4.021	0.967
Agreement with physician regarding sedation level?	4.011	1.031
Overall	3.758	1.028
2.5. Sedation practices domain	Mean	SD
Over sedated if no cough reflex?	3.703	1.347
Over sedated if respond only to noxious stimuli?	3.716	1.141
Over sedated if not following commands?	3.772	1.131
Under sedated if spontaneously moving hand and feet?	3.901	1.027

Under sedated if spontaneously moving trunk and legs?	3.835	1.050
Under sedated if reaching for endotracheal tubes or catheters?	3.559	1.166
Under sedated if tachypnea?	4.072	0.984
Under sedated if ventilator desynchrony?	3.854	0.998
Under sedated if heart rate or blood pressure elevated?	4.011	0.922
Overall	3.284	1.022

Table 3 shows that critical care nurses had a high mean of overall confidence in their ability to manage sedation-related problems (M = 4.033, SD = 1.044). Confidence, however, differs throughout capabilities, indicating both possible practice deficits and areas of strength. Bradycardia (M = 4.240, SD = 1.022) and hypotension (M = 4.056, SD = 1.034), two serious sedation-related consequences, were most confidently identified by nurses. They also expressed high confidence in their ability to react effectively to hypoxia (M = 4.050, SD = 1.040) and bradycardia (M = 4.080, SD = 0.966). These results imply that nurses have received adequate training in identifying and treating respiratory and cardiovascular issues, which are frequent worries while administering sedation. There was a little less confidence in airway control approaches. Nurses were less confident when it came to jaw support (M = 3.258, SD = 0.921), but they were competent when it came to executing a chin lift (M = 3.974, SD = 0.912) and inserting an oropharyngeal airway (M = 3.664, SD = 0.911). These findings imply that additional training and simulation exercises may be necessary to strengthen practical airway management skills. The methods with the lowest stated confidence were employing cardiorespiratory reserve data for risk appraisal (M = 3.551, SD = 1.123) and a patient's sedation and anesthetic history for risk assessment (M = 3.468, SD = 1.156). This suggests a possible lack of understanding of pre-sedation risk assessment, which is crucial for averting difficulties.

Table 3. Confidence in Managing Sedation Complications Scale	**Mean**	**SD**
I am confident that I am able to use information about cardiorespiratory reserve to assess risk for sedation-related complications	3.551	1.123
I am confident that I am able to use body mass index to assess risk of sedation-related complications	3.944	1.013
I am confident I am able to identify in advance patients which patients might be difficult to bag-mask ventilate	3.963	1.024
I am confident I am able to identify in advance which patients might be more difficult to intubate	3.973	0.948
I am confident that I am able to interpret results from a screening tool for Obstructive Sleep Apnea to assess risk of sedation-related complications	4.020	0.934
I am confident I am able to use information about a patient's previous anesthesia and sedation history to assess risk for sedation-related complications	3.468	1.156
I am confident I am able to respond appropriately when hypotension is detected during or following an episode of sedation	3.930	1.070
I am confident I am able to respond appropriately when bradycardia is detected during or following an episode of sedation	4.080	0.966
I am confident I am able to respond appropriately when hypoxia is detected during or following an episode of sedation	4.050	1.040
I am confident I am able to respond appropriately when under ventilation (lower than normal breath volume) is detected during or following an episode of sedation	3.807	1.044
I am confident I am able to identify hypotension during or following an episode of sedation	4.056	1.034
I am confident I am able to identify bradycardia during or following an episode of sedation	4.240	1.022
I am confident I am able to identify abnormal respiratory rate during or following an episode of sedation	3.854	1.001
I am confident that I am able to insert a nasopharyngeal airway correctly	3.652	.985
I am confident that I am able to apply jaw support correctly	3.258	0.921

I am confident that I am able to apply a chin-lift correctly.	3.974	0.912
I am confident that I am able to insert an oropharyngeal airway correctly.	3.664	0.911
Overall	4.033	1.044

Inferential statistics of study variables

It contains the correlation between the nursing competency predictors (sedation practice domains, nursing confidence, and different participants' characteristics presented in tables 4, 5, and 6.

Table 4 shows the matrix of correlation between the total scores of critical care nurses' competency predictors of five domains of nursing sedation practices and confidence in managing sedation, which were highly correlated at (p =0.00). This implies that higher levels of nursing competency are typically displayed and associated with a favorable attitude, practice, and confidence toward administering sedation. This implies that nurses who administer sedatives on a regular basis are more skilled at doing so, which emphasizes how crucial clinical application and practical training are to enhancing professional ability.

