

Effect of Using Nonverbal Communication Method versus Traditional Methods toward Expressing Needs and Satisfaction for Mechanically Ventilated Patients

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Abstract: Background: Critically ill patients in the intensive care unit (ICU) often experience pain, anxiety, fear, dyspnea, and other forms of distress related to ICU interventions and mechanical ventilation. When a patient is intubated and mechanically ventilated, communication is often accomplished through facial expressions, gestures, and/or writing, however, these simple modes of communication are not always effective. Communication board is one of the methods that help patients point to a picture which express their complain
Aim: This study was conducted to evaluate the effectiveness of using nonverbal communication method versus traditional methods toward expressing needs ,anxiety level and satisfaction for mechanically ventilated Patients.
Design: A quasi-experimental study design was used to conduct this study. The study was conducted at cardiothoracic surgery ICU, at Ain Shams University Hospitals affiliated to Ain Shams University. A purposive sample of 80 patients undergoing open heart surgery who were randomly divided into two equal groups
Tools for data collection: Four tools were used in this study. **Tool 1** Patient's characteristics questionnaire. **Tool 2** Anxiety Hamilton scale. **Tool 3** Patient's needs expression assessment questionnaire. **Tool 4** Interviewing patient's satisfaction questionnaire (IPSQ).**Results** there was a statistically significant difference regarding expressing patients' needs using developed communication board rather than traditional methods with highly statistical significance difference as well as the anxiety level has been decreased in intervention group .Also based on (IPSQ) ,85% of study group were satisfied by using the developed communication board compared to 8% of control group with a highly statically significantly difference **Conclusion:** The developed communication board improved the mechanically ventilated patients' ability to express their needs , decreased their anxiety level and increase their satisfaction level with this way of communication. **Recommendations:** communication boards should be used as a standard method in communicating with conscious mechanically ventilated patients and the board should be provided with more pictures that show all patients' need.

Keywords: Developed communication board. Nonverbal communication. Patient on mechanical ventilator. Traditional methods.

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I. Introduction

Communication is a vital element and basic component of nursing in all areas that renders it feasible to exercise all its interventions, including prevention, therapy, rehabilitation, education and health promotion. The nursing process as a scientific method of exercise and performance of nursing is achieved through dialog, in a climate of interpersonal and individual skills of verbal communication. Nursing assessment and diagnosis of the patient could be effected with many methods and complemented by interviews with team members and other health services.^[1]

Due to inability of patient on mechanical ventilation to speak critical care staffs who manage these patients often experience difficulties with one of the most basic human functions: communication, patients with endotracheal are unable to communicate verbally because of the placement of the tube and inflation of the tube's cuff, which prevents passage of air across the vocal cords. Communicating with such intubated patients provides a challenge to both medical and nursing staff who may struggle to meet the patients' psychological and comfort needs, as well as the patients themselves.^[2]

Ventilated conscious patient suffer from anxiety and frustration build and contribute to the negative emotions and feelings of dependency, dehumanization, and futility. Patient on mechanical ventilation had pain along connecting on a machine.^[3]

Critical care nurses can intervene in different ways to interpret nonverbal forms of communication such as mouthing, gesticulating, head nods and writing. Such nonverbal methods not only require energy but are tiring and emotionally draining for patients.^[4,5]

Other communication methods include letter/picture boards, lists of common words or phrases tailored to meet individual patients' needs. Communication board is an example of non-verbal communication methods and ranges from simple pencil and paper to alphabet, word, picture boards to computer keyboards, it includes basic needs (pain thirst, hunger), names of people (family, wife, doctor, friend), and pictures of body parts^[6]

Justification of the study:

