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RESEARCH

Effect of nurse's verbal communication on the level of consciousness, pain, and agitation in anesthetized patients admitted to the intensive care unit: a double-blind clinical trial

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Abstract

Background Various sensory stimuli, including verbal communication, can influence patients' consciousness level, pain perception, and agitation in intensive care units (ICU). This study aimed to explore the impact of verbal communication on the consciousness level, pain, and agitation of anesthetized patients admitted to ICU.

Methods In this randomized controlled clinical trial (RCT), participants were randomly assigned to two groups: an intervention group ($n = 35$) and a control group ($n = 35$). Patients in the intervention group received verbal communication twice a day for 10 days, while the control group received routine care. The level of consciousness, pain, and agitation of patients in both groups were assessed before and 15 min after verbal communication. Demographic questionnaires and Glasgow Coma Scale (GCS), Behavior Pain Scale and Richmond Agitation-Sedation Scale were used to collect data. Data were analyzed by SPSS 25 using t-test, Chi-square and repeated measures ANCOVA test.

Results No significant differences were found between the two groups (verbal communication and control) concerning demographic variables ($p > 0.05$). Before the intervention, no significant difference was observed between the groups in terms of pain ($P = 0.17$). However, significant differences were noted in agitation and the level of consciousness ($P < 0.05$). Comparing the 10-day intervention period, a significant difference in the variables of level of consciousness, pain, and agitation was observed between the verbal communication and control groups ($P < 0.001$).

Conclusion The findings of this study indicate that verbal communication had a positive impact on the level of consciousness, pain, and agitation of anesthetized patients in ICUs. Implementing verbal communication as an intervention by nurses can be an effective approach in medical centers.

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Clinical trial registration code IRCT20150519022320N22; 8/05/2020.

Keywords Sensory stimulation, Verbal communication, Consciousness level, Pain, Agitation

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Background

Sensory input is crucial for the continuation and survival of a patient's life [1]. Patients admitted to intensive care units (ICUs) are exposed to sensory deprivation due to various stress-inducing factors. Sensory deprivation can lead to delayed neurological recovery and pose a threat to the patient in a comatose state [2]. Additionally, it can disrupt levels of consciousness, ultimately contributing to prolonged hospitalization and patient disability [3, 4]. Sensory stimulation is a therapeutic approach in comatose patients aimed at reducing the risk of sensory deprivation and improving various responses. It includes auditory, visual, olfactory, gustatory, and tactile stimul [2].

In comatose patients, auditory sensation is the last to diminish, and there are no obstacles to stimulating this sense. Special attention has been given to auditory stimulation among all sensory stimuli [5]. Studies have shown that auditory stimulation increases the level of consciousness [6] and promotes earlier recovery from coma in patients [7]. The results of Gorji et al.'s study (2012) demonstrated the effectiveness of an auditory stimulation program with familiar sounds for comatose patients in ICU settings [6]. Additionally, Goodarzi et al.'s study (2010) revealed improvement in the GCS scores for comatose patients following a 14-day auditory stimulation program with familiar sounds [5].

However, some studies have not reported favorable clinical outcomes in relation to the level of consciousness in comatose patients undergoing sensory stimulation programs [8]. For instance, Kavousipour et al.'s study on patients with GCS < 8 demonstrated that sensory stimulation, including tactile, visual, auditory, and olfactory stimuli, did not significantly increase the level of consciousness in the study groups [9]. Lombardi et al.'s systematic review on the level of consciousness in comatose patients revealed that none of the studies provided effective, stable, and valid clinical outcomes for sensory stimulation programs [6, 10]. Some studies have highlighted the positive effects of auditory stimulation, such as music, on pain and agitation in anesthetized patients in ICU [11–13].

Due to the temporary sedation of mechanically ventilated patients, both nurses and patients may experience challenging communication interactions or negative emotions due to the lack of communication [14]. Unresponsiveness in an anesthetized patient and the time it takes to establish communication are reasons for the reduced effectiveness of essential communication skills. Nurses must identify suitable sensory stimulations with the help of the patient's family and, through careful planning, provide a conducive environment for these sensory stimulations to prevent sensory deprivation in comatose patients [9, 15].

Nurses are required to engage in effective verbal and nonverbal communication with patients. Ambiguous communication fosters misunderstandings and creates barriers within nurse-patient interactions. In the study by Hayati et al. (2021), 51.6% of nurses demonstrated proficiency in verbal communication [16]. However, communicating with mechanically ventilated patients in ICUs remains a persistent challenge, and efforts to optimize verbal communication strategies in such settings are ongoing [17]. A systematic review by Sharkiya et al. (2023) underscored that diverse verbal communication approaches can significantly enhance patient outcomes across clinical contexts [18].

Communication constitutes the cornerstone of the nurse-patient relationship, with critical care nurses assuming a pivotal role in mediating interactions between patients, their families, and interdisciplinary healthcare teams. This role gains heightened importance in patients with communication disorders or severe illnesses, where miscommunication or misinterpretation of patient cues may induce anxiety and distress, particularly among mechanically ventilated individuals, potentially leading to adverse clinical consequences. Developing, implementing, and evaluating multimodal interventions to optimize communication during the acute phase of critical illness represents a vital nursing priority for enhancing patient recovery trajectories [19].

