# Effect of Communication Board on Clinical Outcomes for Mechanically Ventilated Patients Post Open Heart Surgeries

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## Abstract

**Background:** Communication impairment occurs in mechanically ventilated patients Absence of efficient communication causes anxiety, fear and insecurity for patients post open heart surgeries. **Aim:** Evaluate the effect of using communication board on clinical outcomes for mechanically ventilated patients post open heart surgeries. **Design:** A quasi- experimental research design. **Setting:** conducted at Surgical Intensive Care Unit at Tanta International Teaching Hospital. **Subjects:** A Purposive sample of 60 adult mechanically ventilated patients underwent open heart surgeries were selected from the previously mentioned setting. **Tools:** two tools were used in the process. **Tool (I):** open heart surgery patients' assessment tool. **Tool (II)**: clinical outcomes assessment ttool**. Result:** revealed that 13.33% of the study group compared to (50%) of the control group suffered from severe pain. While (6.67%) of study group compared to (30.00%) of the control group had respiratory distress. Additionally, (73.33%) of the study group compared to (20.00%) of the control group were satisfied with using communication board. significant differences were found between the two groups regarding pain level, respiratory distress level, and satisfaction. **Conclusion:** communication board is a cost effective nursing strategy which helped in improving clinical outcomes for patients open heart surgeries. **Recommendation:** Replication of the study on a larger sample size and with long term follow up can validate and help generalize the results.

**Key words:** Communication board, Clinical outcomes, Open heart surgeries.

## Introduction

Open heart surgeries are surgeries on the heart and great vessels performed by cardiac surgeons. It is often used to treat complications of ischemic heart diseases such as, coronary artery bypass grafting, correct congenital heart diseases, or treat valvular heart diseases from various causes, including endocarditis, rheumatic heart diseases, and atherosclerosis. It also includes heart transplantation **(Libertini & Evans, 2024).**

Coronary artery bypass graft (CABAG) surgery is among the most common performed open heart surgeries operations performed in the world with more than 500,000 surgeries performed each year **(Awad, Ahmed, Mohamed, & Rais, 2024).**

The number of open- heart surgeries performed in Egypt in 2023 is about 69 thousand cases **(Elbadawi et al., 2020).** In Surgical Intensive Care Unit at Tanta International Teaching Hospital (2023), about 100 patients underwent open heart surgeries **(Tanta Statistical Health Records, 2023).**

Patients undergoing open heart surgeries still intubated for up to 24 hours after cardiac surgery to provide sufficient oxygen and ventilation, to protect the lungs and ensure the stability of the patient's clinical condition. Communication impairment occurs due to the placement of an endotracheal tube in the throat, which obstructs airflow between the vocal cords. **(László et al., 2022).**

Communication impairment presents a common distressing problem for patients who receive MV and for the health care providers especially critical care nurses. Absence of efficient communication causes anxiety, fear and insecurity for mechanically ventilated patients **(McClintock et al., 2024).**

Communication with mechanically ventilated patients is essential to improve the quality and safety of health care. It is an important factor to assess pain and other symptoms and help critically ill patients to participate in treatment decisions **(Patel et al., 2023).**

There is a significant relationship between the loss of speech, high level of stress, anxiety, and depression among ICU patients. Current practice in the ICU is to use less sedation in mechanically ventilated patients, which increases the number of patients potentially able to communicate while mechanically ventilated and awake **(Halpern, 2024).**

Numerous traditional and simple methods of communication used by critical care nurses such as eye blinking, lip reading, gestures, and head nods are time-consuming, inadequate to meet all communication needs, and frustrating for both patients and nurses **(Piekarski, Rohner, Monsefi, Bakhtiary, & Velten, 2024).**

Communication board is a method of communication used for intubated patients. It consists of icons and pictures representing patients' basic needs. It also, ranges from simple pencil and paper to alphabet, words, and pictures to computer keyboards **(Kuruppu, Chaboyer, Tobiano, Abayadeera, & Ranse, 2023).**

Communication board includes basic needs of patients, such as pain, dyspnea, suction, thirst, hunger, need for changing position, sleeping, personal hygiene, environmental modification (light, sound, temperature), knowing date and time, images of body parts, and names of people such as family, wife, doctor, friend **(Karlsen et al., 2023).**