From our observation during clinical training of our nursing student in the ICU and reviewing many articles, we noticed that intubated conscious patients on mechanical ventilator at the ICU are often deprived of speech and their ability to communicate, communication with these patients is essential to improve their quality and safety of health care. There is a significant relationship between the loss of speech and severe emotional reactions among ICU patients, such as a high level of frustration, stress, anxiety, and depression. The most commonly used communication methods with critically ill patients, like lip reading, gestures, and head nods are time-consuming, inadequate to meet all communication needs, and frustrating for both patients and nurses. So after reviewing many articles; we found that; Improving communication could be achieved by using a communication algorithm, the use of communication board may enhance and facilitate communication in intubated patients and decrease the level of anxiety and help patients to express and facilitate meeting of their needs easily, and act as a vehicle to obtain recognition of the patients' individuality^[7]. As a result of this we developed a communication board for the conscious mechanically ventilated patients after assessing their basic needs and we want to investigate its effectiveness on patients' ability to express these needs as well as their satisfaction with such a communication board.

Aim of the study:

This study was conducted to evaluate the effectiveness of using nonverbal communication method versus traditional methods toward expressing need, anxiety level and satisfaction for mechanically ventilated patients through the following:

- Designing a nonverbal communication board used by mechanically ventilated patient to express their needs.
- Teaching mechanically ventilated patient the nonverbal communication board prior to mechanical ventilation.
- Comparing between using the developed nonverbal communication board and using the traditional communication methods in identifying the mechanically ventilated patients' need, anxiety level and their satisfaction.

Research Hypothesis:

- Mechanically ventilated patients can express their needs effectively after using the developed communication board compared to patients who used the traditional communication methods.
- Mechanically ventilated patients using the developed communication board will show a lower level of anxiety than patients using traditional communication method for expressing their needs.
- Mechanically ventilated patient using the developed communication board are more satisfied with the communication board rather than patients using the traditional communication methods for expressing their needs.

Operational definition

Traditional methods of nonverbal communication: One of the methods of nonverbal communication, that patient use it when unable to communicate verbally include: gestures, head nodes, mouthing of words, movements of arms and writing.

Nonverbal Communication method:

It is a method of nonverbal communication which can be used to add more than usual methods of speech and writing when these are impaired in case of conscious patient connected with the mechanical ventilator. Communication board is a method of nonverbal communication containing a board with words, pictures it includes basic needs (pain, thirst, hunger), names of people (family, wife, doctor, friend), and pictures of body parts.^[12]

Patient expression:

Ability of the patient to show and explain his\her feeling and complain with understood manner.

II. Subject & methods

Research design: A quasi-experimental study design was used to conduct this study.

Setting: The study was conducted at cardiothoracic surgery I.C.U, at Ain Shams University Hospitals affiliated to Ain Shams University, Cairo, Egypt.

Sample size, type, and technique:

A purposive sample of 80 patient undergoing open heart surgery for the first time, with both sex without any visual or audial impairment , regardless their educational level ,will be ventilated after the surgery, with a fully conscious level and randomly divided into two equal group.

The sample size was determined statistically by power analysis test considering Type I error with significant level $\alpha = 95\%$. & Type II error by power test $\beta = 90\%$.

Tools for data collection:

Four tools were used in this study as following:

1-Patient's characteristics questionnaire: this questionnaire was developed by the researchers and was used to assess patient's demographic data such as: age, sex, level of education and type of operation.

2-Anxiety Hamilton scale : This scale was adapted from **Hamilton (1959)**^[8] and translated into Arabic language by the researchers to assess the level of anxiety in both group (intervention and control) pre operatively prior connecting to the mechanical ventilator before the educational session in both groups and directly after the weaning from the ventilator . This questionnaire was tested for reliability through test-retest reliability, correlation coefficient value was 0.92. **Scoring was as following:** It contains 14 main items, each item is scored on a scale of 0 (not present) to 4 (severe), with a total score range between 0–56, where <17 indicates mild level, 18–24 indicate moderate level and 25–30 indicates severe anxiety level.