It also implies that nurses with greater self-assurance in their sedation abilities are typically better equipped to administer safe and efficient sedation. Better decision-making and a quicker reaction to sedation-related consequences are probably correlated with confidence. The results illustrate that nurses attitude and confidence were highly correlated at (p=0.00). This finding suggests that positive attitudes toward sedation practices are likely associated with greater confidence among nurses in managing sedation-related care. It was recommended that interventions aimed at improving nurses' attitudes (through education, experience, or policy) might also enhance their confidence, which is critical for safe and effective sedation management in clinical settings. Furthermore, the substantial correlation between confidence and practice at (p=0.00) implies that consistent practice boosts performance confidence. The nurses' attitude and practice were highly correlated at (p=0.00). This suggests that nurses who have a favorable outlook on sedation are more assured of their abilities and dedicated to using appropriate procedures.

The results also show that there was a highly significant correlation between the sedation orders and goals and subjective norms of nurses at (p=0.00) and a highly significant correlation between the perceived behavioral control and subjective norms and sedation orders and goals at (p= 0.00). There were highly significant correlations between the nursing sedation practices and subjective norms, sedation orders and goals, and perceived behavioral control at (p= 0.00). These results imply that nursing sedation practices are shaped not only by individual competence but also by social influences, institutional clarity, and perceived control over the sedation process. Enhancing these factors—through training, supportive work environments, and standardized sedation protocols—may lead to better and more consistent sedation practices in clinical settings. Besides, there is a highly correlation between the nursing sedation attitude and subjective norms, sedation orders and goals, perceived behavioral control, and nursing practices at (p= 0.00). There was a highly correlation between the nursing sedation confidence and subjective norms, sedation orders and goals, perceived behavioral control, nursing practices, and attitude at (p= 0.00).

Table 4. Matrix of correlation of Nurse Sedation Practices domains and confidence in managing sedation scale (nursing competency predictors)

Domains	Subjective norms		Sedation orders and goals		Perceived behavioral control		Practice		Attitude		Confidence	
	R	P	r	p	r	p	r	P	R	P	r	p
Subjective norms	1											
Sedation orders and goals	0.30	0.00	1									
Perceived behavioral control	0.47	0.00	0.39	0.00*	1							
Nurses practice	0.41	0.00	0.40	0.00*	0.58	0.00*	1					
Nurses attitude	0.44	0.00	0.26	0.00*	0.42	0.00*	0.69	0.00*	1			
Nurses confidence	0.43	0.00	0.38	0.00*	0.30	0.00*	0.72	0.00*	0.71	0.00	1	
Total scores of competency predictors	0.66	0.00	0.55	0.00*	0.67	0.00*	0.74	0.00*	0.71	0.00	0.77	0.00*

Table 5 shows the effect of predictors of nursing competency on nursing competency using multivariate linear regression analysis. The results showed a significant high impact of nurses attitudes toward sedation, subjective norms, sedation orders and goals, perceived behavioral control, nurses' sedation practices, confidence in managing sedation, and the education level of nurses as predictors on the nursing sedation competency at p = (0.000, 0.00, 0.00, 0.00, 0.00, 0.00, and 0.019), respectively.

These results imply that to improve nursing sedation competency**,** interventions should target not only knowledge and skills through education and training but also work to enhance attitudes, build confidence, reinforce positive norms, and ensure organizational support such as clear sedation protocols and role expectations. A comprehensive, multi-level approach is essential for fostering competent sedation practices in clinical settings.

Table 5. Multivariate linear regression analysis for predictors of nursing com petency

Predictors	Regression coefficient	S.E	T	P
Nurses attitude toward sedation	3.4	0.25	13.5	0.000*
Subjective norms	1.279	.070	18.251	.000*
Sedation orders and goals	1.045	.112	9.309	.000*
Perceived behavioral control	1.239	.070	17.708	.000*
Nurses' Sedation practices	1.020	.039	25.945	.000*
Confidence in managing sedation	1.048	.023	46.000	.000*
Ages	.283	.247	1.146	.253
Gender	-.296	.405	-.731	.465
Education level of nurses	.644	.274	2.353	.019*
Years of experience in nursing	-.239	.297	-.805	.422
Years of experience with sedation	.028	.280	.101	.920
Received formal sedation course	-.265	.402	-.659	.511
R2=0.97 F=121.9 p=0.001*				

Table 4 shows the differences in nursing sedation competency according to the demographics of participants, which illustrated that there were highly significant differences in the nursing sedation competency according to nurses' ages, gender, education, type of critical care unit, and years of experience in sedation at p = (0.004, 0.00, 0.00, 0.03, and 0.00), respectively.
This means that these factors have a notable influence on how competent nurses are in performing sedation-related tasks. More experienced and better-educated nurses demonstrated higher competency,

while differences in age and gender may reflect varying levels of confidence, training, or clinical opportunities. Overall, the findings highlight the importance of considering both personal and professional backgrounds when assessing or improving nurses' competency in sedation practice.