Communication board helps enhancing communication, meet patient's needs, assess and treat pain appropriately, decrease anxiety level, improve quality of care and decrease the length of patient stay in the ICUs. Also, communication board increases patient's satisfaction, decreases frustration, and allows quicker expression of patient's needs **(Salem & Ahmad 2018).**

Critical care nurses play vital roles in communicating with mechanically ventilated conscious patients. Effective communication is a basic part of qualified nursing care and is an important factor in playing an appropriate nursing role in intensive care units, where the hospitalization experience is unpleasant **(Hosseini, Valizad-Hasanloei, & Feizi, 2018)**.

Critical care nurses who are familiar and well trained with using communication board could probably lead to an increase in the quality of patient care. Patients may become more satisfied, comfortable, and cooperative with the staff, experience less pain and agitation **(Holm, Viftrup, Karlsson, Nikolajsen, & Dreyer, 2020).**

**Significance of the study**

Patients with open heart surgery suffer from communication impairment due to presence of an endotracheal tube. Loss of speech leads to high level of stress, anxiety, and depression among ICU patients. Communication enable critical care nurses in meeting patients' needs and improving clinical outcomes. Additionally, the use of communication board may enhance and facilitate communication in intubated patients, decrease the level of anxiety, help patients to express their needs easily, and act as a vehicle to obtain recognition of the patients' individuality. Therefore, the present study aimed to evaluate the effect of using communication board on clinical outcomes of mechanically ventilated patients post open heart surgeries.

**Aim of the study:**

Evaluate the effect of using communication board on clinical outcomes for mechanically ventilated patients post open heart surgeries.

**Research hypothesis**

Study group patients who are exposed to communication board will exhibit reduction of pain level, reduction of respiratory distress level, improvement of hemodynamic parameters, and increase patient's satisfaction than control group patients who will not.

**Subjects and method**

**Study design:**

Quasi-experimental research design was used to conduct the current study. It is a type of research design that resembles an experimental study but lacks random assignment of participants to experimental and control groups. Characteristics, Use of Comparison Groups. No Random Assignment, real-World Application.

**Study setting:**

The study was conducted at Surgical Intensive Care Unit at Tanta International Teaching Hospital affiliated to Ministry of Higher Education and Scientific Research. This unit contained 9 beds.

**Study subjects**

A Purposive sample of 60 adult mechanically ventilated patients underwent open heart surgeries were collected from the previously mentioned setting. The sample size was calculated through Steve Thompon equation for calculating the sample size, assuming total number of patients admitted to ICU per year in 2022. Nearly 100 patients are admitted per year. The sample size was calculated as the following:

Z= confidence level 95%, d=Error proportion (0.05), p= population (80%), assuming total numbers of patient's admission. The specificity of the four scores was 90%. So, the study sample was 60 patients.

The adult patients were divided into two equal groups, 30 patient in each group as follows:

- **Control group:** consisted of 30 patients who received routine care of the intensive care unit for communication such as head nodding and lip reading.
- **Study group:** consisted of 30 patients who received communication board that was implemented by the researcher with the routine care of the intensive care unit.

**The inclusion criteria were as follows;**

Adult patients aged 21-60 years old of both sex. Patients need mechanical ventilation for more than 6 hours. Fully conscious patients who are able to communicate. Spontaneous mode of ventilation such as synchronized intermittent mandatory ventilation (SIMV) continuous positive airway pressure (CPAP), bi-level positive airway pressure (Bi-PAP), pressure support ventilation (PSV).

**The exclusion criteria were as follows;**

Patients suffering from blindness, deafness, and cognitive impairment by review of medical history, including past illnesses, medications, and family history of cognitive disorders. Discussion of symptoms, such as memory loss, confusion, difficulty with problem-solving, or language problems. Asking Functional assessment: Evaluating daily activities like managing finances, cooking, and self-care.

**Tools of data collection**

Two tools were used to collect data:

**Tool I: Open Heart Surgery Patients' Assessment Tool**

This tool was developed by the researcher after reviewing the related literature **(Royse et al., 2022; Wang, Ma, & Li, 2024).** This tool consisted of two parts as the following:

**Part A: Patient's Biosocio-demographic Data**

This part included age, gender, marital status, educational level, current diagnosis, name of surgery, past medical history.