3-Patient's needs expression assessment questionnaire: this questionnaire was developed by the researchers to assess patient's ability to express their basic needs in both groups (intervention & control) during the connection to the mechanical ventilator. It comprised 19 statements divided into 6 statements related to sensation that stated by the patient in form of "I feel" and 13 statements related to needs that stated by the patient in form of "I need" .The responses for those statements were either "expressed correctly" or "expressed incorrectly" . The total for each response for all patients was calculated and its percentage was determined.

This questionnaire was tested for reliability through test-retest reliability, correlation coefficient value was 0.90. For the intervention group this questionnaire was accompanied by the developed communication board**.

4-Interviewing patient's satisfaction questionnaire (IPSQ): This tool was adapted from Newcastle satisfaction with nursing scale (NSNS) (**Thomas et al., 2009**)^[11] and modified by the researcher and translated into Arabic language to assess the level of patient's satisfaction, it was divided into 3 main parts:

Part A: Evaluate the general communication for (intervention & control group).

Part B: Evaluate the ability of the patients' expression for his\her needs on mechanical ventilator for (intervention & control group)

Part C: Evaluate the developed communication board for intervention group and traditional methods for control group. This questionnaire was tested for reliability through test-retest reliability, correlation coefficient value was 0.86.

Scoring system: Interviewing patient's satisfaction questionnaire contain 16 statements. All statements were scores on three points: Unsatisfied (1) had score (0>16) ,Neither satisfied nor unsatisfied (2) had score (16 – 31),Satisfied (3) had score (32 - 48) ,With total Satisfaction level as: satisfied $\geq 75\%$ and unsatisfied $< 75\%$.

****Developed Communication board:** This board was adapted from **Vidatak EZ Board developed by Patak 1999**^[9]. It was founded in 20 different language included Arabic language ,but unfortunately it was a words board only ,the picture board was found in the English version so we developed the communication board guided by both Arabic and English version as well as with a guidance of **El-Soussi, Elshafey and Othman 2015**^[10] and modified by the researchers . {*In 1999, Patak developed a communication device called the Vidatak E-Z Board, a dry erase board with preprinted symbols and icons to help patients express an array of feelings and needs. The Vidatak EZ Communication Board is an evidence-based, patient communication board designed by patients and supported by clinical research to improve patient satisfaction, reduce frustration, and improve patient outcomes. They are the perfect communication aid for providing point-of-care, readily available communication resources for patients who are rendered unable to speak. . It was used to assess the ability of the patient to expression his/ her basic needs or during connecting on mechanical ventilation.*}

It was used to help the patient to express his/ her basic needs during connecting on mechanical ventilator in intervention group using pictures and words it included the following : their basic needs as breathing (dyspnea

and need suction) ,eating/drinking, change position ,time and date ,sleeping, personal hygiene, environmental modification(light ,sound, temperature),elimination and emotional support.

Traditional methods of nonverbal communication: It was used to help the patient to express his/ her basic needs during connecting on mechanical ventilator in control group included the following: gestures, mouthing of words, arm movement and writing.

Pilot Study

It was conducted on 10% of the study sample, eight patients, were selected randomly and excluded from the main study sample. Its aim was to evaluate the simplicity, feasibility, applicability, and clarity of the tools. It also helped in estimation of the time needed to fill in the tools. According to the results of the pilot study, simple modifications were done as rephrasing questions or cancelling some questions.

Ethical consideration:

The approval was obtained from Scientific Research Ethical committee in Faculty of Nursing at Ain Shams University before starting the study. Then an official permission was granted from the director of the Ain Shams University Hospital. The researchers introduced themselves to the patients who met the inclusion criteria and the researchers clarified the objectives and aim of the study to the patients included in the study in order to obtain their acceptance to share in this study. The researchers assured maintaining anonymity and confidentiality of the subject data. The researchers ensured that, the study posed no risk or hazards on their health and their participation in the study is voluntary. patients who were willing to participate in the study and met the inclusion criteria were approached by the researchers and asked for verbal consent to confirm their acceptance, and informed that every step occurred during data collection were considered confidential and they can withdraw from the study whenever they want.

