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Nurses' care coordination competence in mechanically ventilated patients in intensive care units: a cross-sectional study

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Abstract

Background The intensive care unit (ICU) is crucial in treating severely ill patients, particularly those requiring mechanical ventilation. Nurses are essential for coordinating care and addressing any gaps within the ICU team. This study aimed to evaluate the care coordination competency of nurses in Iranian ICUs, specifically about mechanically ventilated patients.

Methods A descriptive cross-sectional study was conducted at Guilan University of Medical Science from September to December 2022, involving 211 ICU nurses selected through convenience sampling. The Nurses' Coordination Competency Scale (NCCCS) and a demographic information form were used. Statistical analyses were conducted using SPSS version 16, including Pearson correlation, independent t-tests, one-way ANOVA, and multiple linear regression analysis, with a significance level set at 0.05.

Results The mean score on the NCCCS for nurses was 3.41 out of 5. The multivariable analysis identified key factors influencing coordination competency, including a Master of Science in Nursing (MSN) degree (b = 0.891, $P < 0.001$), prior ICU experience (b = 0.080, $P < 0.001$), and fixed shift employment (b = 0.500, $P = 0.011$) scored higher on the NCCCS. Conversely, those in commitment-type positions had lower scores than those in standard roles (b=-0.690, $P < 0.001$).

Conclusion The study found that Iranian ICU nurses demonstrated high competency in coordinating care for mechanically ventilated patients. However, they must improve teamwork, align their understanding of patient care needs, and enhance team cohesion through training and advanced technologies.

Keywords Care coordination competency, Mechanical ventilation, Critical care nurses, Intensive care unit

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Introduction

The Intensive Care Unit (ICU) is essential for critically ill patients at high risk of organ failure and death, with approximately 5.7 million annual admissions in the US, representing 27% of all hospital admissions [1]. The ICU team, including physicians, nurses, and respiratory therapists, collaborates to manage mechanically ventilated (MV) patients [2]. Inadequate MV management can lead to complications like pneumonia and long-term dependency on ventilation [2]. Globally, over 20 million patients receive MV support, with 35–50% of ICU patients requiring it [3]. Although a significant number of these patients recover and are eventually discharged [4], the annual costs of long-term ventilation in the US exceed $25 billion [5]. Effective care coordination prevents complications and ensures optimal patient outcomes [2].

Care coordination involves organizing care activities for a patient among multiple participants, including the patient, to facilitate appropriate healthcare services [2]. A team's effective performance relies on cooperation, coordination, communication, and understanding among its members [1]. Takiguchi et al. have identified six competencies for critical care nurses to coordinate care, which include understanding care coordination needs, devising and articulating the care vision, aggregating and disseminating information, and promoting team cohesion [6]. This coordination enhances the quality of care, reduces healthcare costs, decreases hospital admissions, improves chronic disease management, increases patient satisfaction, and ensures better access to specialized care [7]. In the ICU, timely decision-making and care coordination enhance healthcare quality, patient safety, and teamwork [2]. Conversely, a lack of coordination in healthcare delivery can result in fragmented care, increased risk of medical errors, and adverse patient outcomes [8]. To ensure optimal care for mechanically ventilated patients, nurses must assume the role of care coordinators and be equipped with the essential skills to collaborate effectively within interprofessional ICU teams [9].

In the ICU, nurses are essential for monitoring and promptly reporting changes in patient health, particularly in managing conditions such as ARDS, where personalized ventilation adjustments and close observation are critical [10]. Despite caring for two patients, they actively participate in treatments and collaborate with colleagues to maintain a therapeutic environment [11]. Research conducted by Hajinabi et al. in Guilan in 2018 revealed that nurse interaction and teamwork can increase patient safety. Promoting a culture of teamwork can prevent potential harm and adverse effects on patients and contribute to hospitals' return on investment [12]. Additionally, a study by Natalie Mcintosh and colleagues in 2017 in the United States indicates that improving the coordination of patient care and resources is an effective way to enhance the quality of care in ICU departments [13].