**Part B: Ventilator Profile Assessment**

This part was used to assess ventilator mode and ventilator parameters such as $FiO_2$, tidal volume, respiratory rate, and positive end expiratory pressure.

**Tool II: Clinical Outcomes Assessment Tool:**

This tool consisted of four parts as follows

**Part A: Behavioral Pain Scale (BPS)**

This scale was developed by **Wojnar-Gruszka et al., 2022** to assess the level of patient's comfort, and intensity of pain among critically ill conscious mechanically ventilated patients. It composed of 3 observational items (facial expressions, body movement, and compliance with mechanical ventilation) that are scored from 1 to 4, with higher numbers indicating higher levels of discomfort**.**

**Scoring System**

- Each subsection is scored from 1 to 4, with higher numbers indicating higher levels of discomfort and pain.
- The total score for behavioral pain scale can range from 3 (no pain) to 12 (the most severe pain).
- The total scores were categorized into three levels:
  - No pain ≤ 3
  - Mild pain = 4- 6
  - Moderate pain = 7 – 9
  - Severe pain = > 9 score

**Part B: Respiratory Distress Observation Scale (RDOS)**

This scale was developed by **Decavèle et al., 2023** and used by the researcher to assess dyspnea in unconscious or mechanically ventilated patients who are unable to self-report dyspnea. It was also used to assess respiratory distress during the weaning from mechanical ventilation. This scale had eight observer-rated parameters: heart rate, respiratory rate, and accessory muscle use, and paradoxical breathing pattern, restlessness, grunting at end-expiration, nasal flaring, and fearful facial expression.

**Scoring system**

- Each parameter is scored from 0 to 2 points and the points are summed.
- Scale scores range from 0 signifying no distress and 16 signifying the most severe distress.
- Respiratory Comfort: is respiratory distress observation scale <3.
- Respiratory Distress: is respiratory distress observation scale score ≥3.

**Part C: Patient Satisfaction Questionnaire (PSQ):**

This part was developed by the researcher after reviewing the related literature **(Mousazadeh, Yektatalab, Momennasab, & Parvizy, 2019)** to assess the patient's satisfaction regarding communication. It consisted of 10 items. The patient will choose one from 5-point Likert scale as follows: 1 = Very dissatisfied, 2 = dissatisfied, 3 = undecided, 4 = satisfied and 5 = very satisfied.

**Part D: Hemodynamic Parameters Assessment Sheet**

This part was developed by the researcher after reviewing the related literature **Abdelghani, Nunes, Anwar, & Prendergast, 2024)** and it was used to assess heart rate, respiratory rate, blood pressure, oxygen saturation, mean arterial pressure (MAP), and oxygen saturation ($SpO_2$). Mean and standard deviation of the previously mentioned items were calculated.

## Method

**1. Administrative process:**

A written approval to conduct the study was obtained from the responsible authority at Faculty of Nursing, Tanta University to the director of Surgical Intensive Care Unit at Tanta International Teaching Hospital.

**2. Ethical and legal considerations:**

- Scientific research ethical committee approval of the Faculty of Nursing and Faculty of Medicine at Tanta University were obtained and the code number was (4-3-2022).
- Nature of the study was not causing any harm or pain to the entire subjects.
- Confidentiality of data and privacy of the patients were taken into consideration regarding data collection.
- Patients' written informed consent to participate in this study was obtained after explaining the aim of the study. All participants were informed about the purpose of the study and the right to withdraw from the study at any time if desired.

**3. Tool development**

Tool I and tool II part c and d were developed by the researcher after extensive review of the relevant literature **(Abdul-Rahman et al., 2023; Ball, Lee, Kaminsky, & Hameed, 2022)**.

**4. Validity of the tools.**

The developed tools were tested for content validity by nine jury of experts in the field of Critical Care Nursing at the Faculty of Nursing, Tanta University, Cardiothoracic surgeons and Intensivists at the Faculty of Medicine, Tanta University.