While existing literature emphasizes the importance of verbal communication in patient care [14, 16, 18] and explores auditory stimulation as an alternative intervention [6, 7], limited empirical research has investigated the clinical efficacy of verbal communication as a deliberate nursing intervention, particularly in practice settings [17]. This gap is critical, as intubated patients exhibit distinct communication needs that, if unmet, may result in breakdowns in provider-patient communication, compromising care quality and patient safety. To identify the most effective means of establishing verbal communication and create a standardized message that can be used by both nurses and the patient's family, continuous and ongoing research is required to ensure the effective use of communications [20]. Therefore, this study was conducted to investigate the impact of verbal communication on the level of consciousness, pain, and agitation in patients hospitalized in ICU settings.

Materials and methods

Study type and setting

This research is an RCT study conducted in southeastern Iran in patients hospitalized in an ICU. The study population consisted of 70 anesthetized patients hospitalized in the ICUs of Ali ibn Abi Talib Hospital in Rafsanjan. Patients meeting the inclusion criteria were initially selected, and after obtaining written consent forms from legally authorized representatives, they were randomly assigned to two groups: the intervention group and the control group (Fig. 1). Necessary explanations about the objectives and methods of the current study, along with emphasizing the voluntary nature of participation, were provided to the patients. Inclusion criteria comprised individuals aged 18 to 60 years of both genders, GCS score ≤ 8, and both traumatic and non-traumatic patients without a history of previous brain injury, no history of hearing disorders or impairment, and stabilization of vital signs in the ICU. The exclusion criteria included cerebrospinal fluid or brain fluid leakage from the ear and nose during the intervention, skull fracture in the

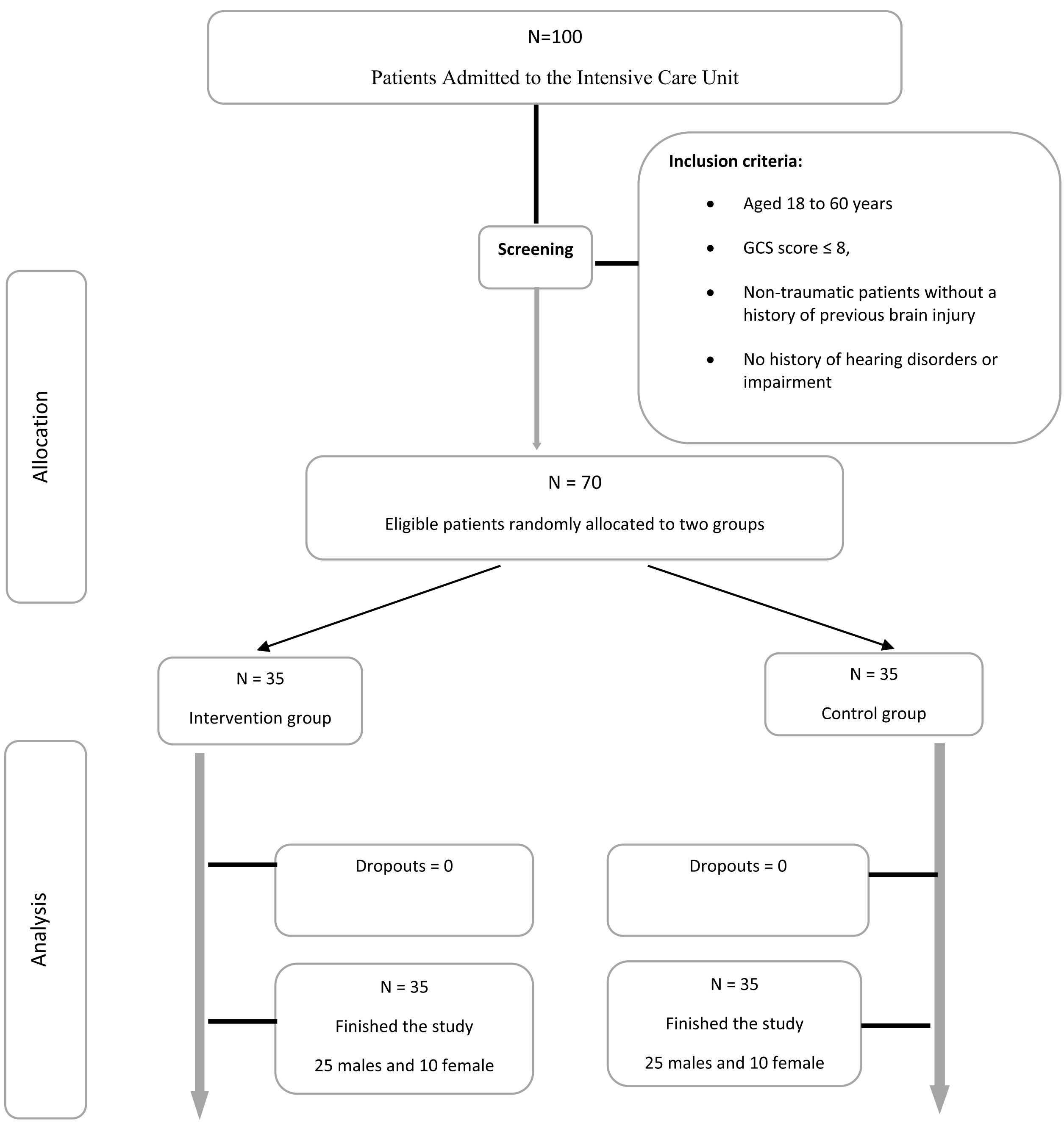

Fig. 1 Explanation of sample size and sampling

concave area based on computed tomography Scan (CT-scan), bleeding in the concave area based on CT-Scan, and patient death before completing the study.