Ineffective collaboration among healthcare professionals can have serious consequences, including increased medical errors, compromised patient safety, reduced healthcare quality, and prolonged hospitalization [14]. An analysis of medical errors in 2005 revealed that 70% of side effects and workplace errors were due to a lack of coordination and inadequate interaction among healthcare personnel. Further evidence from a case study indicated that seven out of eight errors made by a nurse in a special care unit resulted from insufficient coordination and interaction among colleagues [11]. Nurses must work together effectively as it directly impacts their ability to provide high-quality care to patients, which can be achieved through updated technologies and psychosocial interventions [11, 15]. Therefore, the need for coordination presents a significant challenge for nurses in intensive care environments [16].

Effective care coordination among nurses is a proven strategy to address the challenges present in the complex ICU environment, leading to enhanced collaboration, increased patient satisfaction, and reduced hospitalization and ventilation time [2]. However, limited studies evaluate care coordination specifically for mechanically ventilated patients in the ICU [2, 6, 17]. Despite several promising interventions, achieving the desired outcomes remains challenging [18]. Additionally, barriers to successful ICU team performance exist [1].

This study evaluated nurses' ability to coordinate care for mechanically ventilated patients in the ICUs of medical and educational institutions in Rasht. It focused on essential competencies for managing these patients and fostering effective collaboration among nursing staff. The findings could significantly enhance the quality of care and improve patient outcomes in critical situations.

Method

Participants and study design

The research was conducted from September to December 2022, focusing on the invaluable contributions of nurses working in adult intensive care units (ICUs) at educational medical centers in Rasht, northern Iran. This study included seven ICU departments and involved 254 nurses employed at these centers. To qualify for participation, nurses must possess a bachelor's degree, have at least six months of experience in an adult ICU, actively care for mechanically ventilated ICU patients, and provide voluntary consent to participate. The importance of participation in this study cannot be overstated, as it contributes significantly to enhancing our understanding of ICU nursing practices. Additionally, it is essential to note that incomplete or unclear questionnaires would

lead to excluding those responses from the survey. The required sample size was determined using a specific formula, establishing a minimum of 150 participants for this research. This formula considered various factors, including n (required sample size), N (population size), Z (confidence level, e.g., 1.96 for a 95% confidence level), and p (expected proportion, typically set at 0.5 when the exact figure is unknown).

$$\text{formula} = n\frac{N \times Z^2 \times p \times (1-p)}{d^2 \times (N-1) + Z^2 \times p \times (1-p)}$$

The questionnaire was administered in paper using convenience sampling, which involved approaching nurses directly in their work environment at the ICU departments. This method resulted in a strong response rate of 92%. Of the 254 qualified nurses, 228 participated in the study and completed the questionnaires. However, 26 individuals refused to participate, and ultimately, 211 completed questionnaires were included in the analysis. Seventeen questionnaires were excluded due to our rigorous standards for completeness and legibility, ensuring the integrity of our data. All subjects were required to fill out informed consent forms before participation, and those who did not comply were excluded from the study.

Data collection

Demographic and occupational questionnaire

The following information was gathered: demographic and occupational data such as age, gender, marital status, education level, job position, work experience, ICU work experience, occupation type, and shift work.

Nurses' care coordination competency scale

The Nurses' Care Coordination Competency Scale (NCCCS) is a validated questionnaire developed by Takiguchi et al. (2017), consisting of 22 items designed to assess nurses' care coordination competencies [17]. Respondents rate their perceptions on a 1–5 scale. The NCCCS is structured into four subscales: "Promoting Team Cohesion" (7 items), "Understanding Care Coordination Needs" (5 items), "Aggregating and Disseminating Information" (6 items), and "Devising and Clearly Articulating the Care Vision" (4 items).