III. Study Procedure

This phase includes preparatory phase, Content validity and reliability and field work:

Preparatory phase: It included reviewing of the related literature, and theoretical knowledge of varies aspects of the study using books, articles, periodicals and magazines to develop tools for data collection.

Content validity and reliability: Content validity were ascertained by a group of 5 experts from medical surgical nursing department, Faculty of Nursing, Ain shams university , Cairo ,Egypt Their opinion was elicited regarding the format, layout, consistency, accuracy and relevance of the tools and modification was done. Reliability was estimated statistically for the developed tools by test and re test and correlation coefficient value was determined.

Field work:

The actual work of this study started and completed within 7 months started from (December 2015) and was completed by the end of (July 2016). Data collection was done 3 days/week by researchers in the morning, afternoon and night shifts by rotation.

Assessment phase: done at cardiology department where researchers met each patient in control and intervention group undergoing open heart surgery individually and fill tools of data collection at the first meeting through the following:

Control group: The First 40 patients interviewed were grouped as the control group .The researchers used **tool 1** to assess demographic characteristics which took about 5 minutes to be filled .**Tool 2** were used to assess level of patient's anxiety pre connected to mechanical ventilator before the educational session and the administration time was 10–15 minutes for each patient. **Educational session : information about traditional methods of nonverbal communication** were explained to the control group individually and this was used to express their needs while they were on the mechanical ventilator pre connected to mechanical ventilation and this took about 5 minutes to be explained.

Intervention group: The next 40 patients were grouped as intervention group The researchers used **tool 1** to assess demographic characteristics which took about 5 minutes to be filled .**Tool 2** were used to assess level of patient's anxiety pre connected to the mechanical ventilator before the educational session and the administration time was 10–15 minutes for each patient. **Educational session: developed communication board** was used for teaching patients how to express their needs while they were on the mechanical ventilator pre connected to mechanical ventilator and evaluate their awareness to communication board immediately post educational session and before undergoing the surgery and this took about 20-30 minutes for each patient.

Implementation phase: were done at the cardiothoracic surgery ICU where researchers met each patient who was involved in the control and the intervention group individually after the surgery was performed and the patient was fully conscious and on the mechanical ventilator then the researchers started to observe the patient

while he /she expressing their needs till disconnecting from the mechanical ventilator and fill **tool 3** for both group (control and intervention).

Evaluation phase:

After disconnected from mechanical ventilation both groups (control and intervention) were interviewed by the researchers used **tool 2** to evaluate their anxiety level again as well as **tool4** to evaluate the patient's satisfaction towards expressing their needs by using developed communication board for the intervention group and using the traditional methods for the control group.

Statistical analysis:

The data were analyzed using SPSS version 20.0. The collected data were organized, tabulated and statistically analyzed using the Statistical Package for Social Science (SPSS). Numerical data (quantitative) were presented as mean values. Qualitative data were presented as frequencies (n) and percentages (%). The Chi-square test (χ^2 tests) was used for comparisons regarding qualitative data between the intervention and control groups while Independent-samples t-test of significance was used when comparing between two means.

Results

Table (1): Revealed that: more than half of the intervention group was aged between 18-30 years old (52.5%), while half of the control group patients (50%) aged between 30 -45 years old.

As for gender (70%) of the intervention group and (55%) of control group were males.

Regarding their level of education (55%) of intervention group had a Bachelor degree , while control group (40%) had Bachelor degree .Regarding type of operation about (10%)in both group were having (AVR) , CABG (45%) of intervention group & (35%) of control group and MVR in both group were as (20%).