Study sample

Based on the patients examined in a similar study (Moyle et al., 2014) [21], the sample size in each group was calculated using the following formula, with a 95% confidence level and 80% power. The calculated sample size in each group was 32 individuals, and considering potential dropouts, it was set at 35 individuals in each group. An estimate of the standard deviation of the agitation score in each of the two groups is 10. A minimum difference in the mean agitation score between the two groups of 7 has been considered (Fig. 1).

$$n = \frac{2\left(z_1 - \frac{\alpha}{2} + z_1 - \beta\right)^2 (\sigma)^2}{d^2} = \frac{1(1.96 + 0.84)^2 \, (10)^2}{(7)^2} = 31.8$$

Study instruments

In this study, four questionnaires of demographic and background information, Glasgow Coma Scale (GCS), Behavioral Pain Scale (BPS), and Richmond Agitation-Sedation Scale (RASS) were used in order to achieve the objectives of the research.

Demographic and background information questionnaire

It includes age, gender, marital status, education, job, history of addiction, risk factors and cause of hospitalization. Clinical information about the patient, including medical diagnosis, duration of hospitalization, hemodynamic status (systolic and diastolic blood pressure, pulse, breathing rate and oxygen saturation) at the first assessment.

The Glasgow Coma Scale (GCS)

The GCS was employed to measure the patients'level of consciousness. The GCS is the most common tool used to assess and record changes in the level of consciousness. It consists of three subscales (visual response, verbal response, and motor response) and was designed in 1974 by Tysdal and Jennett to standardize the observational and accurate assessment of the level of consciousness response to stimuli [22]. In Momenyan et al.'s study (2016), the GCS demonstrated high internal stability and a Cronbach's alpha of 0.82 for this questionnaire. Inter-rater reliability in recording the total GCS score was acceptable [23].

Behavioral Pain Scale (BPS)

The BPS was utilized to measure patients'pain. The BPS is a valid tool that includes changes in facial expressions, limb movements, and the acceptance of ventilation. This tool has been translated into Persian [24] and has been used in numerous studies to assess pain in anesthetized patients. The scoring system includes three parts: a) facial changes (1—relaxed, 2—moderately tense, 3—completely tense, 4—grimacing), b) limb movement scores (1—no movement, 2—semi-flexed, 3—completely flexed with fingers clenched, 4—completely withdrawn), and c) acceptance of ventilation (1—tolerant movements, 2—coughing but generally tolerating device, 3—struggling with the ventilator, 4—fighting with the ventilator and unable to control ventilation). The Iranian version of the BPS has shown good reliability and validity, with a Cronbach's alpha of 0.749 and a correlation coefficient between two evaluators at different times of 0.78. The correlation coefficient between the initial test and retest was reported as 0.52 [24].

Richmond Agitation-Sedation Scale (RASS)

The RASS was used to assess agitation. The RASS is a valid tool with a variable score range from +4 to − 5, consisting of ten parts. The scores on the Richmond scale include +4 (combative and aggressive), +3 (very restless), +2 (restless), +1 (anxious), 0 (calm—awake), − 1 (drowsy—light sedation), − 2 (sedated—moderate sedation), − 3 (deep sedation), − 4 (very deep sedation), and − 5 (unresponsive). This tool also has good reliability and validity. The RASS showed an intraclass correlation coefficient of 0.65 for intragroup consistency and a concordance coefficient of 0.95, indicating acceptable agreement between evaluators [25].

Data collection and interventions

Sampling began after approval of the proposal, One of the nurses, guided by a neurology specialist physician and a member of the research team in the ICUs, selected patients admitted to the special care ICUs based on the entry criteria with the necessary training. Initially, informed consent was obtained from the patients'parents or legal guardians, and then the patients were enrolled in the study. The samples were divided into two groups, control and intervention, in a randomized block design based on the stratification of patients according to age (18 to 30, 31 to 50, and 51 to 60 years), diagnosis (trauma and non-trauma), and gender (female and male). Patients meeting the criteria were monitored from the time of admission until stabilization of hemodynamic symptoms (blood pressure, respiratory rate, heart rate, and temperature) within the time frame of 24 to 72 h after admission. The implementation of verbal communication intervention was carried out by the researcher, and the measurement of indices was performed by two other nurses. Patients were blinded to group allocation. Outcome assessors were unaware of group assignments. Also, the nurses providing the intervention were not involved in data collection.

Intervention group

In the intervention group, verbal communication was conducted twice daily (afternoon and night shifts) for a minimum of 15–20 min each time, over a period of 10 days in the ICUs. The intervention sessions during the afternoon shift were scheduled from 16:00 to 16:20, and during the night shift, from 21:00 to 21:20.

The content of verbal communication

In the intervention group, nurses provided patients with verbal communication encompassing general information about a) the general information and conditions about the ICU and environment of the ICU ward, b) the details about the patient's medical condition, interventions conducted in the ICU ward, and c) necessary measures for improvement during the treatment (Table 1).

The level of consciousness, pain, and agitation of the patients was assessed by two other nurses with a minimum of 2 years of experience, 5 min before and 5 min after initiating verbal communication.