Exploratory factor analyses conducted by Takiguchi et al. revealed a four-factor model, confirmed through confirmatory factor analysis, with a confirmatory fit index of 0.942 and a root mean square error of approximation of 0.062 [17]. The scale demonstrated strong psychometric properties, with Cronbach's alpha coefficients ranging from 0.812 to 0.890 for the subscales and 0.947 for the overall scale. Scores for the competency scale and its subscales are calculated by averaging responses to specific questions, with possible scores ranging from 1 to 5, where higher scores indicate greater care coordination competency. Higher scores on the NCCCS indicate greater care coordination competency and correlate positively with team leadership, effectively distinguishing nurses' attributes. The NCCCS has shown sufficient validity and reliability, making it a valuable tool for enhancing care coordination in nursing practice. Future research is recommended to explore the relationship between the NCCCS and patient outcomes.

In our study, we utilized the NCCCS tool after obtaining consent from the principal designer of the questionnaire. We engaged two independent translators to translate the original questionnaire into Farsi to ensure accurate translations. Subsequently, we comprehensively assessed content validity using the Content Validity Ratio (CVR) and Content Validity Index (CVI). The questionnaire was then distributed to 10 faculty members and nursing education experts at Guilan University of Medical Sciences to evaluate the relevance and usefulness of each item. All items achieved a CVR score of 0.62 or higher, indicating satisfactory statistical necessity, while the average CVI score was 0.85, further confirming the robustness of the content validity evaluation. A permission letter from the questionnaire designer has been obtained and is attached to this document.

We then administered the questionnaire to a randomly selected group of 211 ICU nurses to assess reliability. The overall Cronbach's alpha coefficient was calculated as 0.965, indicating a high level of reliability. The reliability of the questionnaire's subscales was also evaluated, with Subscale 1 showing $\alpha = 0.89$, Subscale 2 $\alpha = 0.91$, Subscale 3 $\alpha = 0.91$, and Subscale 4 $\alpha = 0.77$, all demonstrating satisfactory reliability levels.

Statistical analysis

In our research, we expressed continuous variables as mean (standard deviation) and categorical variables as n (%). We conducted the Kolmogorov–Smirnov one-sample and Shapiro-Wilk to determine the data's normality. The test results showed that the data exhibited a normal distribution ($p > 0.05$). We utilized univariable analysis to investigate the relationship between NCCCS total score and demographic and occupational characteristics, employing the Pearson correlation coefficient, independent t-test, and one-way ANOVA. We conducted multiple linear regression analysis for multivariable analysis to establish the link between demographic and occupational characteristics and NCCCS total score. The statistical analysis was performed using SPSS for Windows, version 16.0 (SPSS Inc., Chicago, IL, USA), with a significance level set at 0.05.

Table 1 Demographic and occupational characteristics of the nurses [*n* = 211]

Variables	Mean [SD] or *n* [%]
Age [years]	34.80 [6.63]
Sex	
Male	33 [15.6]
Female	178 [84.4]
Marital status	
Single	78 [37.0]
Married	133 [63.0]
Level of education	
BSN	179 [84.8]
MSN	32 [15.2]
Job position	
Nurse	203 [96.2]
Charge nurse	8 [3.8]
Working experience [years]	10.85 [6.04]
Working experience in ICU [years]	7.86 [5.69]
Type of employment	
Employed	105 [49.8]
Contractual	78 [37.0]
Commitment	28 [13.3]
Shift Work	
Fixed	23 [10.9]
Rotational	188 [89.1]

SD Standard Deviation, *BSN* Bachelor of Science in Nursing, *MSN* Master of Science in Nursing, *ICU* Intensive Care Unit

Results

Nurses' demographic characteristics

Table 1 displays the demographic and occupational characteristics of the nurses. The average age of the participants was 34.80 years (SD = 6.63), and the average working experience was 10.85 years (SD = 6.04). Of the participants, 84.4% were female, 63.0% were married, 84.8% held a BSN degree, 3.8% were charge nurses, 49.8% were employed, and 89.1% had rotational shift work.

Descriptive statistics of significant variables

Table 2 provides the descriptive statistics for the NCCCS total score and its domains. The mean score was 3.41 (SD = 1.03). The highest mean score was in the "Understanding care coordination needs" domain, while the lowest was in the "Promoting team cohesion" domain.

