

Original Paper

Relationship of the Alternative Communication Methods by Nurse With Work Environment and Patient Safety Culture in Intensive Care Units



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Running Title Use of Augmentative and Alternative Communication Methods in ICU Nurses

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ABSTRACT

Introduction: One of the most important factors related to the quality of care is the proper communication between nurses and patients. One of the factors that affects patient safety is the working environment.

Objective: This study aimed to determine the use of augmentative and alternative communication (AAC) methods by nurses in intensive care units (ICUs) of hospitals in Ahvaz, southwest of Iran, and assess its relationship with work environment and patient safety culture.

Materials and Methods: This is a correlational and cross-sectional study. Using a census sampling method, 378 nurses working in the ICUs of hospitals affiliated to Ahvaz Jundishapur University of Medical Sciences were selected, of whom 249 were eligible to participate in the study. Data were collected from May to June 2022 using the hospital survey on patient safety culture (HSOPSC), nursing work index (NWI) and an AAC method use questionnaire. The association between the study variables was assessed using Spearman's correlation test. $P < 0.05$ were considered statistically significant.

Results: Among participants, 87.1% were female, and 85.1% had a bachelor's degree. The most common method of communication was verbal communication, as 61 nurses (24.5%) reported they "always" used this method, while it was "often" used by 79 (31.7%) nurses. Moreover, 93 nurses (37.3%) reported that the nurse call bell was the most commonly used tool for communication. Spearman's test results showed a significant relationship between some NWI variables and the use of AAC methods, including a significant relationship between speaking valve use for communication and adequacy of resources and staffing ($r = 0.380$, $p = 0.001$) and between communication with sign language and overall perception of patient safety ($r = -0.330$, $P = 0.001$). There was also a significant relationship between many HSOPSC variables and the use of AAC methods ($P < 0.05$).

Conclusion: Promoting a patient safety culture and improving the working environment can improve nurses' use of AAC methods in ICUs.

Keywords:

Non-verbal communications,
Patient safety, Safety culture,
Workplace environments

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Highlights

- One of the effective factors in increasing the quality of care in ICUs is effective communication between nurses and patients.
- There was a significant relationship between the working environment and the nurses' use of augmentative and alternative communication (AAC) methods in ICUs.
- There was a significant relationship between patient safety culture and nurses' use of AAC methods in ICUs

Plain Language Summary

Patient safety and proper communication between nurses and patients are important in ICUs. The work environment can affect these factors. This study investigated the use of AAC methods by the ICU nurses in southwest of Iran and assessed its relationship with nurses' work environment and patient safety culture. Based on the findings, by improving work environment and patient safety culture, the nurses' use of AAC methods in ICUs can be increased.

Introduction

Effective communication enables healthcare personnel to establish rapport with their patients, obtain crucial health information and work effectively with all healthcare team members. Nurses are always expected to maintain good communication and approach every patient with the intention to understand their concerns [1]. Good communication between nurses and patients is more important in intensive care units (ICUs) as it helps patients perceive their illnesses more positively. According to the statistics of the Iranian Society of Anesthesiology and Critical Care, 1.5-2 million people annually refer to hospitals due to road accidents, strokes and other reasons, of whom 30% need to be hospitalized in the ICU [2]. When normal ways of speaking and writing are restricted in patients, augmentative and alternative communication (AAC) is employed [1]. It refers to the use of strategies or auxiliary tools to support, enhance or replace normal spoken communication [3]. The scope of AAC systems varies from simple level that does not require electronic devices (e.g. pen and paper, symbols, communication boards, or books) to high technology levels that include speech generating devices or electronic equipments [4].

Studies have confirmed that nurse-patient communication affects the quality of patient care and safety [5]. Patient safety refers to an environment free of harm in which patients and caregivers apply safety standards, thereby reducing the risks of an unnecessary action [6]. Evaluation of safety culture in hospitals is generally encouraged by policymakers and healthcare managers [7].

Nurses are the key members of a healthcare team, and their role in care-giving and protection and promotion of the healthcare system has been globally established [8]. Among the key factors that affect patient safety is the nursing work environment. According to the American Nurses Association, the nursing work environment includes all effective factors and indicators of nursing performance, including skilled communication, true collaboration, and effective decision-making [9]. Relationship with colleagues, nurse-to-patient staffing ratio, and management and leadership methods, along with the tools and facilities available in the department, are factors related to nursing work environment that can significantly affect the provision of safe patient care [10]. The results of the studies have shown that the cause of almost all accidents in the work environment is the lack of proper communication between caregivers and patients; 75% of medical errors and 65% of accidents during work shifts are due to improper communication [11-15].