**5. Reliability of the tools**

- The reliability was done on the developed tools (tool I and tool II part (a) and (d)) by Cronbach alpha test and the result was 0.950.
- Reliability of behavioral pain scale was found to be 0.71 **(Wojnar-Gruszka et al., 2022**).
- Reliability of Respiratory Distress Observation Scale was found to be 64% **(Decavèle et al., 2023)**.

**6. Pilot study**

A pilot study was carried out on (10%) 6 patients who attended at Surgical Intensive Care Unit of Tanta international teaching Hospital. The purpose of the pilot study was to test the tool for its relevance, clarity and organization and to determine the length of time needed to collect the data from each patient, since only a minor modification was done, so the patients of the pilot study were excluded from the actual study.

**7. Data collection**

Data was collected over a period of 10 months, started from the beginning of December 2022 to the end of September 2023.

**8. Phases of the actual study**

The present study was conducted on four phases.

**I. Assessment phase**

Immediately upon admission, initial assessment was carried out by the researcher for all study subjects in both control and study groups to assess the patients who met the inclusion and exclusion criteria of the study. The assessment was done by using tool I to collect baseline data.

**Tool I Part (a, b)**

It was used to collect data from patients, patient's family, health care team, and patients' medical records and by the researcher's observation immediately upon admission to collect baseline data. It was used to collect the following data:

Assessment of the patients' Socio-demographic characteristics tool I (part a) which included age, gender, marital status and educational level**.**

Assessment of the patients' clinical data of studied patients tool I (part b) which included current diagnosis, name of the operation, past medical history, and past surgical history.

**II. Planning phase**

This phase was formulated based on assessment phase and literature review. Priorities and expected outcome criteria were put when planning patient care. Also, this phase included preparation of the communication board. The communication board was prepared and was printed on A3 paper (to be easy for the patient to see it) and it was stucked to a rigid carton and covered with a transparent plastic layer to be easily disinfected. Communication board is 42 cm in height and 30 cm in width.

**Expected outcome criteria include**

- Decrease severity of pain
- Decrease severity of dyspnea
- Maintain stable hemodynamic parameters
- Increase patients' satisfaction

**III. Implementation phase**

**Control group:** received routine care of the intensive care unit for communication such as head nodding and lip reading.

**Study group:** received communication board that was implemented by the researcher with the routine care of the intensive care unit.

**Nursing interventions for using communication board include the following**

- Modifying patient's environment (Maintain eye contact, provide adequate room light and control noise).
- Provide complete explanations of all procedures to decrease patient's anxiety and gain cooperation.
- Convey calm reassuring and confident approach.
- Maintain patience if patient gets frustrated or angry.
- Provide the patient with his/ her hearing aids and glasses to facilitate communication.
- Use communication board:
- Communication board was prepared in Arabic language and contained pictures and word headings ‘‘I Am’’ and ‘‘I Want’’ with descriptive words listed under each picture to be suitable for patients who can read and write and other illiterate patients.
- It also contained the Arabic alphabets and numbers 0–9.
- It also contained two drawings: one anterior view and one posterior view of the human body within a box entitled ‘‘pain chart’’ which contained descriptive expressions of pain.
- In addition, it involved a vertical pain scale from 0 to 10 which was utilized to determine the level of pain.


**Communication board Campbell-Salome, et al ., (2023).**


**Communication board related to painDS (2020).**

## IV. Evaluation phase

Evaluation was done for both study and control groups by using tool II to evaluate the effect of using communication board on clinical outcomes among mechanically ventilated patients underwent open heart surgeries. Evaluation was done for both study and control groups throughout the period of patient's connection to the ventilator.

**Statistical analysis of data**

The study data were computerized and verified using the SPSS (Statistical Package for Social Science) version 20 to perform tabulation and statistical analysis Quantitative data were summarized by the arithmetic mean and standard deviation**.**

All statistical analysis was done using two tailed test and alpha error of 0.05 p value less than or equal to 0.05 was considered to be statistically significant.

Frequency tables and cross tabulations with percentages were used to illustrate the result of categorical data and tested by chi square (x2) Correlation analysis: Pearson correlation is used to test nature and strength of relation between three quantitative /ordinal variables. The sign of the coefficients indicates the nature of relation as follows: week correlation for (r) less than 0.25, intermediate. FRIEDMAN'S, A. B. R. (2023).