Correlations among major variables

The data reveals strong positive correlations between the different domains of NCCCS, with correlation coefficients (r) falling within the range of 0.852 to 0.900. Furthermore, positive correlations were detected between the total NCCCS score and its domains, with coefficients ranging from 0.936 to 0.958, as presented in Table 2.

Factors associated with NCCCS total score

Univariable analysis

Based on the univariable analysis, it was observed that several factors are statistically linked to a higher NCCCS total score. These factors include being older ($r = 0.601$, $P < 0.001$), being married (t = −1.995, $P = 0.048$), holding an MSN degree (t = −6.074, $P < 0.001$), working as a charge nurse (t = −2.448, $P = 0.040$), having extensive work experience ($r = 0.578$, $P < 0.001$), having a substantial work history in the ICU ($r = 0.603$, $P < 0.001$), being employed (F = 50.184, $P < 0.001$), and having a fixed shift work schedule (t = 3.219, $P = 0.003$) (refer to Table 3 for more details).

Multivariable analysis

In the multivariable analysis detailed in Table 4, it was discovered that various factors were correlated with higher NCCCS total scores. Notably, individuals possessing an MSN degree (b = 0.891, $P < 0.001$), having previous work experience in the ICU (b = 0.080, $P < 0.001$), and being employed with fixed shifts (b = 0.500, $P = 0.011$) were associated with higher scores. Conversely, nurses under commitment type of employment exhibited significantly lower NCCCS total scores than those underemployed (b = −0.690, $P < 0.001$). Furthermore, the model's R^2 was calculated to be 0.566, signaling that the demographic and occupational variables of the nurses accounted for 56.6% of the variation in the NCCCS total scores.

Table 2 The means and standard deviations of the nurses' coordination competency scale and their correlations [*n* = 211]

Variables	1	2	3	4	5
1. Promoting team cohesion	1				
2. Understanding care coordination needs	0.874[a]	1			
3. Aggregating and disseminating information	0.877	0.900	1		
4. Devising and clearly articulating the care vision	0.852	0.890	0.859	1	
5. NCCCS Total score	0.956	0.958	0.956	0.936	1
Possible Range	1–5	1–5	1–5	1–5	1–5
Observed Range	1.14–5	1.20–5	1.5–5	1–5	1.45–5
Mean [SD]	3.32 [1.08]	3.54 [1.08]	3.46 [1.02]	3.35 [1.17]	3.41 [1.03]

SD Standard Deviation

[a] All correlations were significant at 0.001 level

Table 3 Relationship of the nurses' coordination competency scale total score with demographic and occupational characteristics in ICU nurses [*n* = 211]

Variables	Mean [SD]	a/b/F-value	*P*-value
Age [y]	3.93 [0.501]	0.601[a]	< 0.001
Sex			
Male	3.12 [1.01]	−1.815[b]	0.071
Female	3.47 [1.02]		
Marital status			
Single	3.23 [1.08]	−1.995[b]	0.048
Married	3.52 [0.98]		
Level of education			
BSN	3.25 [1.02]	−6.074[b]	< 0.001
MSN	4.35 [0.30]		
Job position			
Nurse	3.39 [1.03]	−2.448[b]	0.040
Charge nurse	4.05 [0.73]		
Working experience [y]	0.603	0.578[a]	< 0.001
Working experience in ICU [y]	0.578	0.603[a]	< 0.001
Type of employment			
Employed	3.90 [0.81]	50.184	< 0.001
Contractual	3.21 [0.98]		
Commitment	2.16 [0.53]		
Shift Work			
Fixed	3.88 [0.68]	3.219[b]	0.003
Rotational	3.36 [1.05]		

Abbreviations: SD Standard Deviation, *BSN* Bachelor of Science in Nursing, *MSN* Master of Science in Nursing, *ICU* Intensive Care Unit

[a] Results of Pearson's correlation coefficient (r). [b] Results of the independent-sample *t*-test, F = results of the one-way ANOVA

Discussion

The nurses' care coordination competency for mechanically ventilated patients in the ICU is essential. These competencies provide clear guidance for interprofessional and individual activities aimed at coordinated care and improved patient outcomes. This study aimed to evaluate the competency of nursing coordination in mechanically ventilated patients among nurses in Iranian ICU departments.