Table 6. Analysis of variance for differences in nursing competency according to demographic characteristics of participants

demographic variables	Mean nursing competency	SD	F	p
Age			4.4	0.004*
20 – 25 Years Old	168.27	28.01		
26 – 35 Years Old	160.42	17.81		
36 – 40 Years Old	167.36	18.14		
More Than 40 Year	169.78	20.85		
Gender			21.9	0.00*
Female	161.68	18.46		
Male	173.09	21.02		
Education level of nurses			15.6	0.00*
Diploma	165.59	19.61		
Bachelor	161.79	17.98		
Masters	169.90	23.15		
PhD	195.43	5.02		
Years of experience in nursing			1.1	0.31
<5	163.72	23.41		
5-10	162.70	18.30		
>10	166.51	18.63		
Years of experience with sedation			3.2	0.03*
<5	161.89	20.28		
5-10	164.75	18.69		
>10	169.09	20.01		
Received formal sedation course			2.8	0.09
No	161.57	17.78		
Yes	165.87	20.39		
Type of critical care unite you work at.			7.7	0.00*
Cardiac or cardiovascular	161.92	18.22		
Emergency	169.71	24.04		
Endoscopy	191.54	10.72		
ICU	163.51	18.72		

DISCUSSION

The descriptive analysis of study variables

This study aimed to investigate the critical care nurses' competency in the attitude, subjective norms, sedation orders and goals, perceived behavior control, practices, and confidence in the administration of sedative medications and sedation-related complications. According to the current findings, a high competency of the nurses' attitudes, subjective norms, sedation orders, and goals, while a moderate level of competency in the nurses' sedation practice and perceived behavioral control, were reported. It was consistent with Alsomali [26], who found that critical care nurses in Jeddah, Saudi Arabia, had a good overall understanding of sedation for mechanically ventilated patients, particularly in managing sedative drugs. However, to enhance nurses' knowledge and comprehension of sedation management, it is important to implement a continuous educational program that includes theoretical sessions and hands-on practice in sedation assessment and management.

A study by Jang [27] found that ICU nurses' levels of knowledge were not related to competence in sedation practice. Instead, a positive attitude toward sedation practice was significantly related to the subjective norms, orders, and goals, perceived behavioral control, practice of sedation, and intention to use.
Similarly, in a study by Guttormson [9], it was noted that nurses' attitudes toward the effectiveness of sedation in relieving patients' distress during mechanical ventilation correlated positively with their intention to administer sedatives ($r_s = 0.65$). Sixty-six percent of nurses agreed that sedation was necessary for patients' comfort.
In the same line, previous studies have shown that there are nurse-related factors that hinder the proper implementation of sedation protocols, such as a lack of knowledge and skills, fear of oversedation, and lack of confidence [28–29].
A study conducted by Masih [30] revealed that 51.6% of the participants had poor knowledge of assessing under sedation and over sedation. 67% of nurses knew about managing sedative drugs. Most critical care nurses also lacked sufficient knowledge and practice of sedation and its management in mechanically ventilated patients, which posed risks to patients' safety and quality of care.

Inferential statistics of study variables

The total scores of critical care nurses' competency predictors of five domains of nursing sedation practices and confidence scores in managing sedation were highly correlated and impacted nurses' competency.
It was agreed with; a survey reported that nurses' attitudes affect sedation administration practice, and improvement in nurses' attitudes towards sedation and mechanical ventilation experience may be necessary to align sedation practices with clinical practice guidelines [9]. It was consistent with Hebeshy's [31] study, which reported that subjective norms also had a significant impact on nurses' intentions to practice mindful self-care and clinical decisions, and confidence.
Our study's findings in the "Sedation Orders and Goals" domain showed that nursing assessments, unambiguous nurse-physician communication, and the creation of general guidelines for sedation orders all had a substantial impact on sedation practices and clinical confidence.
It was similar to the findings of Graham [32], who studied "Understanding the Determinants of Critical Care Nurses' Use of Sedation Interruptions for Adult Mechanically Ventilated Patients". Highlighting the significance of clearly-defined roles and protocols for nurses, as well as elements that support optimal sedation management techniques, which highly impacted nurses' sedation practice and attitude quality.
Regarding the use of sedation interruptions in a critical care unit, Graham [33] demonstrated a closer alignment in identifying practice barriers, including nurses' knowledge gaps and environmental constraints like staffing and time.
Our study's findings in the perceived behavioral control domain showed that sedation practices were strongly impacted nurse-patient staffing ratios, patient communication challenges, and the requirement for sedatives to perform other nursing responsibilities.
Accordingly, the results of Guttormson's [9] study likewise showed a stronger relationship between nurses' attitudes regarding sedation and their choice to use sedatives than ours did. 66% of nurses thought that sedation was required for patient comfort, which is consistent with our findings.
In contrast to our more practice-oriented findings, those presented in Guttormson's study indicate that although sedation is frequently regarded as required, a subset of nurses, especially those with more experience, had a less positive opinion of it.