Control group

The control group received routine care in the unit without verbal communication during the afternoon and night shifts, and the study parameters were measured during similar time intervals as the intervention group. Routine clinical care in ICUs encompasses a structured set of evidence-based interventions designed to stabilize critically ill patients, prevent complications, and support recovery. Key components include continuous monitoring and assessment of patient status, hemodynamic monitoring, mechanical ventilation management, medication and fluid administration, sedation and analgesia, nutritional support, mobility and rehabilitation, as well as psychosocial and communication support. However, interactions with unconscious or intubated patients often prioritize addressing pain and agitation, emphasizing the reduction of distress and the delivery of patient-centered care. Routine ICU care necessitates a meticulous, protocol-driven approach tailored to individual patient needs. This ensures alignment with evidence-based practices while addressing the unique physiological and psychological demands of critically ill individuals.

Table 1 The content of verbal communication

a) General information about the ICU: Introduction of the nurse, patient awareness regarding personal, temporal, and spatial orientation, introduction of the treating physician or physicians, description of the patient's environmental conditions (description of the unit, necessity of the patient's connection to various devices, explanation of unit sounds, etc.), drawing the patient's attention to the reason for being in the ICU, the purpose of therapeutic and nursing care, and a brief description of events that occurred for the patient
b) Patient's medical status and interventions: Describing the patient's current conditions, interventions performed to expedite the patient's recovery, describing therapeutic methods, specifying actions planned for the next shift or subsequent days for the patient
c) Necessary measures for improvement: Instilling a sense of hope and effort for improvement in the patient, requesting the patient's cooperation with the treatment team if necessary, tolerating medical devices, especially the ventilator, providing a brief description of the patient's connections and coordination with these connections (endotracheal tube and gastric tube), communication methods with nurses, improvement signs in the patient, and necessary measures for earlier recovery and the patient's return to the family. During the intervention, any manipulation or touching of the patient was avoided

Data analysis

The data were analyzed using SPSS 25 software, employing descriptive statistics such as relative and absolute frequencies, means, and standard deviations to calculate quantitative and qualitative results. Before conducting statistical tests to examine the normality of the data, the Kolmogorov–Smirnov test was used. The assumption of sphericity was assessed by Mauchly's Test, which was not met; therefore, the Greenhouse–Geisser correction was applied. Fisher's exact test, T-test, and repeated measures analysis of variance (ANCOVA) were utilized for comparing demographic characteristics and baseline variables of patients, as well as assessing the trend of changes in the study variables during the measurement periods. A significance level of $P < 0.05$ was considered statistically significant.

Ethics approval and consent to participate

This study commenced after obtaining ethical approval and receiving an ethics code from the Research and Technology Deputy and the Ethics Committee of Rafsanjan University of Medical Sciences (IR.RUMS.REC.1398.189). The clinical trial registration code (IRCT20150519022320 N22) was obtained (retrospectively registered) and presented to the authorities and the relevant officials of Ali Ibn Abi Talib Hospital. The researcher secured informed consent from the patients'companions or legal representatives and guardians. Following approval from ICU officials and providing detailed explanations regarding the objectives and methods, the study commenced. All procedures adhered to the applicable guidelines and regulations.

Results

The study findings indicated that the mean age of the research units in the intervention and control groups was 43.60 ± 21.49 and 46.02 ± 22.33, respectively. There was no significant difference in age between the two groups

(P =0.064). Most participants in both the intervention and control groups were male, married, illiterate, self-employed, and had no history of addiction. No significant differences were observed between the two groups in terms of gender, marital status, education level, occupation, history of addiction, duration of hospitalization, and the presence of risk factors (P> 0.05) (Table 2). Most participants in both groups were hospitalized in the ICU due to trauma.

According to the results presented in Table 3, before verbal communication, there was a significant difference between the intervention and control groups in terms of the level of consciousness (P= 0.036) and agitation (P= 0.027). However, there was no significant difference between the two groups regarding pain (P= 0.170). Also,

Table 2 Demographic information in the two groups of intervention and control

Group Variable		Intervention		Control		T—test	*P* value
		M	SD	M	SD		
Age		**43.60**	**21.49**	**46.02**	**22.33**	**– 0.46**	**0.64**
Duration of hospitalization (days)		**8.02**	**5.08**	**7.71**	**4.28**	**0.28**	**0.78**
		N	**%**	**N**	**%**	**Chi-square test**	***P* value**
Gender	Male	25	74.1	25	74.1	0.00[a]	> 0.99
	Female	10	28.9	10	28.9		
Marital status	Married	24	68.6	25	71.4	0.32[a]	0.06
	Widow/Divorced	11	31.4	10	28.6		
Education	Illiterate	13	37.1	17	48.6	2.71	0.25
	High school	10	28.6	12	34.3		
	Diploma	12	34.3	6	17.1		
Job	Unemployed/housewife	9	25.7	9	25.7	0.00	> 0.99
	Freelance	20	57.2	20	57.2		
	Student	6	17.1	6	17.1		
History of addiction	Yes	5	14.3	8	22.9	0.85[a]	0.54
	No	30	85.7	27	77.1		
Risk factor	No risk factor	20	57.1	16	45.7	2.97	0.39
	Hypertension	12	34.3	15	42.9		
	Diabetes	3	8.6	2	5.7		
	Smoker	0	0.0	2	5.7		
Cause of hospitalization	Trauma	23	65.7	18	51.4	1.47[a]	0.33
	Non-trauma	12	34.3	17	48.6		

Data were presented numerically (%)