Table (2) : Represented the comparison between anxiety level for intervention and control group pre connected to the mechanical ventilation and before the educational session and post weaning from the mechanical ventilator for both group , were (50%) of the intervention group and (57%) of the control group were represented with a moderate level of anxiety while after weaning from the mechanical ventilator this result were decreased as only (37.5%) of the intervention group had a moderate level of anxiety with a statistical significance differences ,but half of the control group (50%) still have a moderate level of anxiety with no statistical significance differences

Table (3): clarified the ability of the patients under the study (intervention and control group) to express their needs while they were connected to the mechanical ventilator and it revealed that nearly all the patient in intervention group were be able to express their needs with a highly statistical significant difference between intervention and control group in all items of patient needs list except in their ability to express for eating.

fig (1): illustrated patient's satisfaction level in expressing their need during mechanical ventilation using developed communication board in intervention group and using traditional methods in control group ,there were a highly statistical significant difference regarding interventional group satisfaction 85% than control group 15%

Table (1): Demographic characteristics of the studied group (intervention & control) (n=80)

Items	Intervention Group (n:40)			control Group (n:40)			X ²	P-value
	NO	%	Mean	NO	%	Mean		
Age							T test 1.131	0.265
18 > 30	21	52.5%		15	37.5%			
30 > 45	11	27.5%	44.5	20	50%	40.80		
≤ 45	8	20%		5	12.5%			
Gender							1.920	0.0166*
Male	28	70%		22	55%			
Female	12	30%		18	45%			
level of education							8.310	0.040*
Bachelor	12	30%		16	40%			
Diploma	22	55%		10	25%			
Illiterate	4	10%		10	25%			
Student	2	5%		4	10%			
Operation							15.273	0.033*
AVR	4	10%		4	10%			
CABG	18	45%		14	35%			
MVR	8	20%		8	20%			

(*) p ≤0.05 significant

Table (2): Comparison between the level of anxiety of studied group before connection to the mechanical ventilator (N= 80)

Level of anxiety	Intervention Group(N=40)					Control Group (N=40)						
	pre		post		X ²	P value	pre		Post		X ²	P value
	No	%	No	%			No	%	No	%		
Mild	2	5	14	35	11.40	0.003*	3	7.5	8	20	2.64	0.268
Moderate	20	50	15	37.5			23	57.5	20	50		
Sever	18	45	11	27.5			14	35	12	30		

(*)p ≤ 0.01 highly significant

Table (3): comparison between studied group regarding expressing their needs during mechanically ventilation (n=80)

Patient Needs	Intervention group (N:40) Expression correctly		Control group (N:40) Expression correctly		X ²	P-value
	No.	%	No.	%		
I feel.....						
Dyspnea	36	90	20	50	15.24	0.00009*
Pain	39	97.5	4	10	61.59	0.000018*
Cold	38	95	15	37.5	29.57	0.00000*
hot	30	75	13	32.5	14.53	0.00014*
Thirsty	40	100	9	22.5	50.61	0.00000*
Hungry	5	12.5	4	10	0.13	0.72347*
I need.....						
Suction	38	95	6	15	51.72	0.00000*
lip moistening	40	100	10	25	48.00	0.00000*
Defecation	37	92.5	6	15	48.32	0.00000*
Urination	36	90	17	42.5	20.18	0.00001*
Sleep	40	100	28	70	14.12	0.00017*
Change position	40	100	10	25	48.00	0.00000*
Light off/on	36	90	7	17.5	42.29	0.00000*
To Remove restrains	38	95	11	27.5	38.39	0.00000*
Personal hygiene	39	97.5	17	42.5	28.81	0.00000*
To see the doctor\ nurse	35	87.5	4	10	48.08	0.00000*
To see the family	38	95	3	7.5	61.29	0.00000*
To know the time	40	100	19	47.5	28.47	0.00000*
To know the date	38	95	5	12.5	54.76	0.00000*