**Results**

**Table (1): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries regarding their socio-demographic characteristics**

Regarding age, it was observed that the mean age of the control group was 48.73±13.13 years, while it was 48.73±10.78 years in the study group. Regarding gender, more than half of the study group and the control group were males. In relation to marital status, nearly three fourths (70.00%) of the study group compared to (73.33%) of the control group were married. Regarding educational level, it was observed that an equal proportion (20%) of the study group and the control group had primary and secondary education. No statistically significant differences were found between the two groups regarding age, gender, marital status, and level of education where p> 0.05 for each.

**Table (2): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries Regarding their current diagnosis**

Regarding current diagnosis, this table presented that an equal proportion (80.00%) of the study and the control groups had myocardial infarction. So, the same proportion (80.00%) had coronary artery bypass graft surgery. Regarding past medical history, half of the study group compared to 43.33% of the control group had diabetes mellitus. While an equal proportion (33.33%) of the study and the control groups had cardiac diseases. No statistically significant differences were found between the study and the control groups regarding current diagnosis, past medical and past surgical history where p> 0.05

**Table (3): Mean scores of ventilator parameters of the studied patients on Mechanically Ventilated Post Open Heart Surgeries**

As regard to ventilator parameters, it was observed that mean± SD of fraction of inspired oxygen ($FiO_2$) was 98.00±0.00 for the study and control groups. As for tidal volume it was observed that the mean± SD of tidal volume was 540.67±24.22 for the study and control groups. While mean± SD of set ventilator rate was 13.00±1.17 and 12.67±0.75 for the study and the control group, respectively. Also, this table reveals that positive end expiratory pressure (PEEP) was 6.60±0.81 for the study group and control group. No statistical significant differences were found between the study and the control groups regarding ventilator parameters where p> 0.05.

**Table (4): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries regarding their total behavioural pain level (BPS)**

Concerning total behavioural pain level (BPS), this table concludes that more than half (53.33%) of the study group compared to tenth of the control group suffered from mild pain. While 13.33% of the study group compared to half of the control group suffered from severe pain. Statistically significant difference was found between the two groups regarding total behavioural pain level while p < 0.05.

**Table (5): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries regarding their total respiratory distress (RDOS) level**

Regarding total respiratory distress level (RDOS), this table concludes that minority of the study group (6.67%) compared to nearly one third (30.00%) of the control group had respiratory distress. While 13.33% of the study group compared to nearly half (46.67%) of the control group suffered from severe respiratory distress. Statistically significant difference was found between the two groups regarding total respiratory distress level while p < 0.05.the pain was decreased when used communication board

**Table (6): Mean scores of hemodynamic parameters of the studied patients on Mechanically Ventilated Post Open Heart Surgeries**

This table revealed that mean± SD of heart rate was 84.03±5.54 b/m and 108.27±5.52 b/m for the study group and the control group, respectively. While mean± SD of respiratory rate

was 14.67±1.65 c/m for the study group compared to 27.80±3.51 c/m for the control group. Concerning blood pressure, this table concluded that mean± SD of systolic blood pressure was 116.90±5.97 mmHg and 148.70±12. mmHg, respectively.

While mean ± SD of diastolic blood pressure was 66.27±7.48 mmHg of the study group compared to 75.83±11.79 mmHg of the control group. Additionally, mean± SD of mean arterial pressure (MAP) was 82.17±8.91 mmHg and 98.67±13.10 mmHg for the study group and the control group, respectively. Concerning saturation of peripheral oxygen (SpO2), it is observed that mean± SD of SpO2 was 98.90±0.54 for the study group and 86.37±3.81 of the control group. Statistically significant differences were found between the two groups regarding heart rate, respiratory rate, systolic blood pressure, diastolic blood pressure, and mean arterial pressure, and saturation of peripheral oxygen (SpO2) while $p < 0.05$ for each.

**Figure (1): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries regarding their satisfaction level (PSQ)**

In relation to satisfaction level (PSQ), nearly two thirds (73.33%) of the study group compared to one fifth (20.00%) of the control group patients were satisfied. Statistically significant difference was found between the two groups regarding satisfaction level while $p < 0.05$.