M Mean, *SD* Standard deviation

[a] Fisher's exact test

Table 3 Comparison of the mean of consciousness level, pain, restlessness and hemodynamic status before the intervention in two intervention and control groups

Group Variable	Intervention		Control		T—test	*P* value
	M	SD	M	SD		
Level of consciousness	5.11	1.47	5.97	1.85	– 2.14	0.03
Pain	6.51	2.68	7.48	3.26	– 1.36	0.17
Restlessness	– 4.48	0.50	– 3.97	1.24	– 2.25	0.02
Systolic blood pressure	132.57	20.63	126.00	19.99	1.35	0.18
Diastolic blood pressure	75.94	16.03	76.57	16.68	– 0.16	0.87
Heart rate	97.85	22.03	91.34	20.87	1.27	0.20
Breathing rate	18.28	5.65	16.34	5.39	1.47	0.14
Oxygen saturation	98.14	2.36	97.14	2.94	1.56	0.12

M Mean, *SD* Standard deviation

before the intervention, there was no significant difference in hemodynamic variables between the intervention and control groups ($P > 0.05$).

The findings in Table 4 show that the level of consciousness before the study in the intervention group was 11.47 ±1.5, with an increasing trend reaching its highest value (20.8 ±41.2) on the tenth day. However, in the control group, although the score before the intervention was higher than that of the intervention group (97.5 ±85.1), the trend of increasing consciousness was slow. Repeated measures analysis of variance showed a significant difference between the intervention and control groups on the tenth day compared to the beginning of the study ($P < 0.001$).

According to Table 5, the pain intensity before the study in the verbal communication group was 51.6 ±68.2, with a decreasing trend reaching its lowest value (77.3 ±43.1) on the tenth day. However, in the control group, the pain reduction trend fluctuated, reaching a value close to the beginning of the study on the fourth day. Repeated measures analysis of variance showed a significant difference

Table 4 Comparison of the mean and standard deviation of the level of consciousness variable in two intervention and control groups on the first to tenth days

Group Variable	Intervention		Control		Repeated Measures ANOVA	*P* value
	M	SD	M	SD		
Before intervention	5.11	1.47	5.97	1.85		
First day	5.11	1.47	5.97	1.85		
Second day	5.37	1.43	6.11	1.84		
Third day	5.68	1.43	6.40	1.94		
Fourth day	5.91	1.59	6.68	1.98		
Fifth day	6.48	1.63	6.68	1.98		
Sixth day	6.77	1.66	6.74	1.77	F = 1088.05	P < 0.001
Seventh day	7.25	1.82	6.88	1.82		
Eighth day	7.62	2.01	6.88	1.77		
Ninth day	7.91	2.21	7.05	1.93		
Tenth day	8.20	2.41	7.20	2.08		
Greenhouse–Geisser	F = 58.69		F = 14.51			
P value	*P* < 0.001		*P* < 0.001			

M Mean, *SD* Standard deviation

Table 5 Comparison of the mean and standard deviation of the restlessness variable in two intervention and control groups on the first to tenth days

Group Variable	Intervention		Control		Repeated Measures ANOVA	*P* value
	M	SD	M	SD		
Before intervention	− 4.48	0.50	− 3.97	1.24		
First day	− 4.48	0.50	− 3.97	1.24		
Second day	− 4.25	0.50	− 3.94	1.13		
Third day	− 4.05	0.48	− 3.68	0.99		
Fourth day	− 3.82	0.51	− 3.45	1.06		
Fifth day	− 3.60	0.60	− 3.45	0.81		
Sixth day	− 3.34	0.53	− 3.40	0.81	F = 2011.65	*P* < 0.001
Seventh day	− 3.20	0.67	− 3.44	0.83		
Eighth day	− 2.91	0.88	− 3.31	0.96		
Ninth day	− 2.71	1.07	− 3.22	1.03		
Tenth day	− 2.62	1.19	− 3.20	1.10		
Greenhouse–Geisser	F = 36.94		F = 7.00			
P value	*P* < 0.001		*P* < 0.001			

M Mean, *SD* Standard deviation

between the intervention and control groups on the tenth day compared to the beginning of the study ($P < 0.001$).

As shown in Table 6, the severity of agitation in participants before the study in the verbal communication group was 48.4 ± 50.0, with a decreasing trend reaching its lowest value (62.2 ± 19.1) on the tenth day. However, in the control group, the agitation reduction trend did not change much in the first two days and then remained relatively stable on the fourth, fifth, and sixth days. Nevertheless, repeated measures analysis of variance showed a significant difference between the verbal communication and control groups on the tenth day compared to the beginning of the study ($P < 0.001$).