The current study's findings in the sedation practices domain showed that a variety of clinical indicators and patient reactions, including cough reflex, reaction to noxious stimuli, and movement, affect nursing competency and confidence. The majority of nurses in Allawy and Ibrahim's [34] study lacked enough information and practice about sedation assessment and management; (89.5%) of them were inadequate in sedation assessment, and (94.3%) lacked basic sedation expertise. The accuracy of sedation procedures may be directly impacted by this ignorance since our findings raise the possibility of under- or over-sedation due to inadequate understanding.
The elements that influence sedation decision-making, such as prior experiences, situational awareness, and safety prioritization, were examined by Macpherson [35], which agreed with this study's results.

These elements are consistent with the sedation procedures used in our investigation, which placed a strong focus on unit learning and local rules, indicating that institutional effects and personal experience are important in sedation management.
Besides, Macpherson's study [35], emphasizes the crucial impact of unit-specific practices and safety priorities in sedation decision-making, while Allawy and Ibrahim's [34] study emphasizes the need for enhancing nurses' expertise to prevent sedation errors.
Our study's findings show that nurses' confidence in handling sedation-related issues differs depending on a number of critical variables and sedation-related operations. The ability to react effectively to emergency situations had the greatest confidence levels. However, abilities like applying jaw support and appropriately inserting airway devices like nasopharyngeal and oropharyngeal tubes showed the lowest confidence levels.
It was agreed with; Conway's [14] study showed a high degree of dependability in the scale of confidence and demonstrated that nurses who underwent sedation training showed a considerable boost in their confidence in addressing sedation issues. Conway also showed that confidence levels were highly influenced by years of experience and workplace culture. It also emphasizes that confidence can significantly improve after training.

CONCLUSION

The majority of highly educated Saudi female critical care nurses reported a high competency in their attitudes, subjective norms, sedation orders, and goals, while they were moderately competent in the sedation practice and perceived behavioral control.
The critical care nurses' competency predictors and confidence in managing sedation were highly correlated. A high impact of nurses' attitude, subjective norms, sedation orders and goals, perceived behavioral control, nurses' sedation practices, and confidence in managing sedation, as well as a highly significant influence of the nursing sedation competency according to nurses' ages, gender, education, type of critical care unit, and years of experience in sedation practice.

Limitations of the Study

The cross-sectional form of the study is one of its weaknesses. This could make it more difficult to evaluate long-term patterns or shifts in sedation techniques over time. Furthermore, because the study was limited to a certain area of Saudi Arabia, its conclusions might not apply to all hospitals in the nation. The use of nurses' self-reported data, which may add bias because responses might not fully represent real sedation procedures, is another drawback.
The use of a convenience purposive sampling method is another limitation. It was allowed for the inclusion of participants with specific experience and qualifications relevant to the research (e.g., ICU nurses involved in sedation practices), but it may introduce selection bias and limit the generalizability of the findings.
Social desirability bias is a significant limitation in this study depending on self-reported data. This bias can lead to inflated perceptions of nurse capabilities, obscuring true competency gaps and affecting the accuracy of training needs assessments. It might lead to an overestimation of competence and confidence among participants.

Implications and recommendations

Hospitals must first establish standardized sedation protocols. Training initiatives should be put in place to improve nurses' proficiency in accurately determining sedation levels. Encouraging improved communication between physicians and nurses. The study also addresses problems with workload and nurse-patient ratios, as these can impede the best possible sedation practices. It is advised that medical facilities make sufficient personnel and resource investments to assist nurses' vital role in managing patients' sedation.

Direction for further research

Future research could concentrate on a longitudinal approach to sedation techniques. Results may be more broadly applicable if the study is expanded to cover a bigger and more varied sample of Saudi Arabian hospitals. Future research could include examining the viewpoints of physicians and patients.

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Conflicts of interest
There are no conflicts of interest.

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