**Table (7): Percentage comparison between behavioural pain level (BPS) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their respiratory distress level (RDOS) and satisfaction level (PSQ)**

This table showed that there were positive significant relations between behavioural pain levels and respiratory distress levels within the study group with P=0.009. On the other hand, there were negative relations between behavioural pain levels and respiratory distress levels within the control group with P=0.801. Also, negative relations were found betweenbehavioural pain levels satisfaction levels within the study group and the control group with P>0.05 for each.

**Table (8): Association between total behavioural pain score (BPS) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their socio-demographic characteristics**

This table concludes that no significant associations were observed within the studied patients regarding biosocio-demographic characteristics (age, gender, educational level, and type of surgery) and their behavioural pain scores where p>0.05 for each.

**Table (9): Association between total respiratory distress level (RDOS) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their socio-demographic characteristics studied**

This table concludes that no significant associations were observed within the studied patients regarding biosocio-demographic characteristics (age, gender, educational level, and

type of surgery) and their respiratory distress level where p>0.05 for each.

**Table (10): Association between total satisfaction level (PSQ) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their socio-demographic characteristics**

This table reveals that no significant associations were observed within the studied patients regarding biosocio-demographic characteristics (age, educational level, and type of surgery) and their respiratory distress level where p>0.05 for each. While significant association was observed within the study group patients regarding gender and their respiratory distress level where p>0.05. So, this table reveals that female patients were more satisfied.

**Table (1): Distribution of the studied patients on mechanically ventilated post open heart surgeries regarding their socio-demographic characteristics**

| Characteristics | The studied patients (n=60) | | | | $\chi^2$ P |
|---|---|---|---|---|---|
| | Study group (n=30) | | Control group (n=30) | | |
| | N | % | N | % | |
| **Age (in years)** | | | | | |
| - (21-<30) | 4 | 13.33 | 6 | 20.00 | 1.709 0.426 |
| - (40-<50) | 5 | 16.67 | 2 | 6.67 | |
| - (50-60) | 21 | 70.00 | 22 | 73.33 | |
| Range Mean ± SD | (20-60) 48.73±10.78 | | (21-60) 48.73±13.13 | | t=0.00 P=1.00 |
| **Gender** | | | | | |
| - Male | 17 | 56.67 | 16 | 53.33 | FE 0.606 |
| - Female | 13 | 43.33 | 14 | 46.67 | |
| **Marital status** | | | | | |
| - Single | 6 | 20.00 | 5 | 16.67 | 0.114 0.945 |
| - Married | 21 | 70.00 | 22 | 73.33 | |
| - Widow | 3 | 10.00 | 3 | 10.00 | |
| **Educational level** | | | | | |
| - Read and write | 3 | 10.00 | 0 | 0.00 | 3.273 0.351 |
| - Primary | 6 | 20.00 | 6 | 20.00 | |
| - Secondary | 6 | 20.00 | 6 | 20.00 | |
| - University | 15 | 50.00 | 18 | 60.00 | |

**Control group:** receive routine hospital care such as head nodding

**Study group:** undergo communication board that implemented by the researcher

FE: Fisher' Exact test

**Table (2): Distribution of the studied patients on mechanically ventilated post open heart surgeries regarding their clinical data**

| Clinical data | The studied patients (n=60) | | | | $\chi^2$ P |
|---|---|---|---|---|---|
| | Study group (n=30) | | Control group (n=30) | | |
| | N | % | N | % | |
| **Current Diagnosis** | | | | | |
| - Myocardial infarction | 24 | 80.00 | 24 | 80.00 | FE |
| - Rheumatic heart diseases | 6 | 20.00 | 6 | 20.00 | 1.00 |
| **Type of surgery** | | | | | |
| - Coronary artery bypass grafting (CABG) | 24 | 80.00 | 24 | 80.00 | FE |
| - Heart valve repair/replacement | 6 | 20.00 | 6 | 20.00 | 1.00 |
| **Past medical history** | | | | | |
| - Hypertension | 7 | 23.33 | 9 | 30.00 | |
| - Diabetic mellitus | 15 | 50.00 | 13 | 43.33 | 0.393 |
| - Atherosclerosis | 1 | 3.33 | 1 | 3.33 | 0.996 |
| - Cardiac disease | 6 | 33.33 | 6 | 33.33 | |
| - Endocrine disease | 1 | 3.33 | 1 | 3.33 | |