Additionally, the results of the Repeated Measures ANCOVA indicated a significant main effect of time on reducing restlessness (F(2.43, 162.56) = 7.51, $p < 0.001$, $\eta^2 = 0.101$), reflecting meaningful changes over time. The interaction effect of time and group was significant (F(2.43, 162.56) = 4.51, $p = 0.008$, $\eta^2 = 0.063$), suggesting that the pattern of restlessness changes varied among groups. The interaction effect of time and baseline restlessness was also significant (F(2.43, 162.56) = 16.12, $p < 0.001$, $\eta^2 = 0.194$), indicating that initial levels influenced changes over time. These findings demonstrate that the intervention significantly reduced restlessness, supported by the significant main effect of time and the interaction effect of time and group. The initial level of restlessness influenced this effect (F(1, 162.56) = 57.47, $p < 0.001$, $\eta^2 = 0.462$), highlighting the intervention's effectiveness (Fig. 2). The analysis revealed significant changes in pain scores over time (F = 8.52, $p < 0.001$), although these changes were consistent across groups (F = 1.48, $p = 0.191$). The initial pain level significantly impacted change trends over time (F = 20.93, $p < 0.001$), emphasizing the need for future interventions to consider initial pain levels as predictors of treatment response (Fig. 3). Finally, the main effect of time on level of consciousness scores was significant (F(1.92, 128.87) = 10.60, $p < 0.001$, $\eta^2 = 0.137$), with varying patterns across groups (F(9, 128.87) = 11.79, $p < 0.001$, $\eta^2 = 0.150$). The initial level of level of consciousness emerged as a significant predictor for post-intervention scores, underscoring the importance of baseline level of consciousness in evaluating treatment efficacy (Fig. 4).

Discussion

The aim of the current study was to determine the impact of verbal communication on the level of consciousness, pain, and agitation in hospitalized anesthetized patients in ICUs. In light of the literature review, this study stands out as one of the few investigations that has examined the influence of verbal communication on the consciousness level, pain, and agitation of anesthetized patients in specialized units.

Table 6 Results of the repeated measures ancova to examine the effect of the intervention on level of consciousness, restlessness and pain scores, adjusting for the effect of the baseline variable (pre-intervention)

Variable	Source	Sum of Squares	df	Mean Square	F	*p*-value	Partial Eta Squared
Restlessness	Time	22.00	2.42	9.06	7.51	< 0.001	0.10
	Time * Group	13.22	2.42	5.44	4.51	.008	0.06
	Time * Covariate (Before intervention)	47.21	2.42	19.46	16.11	< 0.001	0.19
	Group	9.12	1	9.12	3.91	.052	0.05
	Covariate (Before intervention)	133.94	1	133.94	57.47	< 0.001	0.46
	Error	196.28	162.56	1.20			
Pain	Time	148.23	5.35	27.66	8.51	< 0.001	0.11
	Time * Group	25.76	5.35	4.80	1.48	.191	0.02
	Time * Covariate (Before intervention)	364.29	5.35	67.98	20.93	< 0.001	0.23
	Group	227.02	1	227.02	22.77	< 0.001	0.25
	Covariate (Before intervention)	860.68	1	860.68	86.33	< 0.001	0.56
	Error	1165.94	359.01	3.24			
level of consciousness	Time	61.54	1.92	32.00	10.60	< 0.001	0.13
	Time * Group	68.40	9	7.60	11.78	< 0.001	0.15
	Time * Covariate (Before intervention)	8.68	1.92	4.51	1.49	.228	0.02
	Group	89.00	1	89.00	14.38	< 0.001	0.17
	Covariate (Before intervention)	1519.19	1	1519.19	245.49	< 0.001	0.78
	Error	388.876	128.86	3.01			

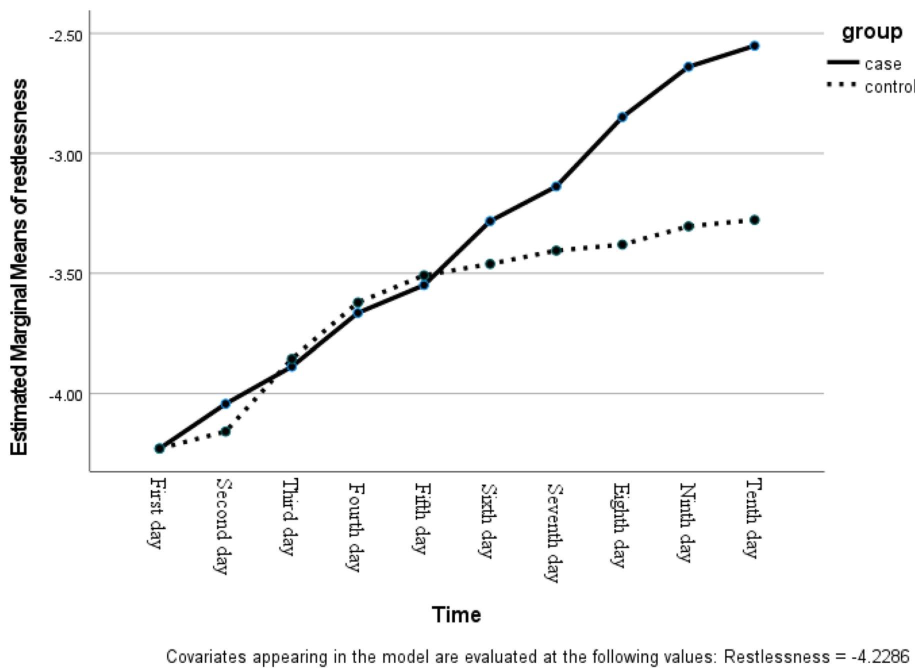

Fig. 2 Estimated Marginal Means of Restlessness over Time between Case and Control Groups