(*)p ≤ 0.01 highly significant

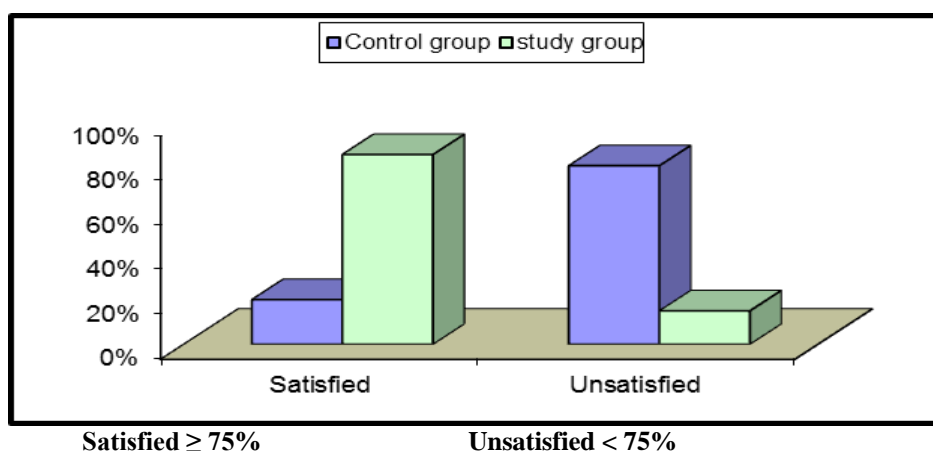


Figure (1): Total Level of patient’s satisfaction about expressing their needs during mechanical ventilation for studied group post weaning from the mechanical ventilator (Total N= 80)

IV. Discussion

The need for effective communication is heightened during critical illness ,when a patient is intubated, communication is often accomplished through facial expressions, gestures, and writing and in many times there is difficult to understood through nurses ,and it could resulting in frustration and anxiety related to the inability to communicate in patients who have been mechanically ventilated.^[13]

Communication board is an effective intervention for decreasing patients' distress and facilitating communication and increasing the patient's satisfaction.^[14]

The current study revealed that more than half of the studied subject age was ranged from 35-50 years old. These findings are in concordance with ^[15] who studied coronary artery bypass grafting outcomes and stated that median age was 40 years old.

ALSO our study found that the male patients represent the great majority. These findings are in concordance with ^[16] who reviewed CABG surgery and stated that the males had increased incidence of arterial grafts than female. From our point of view, this male patient with the age of 40 or higher is the most age in Egypt affected by coronary artery diseases and undergoing a coronary artery bypass grafting surgery.

According to our study ,the anxiety level in the studied group (intervention and control group)before connecting to the mechanical ventilator and before the educational session clarified that almost half of them (in both group) represented with a moderate level of anxiety while after weaning from the mechanical ventilator this findings were decreased in the intervention group with a statistical significance difference .These findings went with **Samuelson, 2011; Treggiari et al., 2009; Hofhuis et al., 2008.**^[17, 18,6]

^[17,18,6]who found that up to 65% of critically ill individuals will undergoing to mechanical ventilation experience increased anxiety due to fear from inability to adequately communicate with their care-givers and family. Also it was supported by **El-Soussi ,Elshafey and Othman 2015**^[10] in their study entitled , Augmented alternative communication methods in intubated COPD patients: Does it make difference and concluded that , communication board as a type of alternative communication methods can improve the level of satisfaction and decrease distress but it did not change mortality in intubated COPD patients.

Furthermore these findings were supported with **Patak et al., 2009**^[3] who reported that the majority of the control group using the paper and pen, as an aid in patient's communication, were not helpful. This may be related to muscular weakness, difficulty with seeing or tiredness where it is very frustrating to write because of fatigue, poor vision, and hand tremors especially in the presence of physical restraints. Moreover, some patients were not educated, as a result of these difficulties of communication control group had high level of anxiety, frustration and distress.