Overall, the literature review revealed that safety culture is affected by factors such as communication and work environment; however, there are few studies on the relationship between patient safety and AAC. In this regard, this study aims to determine the usage rate of AAC by ICU nurses in Ahvaz, southwest of Iran, and assess its relationship with nursing work environment and patient safety culture.

Materials and Methods

This is a correlational study with a cross-sectional design. The study population comprised all permanent and contractual nurses working in the ICUs of selected hospitals in Ahvaz, southwest of Iran. They all were included in study using a census method. The inclusion criteria were at least 6 months of work experience in the ICU, at least a bachelor's degree, willingness to participate in the study, and complete responses to the questionnaires. Of the 378 nurses, 249 were eligible to participate in this research. Data were collected from May to June 2022 using three questionnaires, including the hospital survey on patient safety culture (HSOPSC), the nursing work index (NWI), and the AAC scale.

The HSOPSC is a field questionnaire designed by the agency for healthcare research and quality [16]. It has 42 items and 12 dimensions of patient safety culture. Each item is rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The dimensions include overall perception of continuous improvement/organizational learning, frequency of reported events, overall perception of patient safety, employees/manager expectations and actions promoting patient safety, communication openness, teamwork within the department, feedback and communication about errors, non-punitive response to errors, staffing, teamwork across hospital departments, hospital management support for patient safety, and hospital handoff and transitions. Those with a positive response >75% are considered as areas of strength, and those with a positive response <50% are considered as areas of weakness that require intervention. Those with a positive response between 50-70% are the areas with potential for improvement. In this study, the Persian version of the HSOPSC was used [17].

The NWI is a standard tool designed by Lake et al. It has 34 items rated on a 4-point Likert scale as: 1) Completely disagree, 2) Somewhat disagree, 3) Somewhat agree and 4) Completely agree. This questionnaire has five domains: Nurse participation in hospital affairs (11 items), nursing foundations for quality of care (9 items), nurse/manager ability (7 items), adequacy of resources and staffing (4 items), and collegial nurse-physician relations (3 items). A score above 2.5 in each domain indicates the favorable level of work environment, and a score <2.5 indicates a poor level of work environment [18]. In this study, the Persian version of NWI was used [19].

The AAC scale was used to rate nurses' use of AAC methods. It was developed by Jansson et al. [8] and has 16 items, measuring demographic information (items 1-10), care needs of special people, such as disabled patients (items 11 and 12 each with four options), communication methods and obtaining information from the patient (items 13 and 14 rated on a Likert scale from 4 [always] to 0 [never]) and the types of AAC methods (items 15 and 16 answered by yes or no). The total score is not calculated. The forward-backward translation method was used to translate the scale from English to Persian, performed by two experts with PhD in English Language Teaching. To confirm the validity of the tool, the content validity was checked by 10 experts with experience working in ICU, including 6 nurses and 4 anesthesiologists. Next, the content validity index (CVI) was calculated for each item and the subscales. The acceptable CVI score for each item is 0.8 or higher, and the acceptable CVI score for each subscale is 0.9 or higher [20]. To examine the reliability of the Persian AAC scale, Cronbach's α coefficient was calculated, and the acceptable value of 0.74 was obtained.

Before data collection, the study objectives were explained to the participants and their informed consent was obtained. After collection, continuous data were reported as Mean \pm SD and categorical data as number (percentage). The normality of continuous data was assessed using the Shapiro-Wilks test. The association between the frequency of using each AAC method and the scores of HSOPSC and NWI was assessed using Spearman's correlation test. $P < 0.05$ were considered statistically significant. All analyses were done in SPSS software, version 22 (IBM Corp., Armonk, NY).

Results

The mean age of participants was 30.96 \pm 6.63 years, and most of them were female (87.1%). Table 1 presents other characteristics of participants. Table 2 presents the frequency of using AAC methods by nurses. The most common method of communication with patients was verbal method as 61(24.5%) nurses had always used verbal communication method. The least commonly used AAC method ($n=15$, 6%) was communication with electronic devices. Concerning the tools for communication with ICU patients, the call bell was the most common tool ($n=93$, 37.3%), while the least used communication tool was the speech production tool ($n=13$, 2.5%). The mean scores of NWI and HSOPSC domains are shown in Table 3.