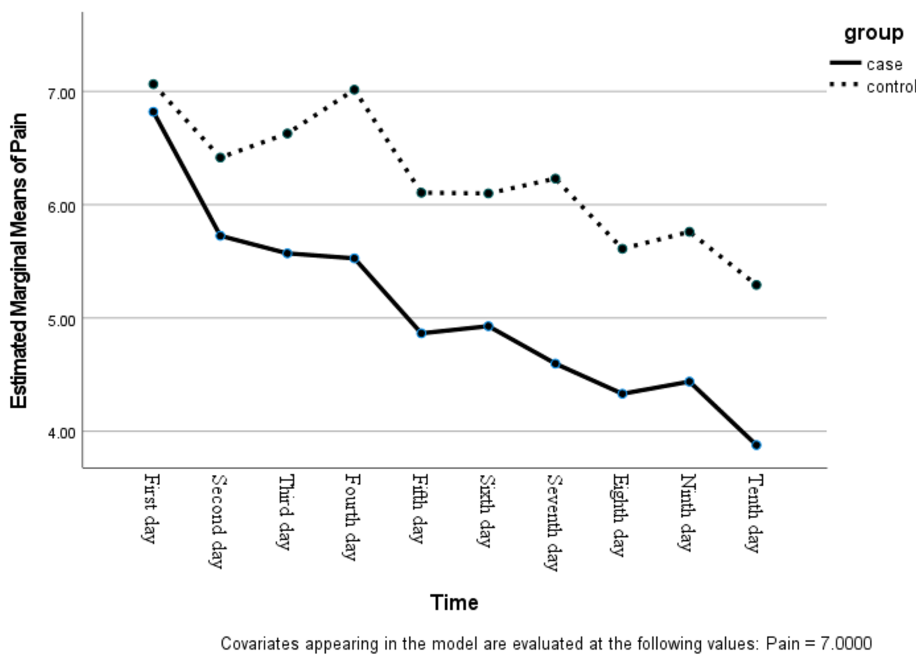

Fig. 3 Estimated marginal means of pain over time between case and control groups

The study found that establishing verbal communication had a significant impact on the level of consciousness in anesthetized patients admitted to ICUs. Moreover, no studies were identified that specifically investigated the effects of verbal communication on pain and agitation in anesthetized patients in specialized care units. Therefore, references to studies focusing on auditory stimuli or music were used for comparison. The results of the

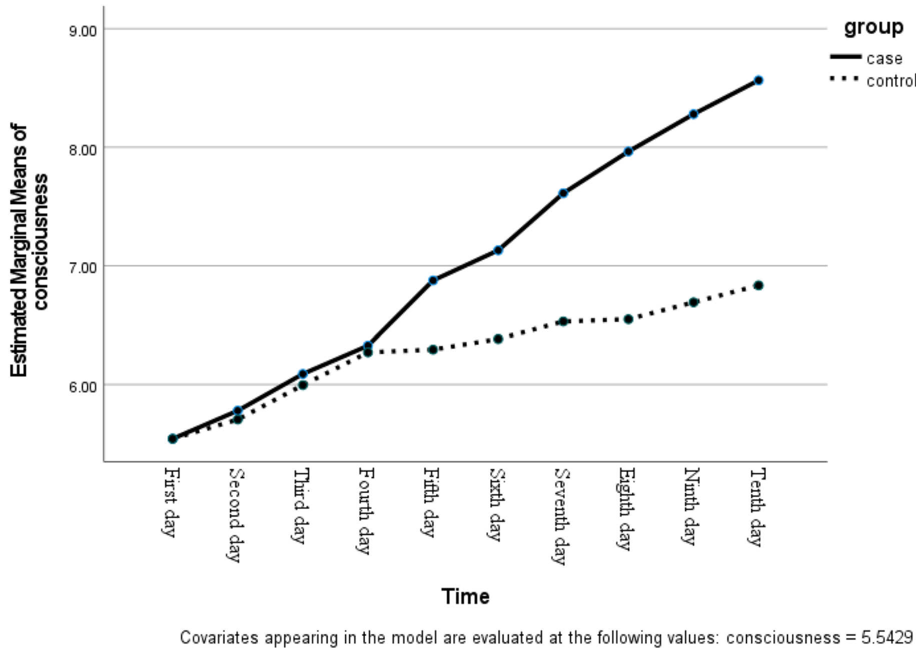

Fig. 4 Estimated marginal means of level of consciosness over time between case and control groups

current research align with studies conducted by Bahonar et al. [26] Mohammadi et al. [27], Çevik and Namik [28], Parveen et al. [29], Heidari et al. [6], Hosseinzadeh et al. [7], Hassanzadeh et al. [2], Sargolzaei et al. [30], and Goudarzi et al. [5].

Comparison of the findings of the present study with other research utilizing various auditory stimuli (familiar or unfamiliar, natural sounds) indicates the effectiveness of implementing auditory stimuli alone or through nursing intervention. Studies have demonstrated that sensory stimulation through activation of the reticular activating system contributes to the improvement of comatose patients [31]. However, due to the limited number of studies on the effectiveness of verbal communication intervention on the level of consciousness in anesthetized patients, further research is needed for a comprehensive comparison with auditory stimuli, which should be addressed in future studies. Furthermore, the present study diverges from Davis and Gimenez (2003) [32] regarding the assessment of consciousness levels before and after auditory stimulation. The shorter duration of intervention compared to the referenced study and the use of diverse sounds, coupled with the neglect of auditory sensation in patients, may contribute to the differences in results. This is in contrast to the findings of Puggina da Silva and Santos (2011), which demonstrated that auditory messages are more powerful stimuli than music in patients with impaired consciousness [33].