This study declared that there were a statistical significantly difference towards expressing the intervention group their basic needs using the developed communication board during their intubation on the mechanical ventilator period rather than the control group who used the traditional methods. supported by **El-Soussi ,Elshafey and Othman 2015**^[10] in their study entitled , Augmented alternative communication methods in intubated COPD patients: Does it make difference and studied intubated patients as control and study group at the pulmonary critical care unit were the control group involved patients receiving the routine nursing communication practices while the study group involved patients who utilized modified communication board and paper/pen as an augmented alternative communication methods. They discovered that the majority of patients in the study group (63.3%) evaluated communication methods which were used by the researcher as "extremely helpful". While 33.3% and 26.7% of patients in the control group evaluated communication methods which were used by critical care medical and nursing staff in the intended ICU as "Somewhat helpful" and "Helpful", respectively. Statistical significant difference was found between both groups as regards evaluation of communication methods.

Also that was in agreement with **Happ, Tuite, Dobbin, DiVirgilio-Thomas & Kitutu. 2008**^[19]who study traditional methods of non-verbal communication for conscious ventilated patients and stated that Lip reading , head nods and writing more done when patients are intubated . Some nurses cannot understand the patient's needs .In that the most commonly used methods were patient's ease in expression of their demands, and satisfaction of their need on time relieves the patient and helps him/her feel safer was board that help patient to clear express his need.

Current study revealed a statistical significantly increased in patient satisfaction level toward using developed communication board in expressing their basic needs in intervention group more than control group using the traditional communication methods post weaning from the mechanical ventilator.

TenHorn, Elbers, Girbes and Tuinman 2016^[5] who have a study entitled" Communicating with conscious and mechanically ventilated critically ill patients: a systematic review "and stated that: a communication board for intubated patients consists of icons and pictures representing basic needs. This was used with three studies, one retrospective cohort and two quasi-experimental studies ^[20, 12, 22]. The first study, by **Stovsky,Rudy and Dragonette 1988**^[21] stated that a planned communication with a picture board (comprised of 22 Pictures with words) increased patient satisfaction, measured with the visual analog scale on satisfaction with

Communication, in the early postoperative intubation period after cardiac surgery ($p = 0.05$). Of the patients, 70 % ($n = 14$) asked for items not indicated on the board^[23]. The other two studies used a two-sided board with the alphabet, a picture of the human body, and a pain scale combined with sentences^[22] or illustrations^[21]. In the retrospective study by Patak et al.^[12], the majority (97 %; $n = 28$) of patients reported in the structured interviews that the communication board would have been helpful in communicating effectively during mechanical ventilation and it would have decreased their frustration level (29.8 % vs 75.8 %, $p < 0.001$). The study by Otuzoğlu and Karahan(2014)^[20] stated that for 77.8 % ($n = 35$) the illustrated communication material was beneficial for communication between the medical staff and the intubated patients. Of the patients in their intervention group, 91.1 % ($n = 41$) used the alphabetical part of the board. Advantages mentioned by all three studies were an increased efficiency and speed of communicating, decreased frustration, and quicker expression of patients their needs.^[20, 21, 22]

Likewise this result was in the line with Elliot and Wright 2008^[14] who reported that communication board was an effective intervention for decreasing patients' distress and facilitating communication and increasing the patient's satisfaction. After discussing our results and finding our **Research Hypothesis were proven as the** mechanically ventilated patients can express their needs effectively after using developed communication board in comparing of patients who used traditional communication methods.

Mechanically ventilated patient using the developed communication board are more satisfied with the communication board than patients using the traditional communication methods for expressing their needs as well as they showed a lower level of anxiety than those patients using traditional communication method for expressing their needs.

V. Conclusion & Recommendations

Conclusion:

The developed communication board improved the mechanically ventilated patients' ability to express their need, decreased their anxiety level and increase their satisfaction level with this way of communication.

Recommendations:

- Communication boards should be used as a standard method in communicating with conscious mechanically ventilated patients and the board should be provided with more pictures that show all patients' need.
- Further studies should be done to assess the effect of communication board on other physiological and psychological parameters.

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