Table 1. Sociodemographic characteristics of participants (n=249)

Quantitative Variables		Mean±SD/No. (%)
Age (y)	-	30.96±6.63
Work experiences (y)	-	1.02±2.68
Gender	Male	32(12.9)
	female	217(87.1)
Degree	Bachelor's degree	212(85.1)
	Master's degree	37(14.9)
Occupation	Nurse	245(98.4)
	Trained nurse	4(1.6)
First language	Persian	230(92.4)
	Arabic	17(47)
	Kurdish	2(0.8)
Second language	Arabic	117(47)
	English	88(35.3)
	French	12(4.8)
	German	32(12.9)
Having research experience	Yes	85(34.1)
	No	164(65.9)

To assess the relationship between the usage of AAC methods and NWI dimensions, Spearman's test was used. The results are presented in [Table 4](#). There was a significant relationship between communication board use and nurse participation in hospital affairs ($r=0.283$, $P=0.001$), between communication with electronic devices and nurse participation in hospital affairs ($r=0.284$, $P=0.001$), and between speaking valve use and adequacy of resources and staffing ($r=0.380$, $P=0.001$).

All significant relationships between the usage of AAC methods and HSOPSC are shown in [Table 5](#). There was a significant relationship between communication with sign language and overall perception of patient safety ($r= -0.330$, $P=0.001$).

Discussion

The results of this study showed that verbal communication was the most common method of nurse-patient

communication in the ICUs of hospitals in Ahvaz, and the use of electronic communication devices was the least common. The most common tool for communication was the nurse call bell, and the least common tool was the speech production tool.

A study in Iran on speech-language pathologists (SLP) showed that a few numbers of them were familiar with the concept of AAC. Most of them were familiar with low-tech AAC devices (e.g. paper and pen, communication board, sign language) and a few were familiar with high-tech AAC devices [21]. In another study, it was found that anesthesiologists had less knowledge about modified call buttons, communication boards, and alphabet boards than nurses [8]. Their study is similar to the present study in terms of examining the use of AAC methods. In their study, the level of patient satisfaction with the AAC methods was examined, while our study investigated the nurses' usage of AAC methods.

Table 2. Frequency of using AAC methods among nurses (n=249)

AAC Methods		No. (%)
Verbal communication	Always	61(24.5)
	Often	79(31.7)
	Sometimes	81(32.5)
	Rarely	23(9.2)
	Never	5(2)
Written communication	Always	8(3.2)
	Often	34(13.7)
	Sometimes	115(46.2)
	Rarely	53(21.3)
	Never	39(15.7)
Communication board use	Always	14(5.6)
	Often	13(5.2)
	Sometimes	48(19.3)
	Rarely	92(36.9)
	Never	0
communication with electronic devices	Always	15(6)
	Often	28(11.2)
	Sometimes	31(12.4)
	Rarely	74(29.7)
	Never	101(40.6)
Communication with sign language	Always	32(12.9)
	Often	67(26.9)
	Sometimes	99(39.8)
	Rarely	38(15.3)
	Never	13(5.2)
Communicating with facial expressions	Always	21(8.4)
	Often	66(26.5)
	Sometimes	102(41)
	Rarely	48(19.3)
	Never	0

AAC Methods	No. (%)
Communication with the presence of an interpreter	Always
	20(8)
	Frequently
	48(19.3)
	Sometimes
Communication with speaking valve use	88(35.3)
	Rarely
	63(25.3)
	Never
	30(12)
Communication with body language	Always
	15(6)
	Often
	39(15.7)
	Sometimes
	41(16.5)
	Rarely
	42(16.9)
	Never
	0
	Always
	21(8.4)
	Often
	49(19.7)
	Sometimes
	99(39.8)
	Rarely
	51(21.5)
	Never
	29(11.6)

Table 3. Mean scores of the NWI and HSOPSC domains

	Variables	Mean±SD
NWI	Nurse participation in hospital affairs	2.48±0.50
	Nursing foundations for quality of care	2.26±0.56
	Nurse/manager ability	2.50±0.81
	Adequacy of resources and staffing	2.62±0.78
	Nurse-physician relations	2.25±0.89
HSOPSC	Communication openness	8.65±3.39
	Feedback and communication about errors	9.69±6.17
	Frequency of reported events	9.14±2.36
	Hospital handoff and transitions	11.10±3.85
	Hospital management support for patient safety	9.61±3.38
	Non-punitive response to errors	9.68±2.53
	Overall perception of continuous improvement/organizational learning	10.02±2.96
	Overall perception of patient safety	12.51±2.75
	Staffing	11.82±3.08
	Employees/manager expectations and actions promoting patient safety	11.14±3.95
	Teamwork across hospital departments	11.51±2.87
	Teamwork within the department	12.90±3.36

NWI: Nursing work index; HSOPSC: Hospital survey on patient safety culture.