The study indicates that the Nursing Care Coordination Competency Scale (NCCCS) score among ICU nurses in Iran is high, with an average rating of 3.41 out of 5. This score is better than the 3.38 reported by Takiguchi et al. [17] but lower than the 3.94 achieved by Alsharari et al. [2]. The strong competency of Iranian ICU nurses in care coordination is reflected in the NCCCS, which assesses various skills and aligns with the emphasis on professional communication and collaboration found in the Iranian nursing curriculum [19]. Furthermore, a qualitative study showed that ICU nurses effectively lead interprofessional teamwork for mechanically ventilated patients, identifying care gaps and addressing specific needs [20, 21]. Collaboration with specialists enhances understanding and improves coordination [22]. Salas et al. emphasize that such collaboration significantly improves patient outcomes [18].

In our study, the 'Promoting Team Cohesion' factor (factor 1) had the lowest average score of 3.2 on the NCCCS, higher than Takiguchi's 3.1 [17] but lower than Alsharari et al.'s 2.9 [2]. ICU nurses should improve team cohesion in caring for mechanically ventilated patients. Limited resources, power imbalances, and a lack of standardized protocols in the Iranian healthcare system hinder coordination. While our findings indicate low cohesion, other studies, like those by Tadayon et al., suggest that higher levels are possible [11]. Barriers to team cohesion include one-way communication, generational differences, individual personalities, and communication

Table 4 Multiple linear regression analysis for nurses' coordination competency scale predictors based on demographic and occupational characteristics in intensive care unit nurses [*n* = 211]

Variables	b	95% CI for b	β	*P*
Age	−0.003	[−0.037, 0.031]	−0.022	0.847
Sex [Female vs. Male]	0.154	[−0.112, 0.419]	0.054	0.255
Marital status [Married vs. Single]	−0.009	[−0.225, 0.207]	−0.004	0.935
Level of education [MSN vs. BSN]	0.891	[0.617, 1.165]	0.312	< 0.001
Job Position [Charge Nurse]	0.032	[−0.549, 0.613]	0.006	0.915
Working experience [years]	0.025	[−0.017, 0.068]	0.149	0.238
Working experience in ICU [years]	0.080	[0.053, 0.106]	0.441	< 0.001
Type of occupation				
Contractual vs. Employed	−0.163	[−0.400, 0.073]	−0.077	0.175
Commitment vs. Employed	−0.690	[−1.083, −0.298]	−0.228	< 0.001
Shift Work [Rotational vs. Fixed]	0.500	[0.117, 0.883]	0.152	0.011
Model Characteristics				
R^2	0.566			
Adjusted R^2	0.544			

SD Standard Deviation, *BSN* Bachelor of Science in Nursing, *MSN* Master of Science in Nursing, *ICU* Intensive Care Unit, *CI* Confidence Interval

b: unstandardized coefficient; β: standardized coefficient

issues from medical dominance [23, 24]. Team meetings can enhance cohesion and patient care quality [22, 25]. Additionally, communication with mechanically ventilated patients usually relies on traditional methods based on their requests.

Given that effective communication can lead to understanding and meeting the needs of patients, this issue may affect their satisfaction with the level of communication [26]. Care coordination, organization of individuals, and management resources are necessary to meet the healthcare needs of patients and are typically achieved through information exchange between responsible parties for patient care [27]. Nursing managers can enhance team cohesion by implementing guidance and official university support programs and increasing management support [27]. Encouraging open communication and teamwork and recognizing individual contributions are essential for improving cohesion in ICU departments. Our study highlights the need to identify strengths and weaknesses among ICU nurses to create targeted training programs.