In the present study, verbal communication has proven to be effective in reducing pain and agitation in anesthetized patients hospitalized in ICUs. The results of the current research are consistent and harmonious with the findings of studies by Khojeh et al. [11], Zolfaghari et al. [12], and Yaghoubinia et al. [13]. A comparison of the current study's findings with other research using auditory stimuli and music indicates the effectiveness of both verbal communication and auditory stimulation, as well as music. This suggests that verbal communication may have a more pronounced impact on auditory stimuli, particularly in anesthetized patients.

It is noteworthy that some studies, such as Zolfaghari et al. (2015) [12], have focused on physiological parameters as indicators of pain assessment in anesthetized patients in intensive care, rather than utilizing pain assessment tools. Some investigations have demonstrated that auditory stimulation, through mechanisms such as endorphin secretion and interference with pain processing pathways, reduces the intensity of patients'pain [34]. Peterson and Almerud, on the other hand, believe that auditory stimuli, such as music, influence the brain, stimulate alpha brainwaves, promote endorphin release, induce relaxation, and decrease pain and anxiety [35]. However, due to the limited number of studies on the effectiveness of verbal communication intervention on pain and agitation in anesthetized patients, further research is needed in this regard.

Various studies have explored the use of different sounds for auditory stimulation, considering their positive or negative emotional and affective impact on patients. A crucial difference in this study compared to others is the choice of verbal communication as an intervention, which can dynamically and comprehensively address emotional and affective aspects for patients. Unlike other studies that focus solely on the type of sound and specific individuals'voices, this study goes beyond to emphasize the importance of establishing communication with patients to enhance therapeutic outcomes. The content of verbal communication relies on conveying information about the patient's condition, interventions performed, and therapeutic progress to enhance patients'well-being. This study encourages early exploration of implementing interventions for comatose patients after admission to ICUs, as it can be vital for patients'survival, quality of life, and long-term prognosis [31]. The current research aims to identify and elucidate an effective and feasible intervention to improve the condition of hospitalized patients in ICUs, focusing on the crucial role of nurses in managing and implementing structured verbal stimulation interventions. Future studies should focus on larger sample sizes and prioritize addressing barriers such as time constraints and staff training needs, while accounting for diverse demographic and clinical characteristics of patient populations. Additionally, investigating the impact of specific types of verbal interactions (e.g., brief and frequent) within care routines should be a key consideration in subsequent research.

Implications for practice

The findings of this study provide actionable insights for enhancing ICU patient care and fostering effective communication with critically ill patients. This research underscores that nurses' verbal communication is not merely a compassionate gesture but a significant clinical intervention. By formalizing the role and responsibilities of communication in the ICU, nurses can improve patient outcomes and reduce disease-related complications. To achieve this, structured verbal communication should be integrated into daily nursing care routines for sedated or unconscious ICU patients. This intervention is cost-effective, non-invasive, and aligns with patient-centered care principles. Furthermore, emphasis should be placed on implementing targeted training programs for nurses to optimize the use of verbal communication in engaging with non-responsive patients.

Limitations

Although the results of this study propose this intervention as effective, caution is required in interpretation due to the limited number of similar studies. The study has some limitations that need consideration. The unique status of patients hospitalized in ICUs, minimizing the impact of various influential variables on the levels of consciousness, pain, and agitation, presents a challenge. Despite having a control group and attempting to make important and influential variables similar in both groups, environmental factors, patient-related challenges, factors related to the patient's recovery process, and differences in treatment response cannot be entirely simulated. Due to the small sample size and confounding baseline variables, conclusions should be drawn with caution and larger studies are needed.

Conclusion

Based on the findings of this current research, it can be concluded that implementing verbal communication intervention by nurses has led to a significant difference in the level of consciousness, pain, and agitation in anesthetized patients admitted to ICUs. Considering the simplicity and cost-effectiveness of verbal communication intervention in anesthetized patients admitted to ICU, its positive impact on increasing consciousness level, reducing pain, and alleviating agitation has been demonstrated. Therefore, by employing verbal communication intervention, the process of improvement in hospitalized patients in ICUs can be facilitated, enhancing the quality of care provided to them. However, due to the small sample size and some confounding variables, more studies are needed to confirm these results.

Abbreviations

BMI	Body mass index
BPS	Behavioral Pain Scale
CT-scan	Computed tomography Scan
GCS	Glasgow Coma Scale
ICU	Intensive care unit
ICUs	Intensive care units
RCT	Randomized controlled clinical trial
RASS	Richmond Agitation-Sedation Scale

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Consent to participate

Women who agreed to participate provided informed consent before commencement of the study.

Authors' contributions

AR, AT, TM, AMA and MAZ conceived the presented idea. AR and MAZ analysed the data. AT and MAZ processed the data and designed the tables. AT, AHH, MMA and MAZ took the lead in writing the manuscript. All authors provided critical feedback and contributed to the final version of the manuscript.

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Data availability
The datasets were analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
This study was conducted in accordance with the Declaration of Helsinki and Clinical Practice guidelines. Ethical approval was obtained from the Research Ethics Committee of the Rafsanjan University of Medical Sciences Ethics committee with the ethical code of: IR.RUMS.REC.1398.189. The clinical trial registration code (IRCT20150519022320 N22) was obtained and presented to the authorities and the relevant officials of Ali Ibn Abi Talib Hospital. Informed written/verbal consent was obtained from all subjects and/or their legal guardian(s). The study adhered to the CONSORT guidelines.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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