Table 4. Association between the usage of AAC methods and NWI dimensions

AAC Methods	NWI Dimensions	r	P*
Verbal communication	Nurse-physician relations	-0.088	0.169
	Adequacy of resources and staffing	0.161	0.011
	Nurse/manager ability	-0.046	0.467
	Nursing foundations for quality of care	0.030	0.642
	Nurse participation in hospital affairs	0.021	0.747
Written communication	Nurse-physician relations	0.047	0.461
	Adequacy of resources and staffing	0.202	0.001
	Nurse/manager ability	0.070	0.270
	Nursing foundations for quality of care	0.131	0.039
	Nurse participation in hospital affairs	0.238	0.0001
Communication board use	Nurse-physician relations	0.025	0.690
	Adequacy of resources and staffing	0.132	0.037
	Nurse/manager ability	0.190	0.003
	Nursing foundations for quality of care	0.245	0.0001
	Nurse participation in hospital affairs	0.283	0.0001
Communication with electronic devices	Nurse-physician relations	0.247	0.0001
	Adequacy of resources and staffing	0.238	0.0001
	Nurse/manager ability	0.214	0.001
	Nursing foundations for quality of care	0.255	0.0001
	Nurse participation in hospital affairs	0.284	0.0001
Communication with sign language	Nurse-physician relations	-0.009	0.893
	Adequacy of resources and staffing	0.070	0.272
	Nurse/manager ability	0.061	0.341
	Nursing foundations for quality of care	0.198	0.002
	Nurse participation in hospital affairs	0.189	0.003
Communicating with facial expressions	Nurse-physician relations	-0.054	0.394
	Adequacy of resources and staffing	-0.050	0.429
	Nurse/manager ability	-0.151	0.017
	Nursing foundations for quality of care	-0.137	0.031
	Nurse participation in hospital affairs	-0.028	0.661

AAC Methods	NWI Dimensions	r	P*
Communication with the presence of an interpreter	Nurse-physician relations	0.062	0.330
	Adequacy of resources and staffing	0.194	0.002
	Nurse/manager ability	0.039	0.536
	Nursing foundations for quality of care	-0.069	0.279
	Nurse participation in hospital affairs	0.105	0.099
Communication with speaking valve use	Nurse-physician relations	0.197	0.002
	Adequacy of resources and staffing	0.380	0.0001
	Nurse/manager ability	0.205	0.001
	Nursing foundations for quality of care	0.192	0.002
	Nurse participation in hospital affairs	0.251	0.0001
Communication with body language	Nurse-physician relations	-0.003	0.960
	Adequacy of resources and staffing	0.127	0.046
	Nurse/manager ability	0.005	0.936
	Nursing foundations for quality of care	0.044	0.485
	Nurse participation in hospital affairs	0.075	0.238

AAC: Augmentative and alternative communication methods; NWI: Nursing work index.

*Spearman test.

Despite recent developments in different communication modes, most ICU nurses in our study tended to use traditional methods, such as verbal communication. Although ICU patients are limited to communicate verbally due to their lower level of consciousness, this method is still widely preferred by many patients due to its ease of use. By attending educational workshops, ICU nurses can learn about AAC methods and health managers can play an important role in this field by providing them with various communication tools [22].

Research has shown that in hospitals with a continuous positive work environment, nurses have lower burnout, lower desire to leave their positions, and lower job dissatisfaction. Better work environments also correlate with the overall quality of patient care [23]. Given the significant relationship between the dimensions of the work environment and the use of AAC methods in our study, attention to nurses' environment should be recognized as a priority. Joolae et al. reported a weak but statistically significant relationship between patients' falls and the nurses' working environment [24]. Although the purpose of our study and their study are different, both studies emphasize the safety of the nursing work environment.