In the context of 'Work out the professionals,' nurses were ranked the lowest. Analysis indicates that experienced physicians involve nurses in end-of-life decisions, fostering a cohesive approach and enhancing satisfaction for all parties [28]. Kvande et al. emphasize the significance of physicians being receptive to nurses' observations. Although physicians are responsible for decision-making, ICU nurses should recognize their right to participate in treatment decisions [29]. Research demonstrates that communication tools and team-based training can strengthen nurse-physician relationships and improve patient outcomes in the ICU [30, 31]. Nurses should feel empowered to express their opinions to the healthcare team, as open dialogue at the bedside can enhance communication regarding patient care [32].

In this study, the "Understanding Care Coordination Needs [factor II]" subscale achieved the highest average score of 3.54, but this is lower than the scores of Japanese nurses (3.8) and Saudi Arabian nurses (4.00) [2, 17]. Iranian nurses need better coordination to support mechanically ventilated patients, as understanding patient needs in unstable ICU settings requires specialized knowledge and skills [17]. Notably, "Verify whether the medical team is appropriately addressing patient and family concerns" received the lowest ranking, consistent with Alsharari et al.'s findings [2]. Nurses must address these concerns, as unmet needs can negatively affect family health [33]. A German study found that families of ICU patients often face uncertainty and emotional distress [34]. Family members are essential caregivers for ICU patients who want to stay close, seek honest information, and find social support during recovery [35]. Proper care from the medical team for both patients and their families is vital to improving outcomes. The team should consider the concerns and needs of families when making treatment decisions, ensuring sensitivity to their situation.

In the "Aggregating and Disseminating Information [Factor III]" section, the average score was 3.46, similar to Takiguchi et al.'s 3.44 but lower than Alsharari et al.'s 4.05. Clear and accurate information is vital for healthcare professionals and relies on effective listening [36]. Barriers to effective information transfer include role ambiguity and provider uncertainty [37]. Care coordination depends on managing information exchanges among those involved in different care aspects [38]. Nurses in leadership roles should act as communication links to enhance this coordination [39–41]. The survey found that "understanding professionals' concerns" received the lowest ratings, highlighting the need for nurses better to grasp specialists' concerns about mechanical ventilation management. Discussions during team interactions can address these issues [17]. ICU specialists focus on identifying life-threatening problems, ensuring timely patient care, and enhancing resources for long-term recovery and safe discharge [35].

The study found that the average score for "devising and clearly articulating the care vision" (Factor IV) was 3.53, which is lower than Alsharari et al.'s score [2] but higher than Takiguchi et al.'s 3.28 [17]. Critical care nurses managing mechanically ventilated patients articulate their care vision effectively and should create programs that enhance interprofessional team activities and shared competencies [42]. Furthermore, nursing autonomy is closely tied to the core competencies of ICU nurses [43], enabling specialized nurses to communicate their care vision well within teams [17]. The item "propose a mobilization plan based on the patient's desired lifestyle after discharge" ranked lowest, highlighting the need for ICU nurses to receive more training in educating patients about post-discharge exercise programs. ICU survivors often experience lasting disruptions in their daily activities [44]. The lack of educational and continuous care systems leaves families unsure of proper care, leading to higher readmission rates. Comprehensive post-discharge education for caregivers is vital to reduce costs and prevent these readmissions [44]. It is recommended that ICU nurses develop educational programs for patients and families during discharge.

Multiple regression analysis indicates that ICU experience improves nurses' coordination competencies. More experienced ICU nurses better understand managing mechanically ventilated patients, which contradicts Alshahrani et al. [2] and Tadayon et al. [11]. Perrie et al. found no link between ICU experience and knowledge of weaning criteria [45]. Other studies reported no significant difference in teamwork scores based on years of ICU experience [46]. This increased coordination competence

likely stems from accumulating specialized skills in the ICU [47]. At the same time, novice nurses may struggle with communication due to lower authority levels in their early years [24].

The study identified education level, employment status, and shift work as predictors of the NCCCS. Nurses holding a master's degree scored higher than those with a bachelor's degree, likely due to greater awareness of the importance of coordination [2]. While higher education generally improves teamwork scores, some studies found no correlation between education level and knowledge of weaning criteria [45, 48]. Nursing competence necessitates experience, education, training, communication skills, and collaboration [17].