Furthermore, the results of our study confirmed that patient safety culture correlated significantly with the use of AAC methods. Consistently, the result of another study showed that there was a significant relationship between the nurses' communication skills and the patient safety in ICUs [25]. A study showed that the use of communication boards can reduce the anxiety of conscious patients under mechanical ventilation [1]. In a hospital with a favorable patient safety culture, nurses can express their opinions freely, and in cases where an accident is probable to occur due to system problems or human factors, the risks can be reported in time [25]. Research has proved that the problems caused by low patient safety culture among the medical staff caused hospital-acquired infections, medication errors, and patient falling from the bed [26] and nurse withdrawal from the healthcare system [27].

According to the results of the present study regarding the significant relationship between many variables of patient safety culture and the use of AAC methods by nurses, and concerning the role of patient safety culture in increasing safety and improving the quality of nursing care, it seems necessary to increase the focus

Table 5. Association between the usage of AAC methods and HSOPSC dimensions

AAC Methods	HSOPSC Dimensions	r	P*
Verbal communication	Non-punitive response to errors	-0.126	0.048
	Overall perception of continuous improvement/ organizational learning	-0.215	0.001
Written communication	Feedback and communication about errors	0.147	0.020
	Hospital handoff and transitions	0.169	0.008
	Overall perception of continuous improvement/ organizational learning	-0.129	0.042
Communication board use	Feedback and communication about errors	0.210	0.001
	Frequency of reported events	0.209	0.001
	Hospital management support for patient safety	0.182	0.004
	Overall perception of patient safety	-0.161	0.011
Communication with electronic devices	Hospital handoff and transitions	-0.131	0.040
	Hospital management support for patient safety	0.173	0.006
	Non-punitive response to errors	0.244	0.0001
	Overall perception of continuous improvement/ organizational learning	0.139	0.029
Communication with sign language	Teamwork within the department	0.294	0.0001
	Communication openness	-0.218	0.001
	Feedback and communication about errors	-0.130	0.040
Communicating with facial expressions	Overall perception of patient safety	-0.330	0.0001
	Communication openness	-0.179	0.005
	Feedback and communication about errors	-0.177	0.005
	Frequency of reported events	-0.182	0.004
	Hospital management support for patient safety	-0.211	0.001
	Non-punitive response to errors	-0.160	0.011
	Teamwork across hospital departments	-0.170	0.007
Communication with the presence of an interpreter	Communication openness	0.187	0.003
	Feedback and communication about errors	0.199	0.002
	Frequency of reported events	0.133	0.036
Communication with speaking valve use	Feedback and communication about errors	0.147	0.021
	Hospital handoff and transitions	-0.150	0.018
	Hospital management support for patient safety	0.208	0.001
	Non-punitive response to errors	0.222	0.0001
	Teamwork within the department	0.175	0.006

AAC Methods	HSOPSC Dimensions	r	P*
Communication with body language	Hospital handoff and transitions	-0.209	0.001
	Non-punitive response to errors	-0.166	0.009
	Overall perception of patient safety	-0.131	0.039
	Staffing	-0.129	0.042

AAC: Augmentative and alternative communication methods; HSOPSC :Hospital survey on patient safety culture.

*Spearman test.

Note: Only the HSOPSC dimensions with significant association have been reported (P<0.05).

on establishing correct communication to improve patient safety in the ICUs. However, these findings should be further studied. One of the most important limitations of this study was that nurses' heavy workloads in ICUs and their psychological states, which could not be controlled, might have influenced their responses while completing the questionnaire.

Necessary training programs regarding AAC methods should be provided to the ICU nurses in Ahvaz city to foster principled and patient-centered manners in them. Moreover, it is recommended to develop applicable and updated solutions for improving the work environment and patient safety culture in hospitals of Ahvaz city. Further studies using larger sample sizes in other hospital departments are commended to gain a better understanding regarding the use of AAC methods by staff for communication with different patients.

Ethical Considerations

Compliance with ethical guidelines

The study was approved by the Ethics Committee of [Ahvaz jundishapur University of Medical Sciences](#), Ahvaz, Iran (Code: IR.AJUMS.REC.1400.277). Written informed consent was obtained from all samples prior to participation in the study.

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Authors' contributions

Conceptualization and study design: Maedeh Misaghi, Neda Sayadi and Simin Jahani; Data collection: Maedeh Misaghi; Data analysis: Elham Maraghi; Data interpretation: Maedeh Misaghi, Neda Sayadi, Simin Jahani and Elham Maraghi; Writing the original draft: Somayeh Biparva Haghighi, Maedeh Misaghi and Neda Sayadi; Review & editing: Somayeh Biparva Haghighi; Final approval: All authors.

Conflict of interest

The authors declared no conflict of interest.

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