Additionally, employed nurses demonstrated higher nursing care competence than committed nurses, although this finding lacks extensive supporting literature. Rezaei et al. noted that nurses with suitable job status scored higher on interprofessional collaboration [49], suggesting that improving nurses' employment status may enhance care coordination. Lastly, shift work was also a predictor, with nurses on fixed shifts scoring higher than those on rotating shifts. Tadayon et al. attributed this to better understanding and communication among colleagues on fixed shifts [11]. Careful evaluation of shift hours is essential, as longer shifts correlate with lower quality and safety in patient care [50]. In contrast, rotating shifts can pose health risks for nurses, adversely affecting their quality of life and increasing work-related errors [51].

Study limitations

The study represents a pioneering effort in Iran, offering a comprehensive assessment of care coordination competency among ICU nurses through the Nurses' Coordination Competency Scale. Findings indicate a high overall care coordination competency among Iranian ICU nurses, a reassuring and confidence-boosting result for healthcare professionals, researchers, and policymakers. The study also identifies areas for improvement, such as enhancing team cohesion and providing a clear roadmap for future development. This research uniquely focuses on the competency of nurses coordinating care for mechanically ventilated patients, marking a first in Iran. A notable response rate of 92% highlights participant enthusiasm and engagement. However, the study has limitations: it is cross-sectional and focused solely on nurses from special care units in Rasht, limiting the generalizability of results to other regions or countries. The reliance on self-reported data through a questionnaire may have introduced inaccuracies or biases, as responses could be impacted by cognitive bias. Additionally, the need for defined critical thresholds for the total NCCCS score and its sub-scores complicates the assessment of overall score significance and definitive high categorization.

Conclusion

This research assessed the ability of nurses in Iranian ICU departments to coordinate care for mechanically ventilated patients. The results revealed that, overall, Iranian ICU nurses demonstrated a high level of competency in coordinating care for these patients. However, the 'promoting team cohesion' factor received the lowest average score, suggesting that efforts are needed to enhance teamwork among ICU nurses in managing mechanically ventilated patients. The 'understanding care coordination needs' factor received the highest average score. However, it was still lower than that of Japanese and Saudi Arabian nurses, indicating that Iranian nurses must better align their understanding of managing ventilated patients with patient care needs. The study recommends improving team cohesion in the ICU department to promote better collaboration, with suggested measures including training, practical exercises, and advanced technologies to strengthen communication and coordination. It is also recommended that the ICU department oversee team member scheduling systems to improve organization and interaction, ultimately improving patient care quality.

Abbreviations

SD	Standard Deviation
CI	Confidence Interval
BSN	Bachelor of Science in Nursing
MSN	Master of Science in Nursing
ICU	Intensive Care Unit
NCCCS	Nurses' Care Coordination Competency Scale

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Authors' contributions

M.HK., M.A., T.KM, and SM conceptualized the study; M.HK. supervised data collection; M.A., T.KM., and S.M. Database search strategy; M.HK., M.A., T.KM., and S.M the data and drafted the first version of the manuscript; M.HK., M.A., T.KM., and S.M. reviewed and edited the manuscript; all authors read the revised the manuscript and approved the final version.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

The Ethics Committee of Guilan University of Medical Sciences, Rasht, Iran [Ethics Code: IR.GUMS.REC.1401.225] approved the ethics for this study. Participants were informed about the study's aim, confidentiality of their data, and voluntariness of participation, and then written informed consent was

obtained from all of them. All methods were carried out in accordance with relevant guidelines and regulations, including the Declaration of Helsinki. Initially, the researchers visited special departments of hospitals in Rasht and were introduced to the nurses by nursing offices. Then, all necessary information regarding the study's objectives, methodology, and how it would be conducted was presented to the participants. Participation in this study was voluntary, and participants were informed that they could withdraw from the study at any stage. Ethical considerations such as written informed consent, confidentiality principles, anonymity, and keeping information confidential were observed in this study.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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