**Control group:** receive routine hospital care such as head nodding
**Study group:** undergo communication board that implemented by the researcher
FE: Fisher' Exact test

**Table (3): Mean scores of ventilator parameters of the studied patients on Mechanically Ventilated Post Open Heart Surgeries**

| Ventilator parameters | The studied patients (n=60) Range Mean ± SD | | t P |
|---|---|---|---|
| | Study group (n=30) | Control group (n=30) | |
| - Fraction of inspired oxygen ($FiO_2$) | (40-100) 98.00±0.00 | (40-100) 98.00±0.00 | - |
| - Tidal volume | (480-550) 540.67±24.22 | (480-550) 540.67±24.22 | 0.00 1.00 |
| - Set ventilator rate | (12-20) 13.00±1.17 | (12-20) 12.67±0.75 | 1.306 0.197 |
| - Positive end expiratory pressure (PEEP) | (5-7) 6.60±0.81 | (5-7) 6.60±0.81 | 0.00 1.00 |

**Table (4): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries regarding their total behavioral pain level (BPS)**

| Behavioral Pain (BPS) level | The studied patients (n=60) | | | | $\chi^2$ P |
|---|---|---|---|---|---|
| | Study group (n=30) | | Control group (n=30) | | |
| | N | % | N | % | |
| - Absence pain | 0 | 0.00 | 0 | 0.00 | |
| - Mild pain | 16 | 53.33 | 3 | 10.00 | 15.445 |
| - Moderate pain | 10 | 33.33 | 12 | 40.00 | 0.000* |
| - Severe pain | 4 | 13.33 | 15 | 50.00 | |
| Range | (4-12) | | (4-12) | | F=13.46 |
| Mean ± SD | 4.57±2.27 | | 8.77±2.37 | | P=0.001* |

(3) Absence pain, (4) Mild pain, (5-7) Moderate pain, (8-12) Severe pain

Control group: receive routine hospital care such as head nodding

Study group: undergo communication board that implemented by the researcher

* Statistically significant at level P<0.05.

**Table (5): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries regarding their total respiratory distress level (RDOS)**

| RDOS Level | The studied patients (n=60) | | | | $\chi^2$ P |
|---|---|---|---|---|---|
| | Study group (n=30) | | Control group (n=30) | | |
| | N | % | N | % | |
| - No distress | 14 | 46.67 | 5 | 16.67 | |
| - Respiratory Comfort | 10 | 33.33 | 2 | 6.67 | 19.607 |
| - Respiratory distress | 2 | 6.67 | 9 | 30.00 | 0.000* |
| - Most severe distress | 4 | 13.33 | 14 | 46.67 | |
| Range | (0-16) | | (0-16) | | F=18.34 |
| Mean ± SD | 3.27±5.72 | | 10.17±6.72 | | P=0.000* |

**Control group:** receive routine hospital care such as head nodding

**Study group:** undergo communication board that implemented by the researcher

* Statistically significant at level P<0.05.

**Table (6): Mean scores of hemodynamic parameters of the studied patients on Mechanically Ventilated Post Open Heart Surgeries**

| Hemodynamic Parameters | The studied patients (n=60) Range Mean ± SD | | t P |
|---|---|---|---|
| | Study group (n=30) | Control group (n=30) | |
| - Heart rate (60-100 b/min) | (74-95) 84.03±5.54 | (100-118) 108.27±5.52 | 16.995 0.000* |
| - Respiratory rate (16 -20 c/min) | (12-17) 14.67±1.65 | (21-36) 27.80±3.51 | 18.606 0.000* |
| - Blood pressure – Systolic (120±20) | (105-126) 116.90±5.97 | (110-170) 148.70±12.23 | 12.789 0.000* |
| – Diastolic (80±15) | (52-82) 66.27±7.48 | (52-95) 75.83±11.79 | 3.750 0.000* |
| - MAP (70-100 mmHg) | (46-95) 82.17±8.91 | (50-113) 98.67±13.10 | 5.704 0.000* |
| - Saturation of peripheral oxygen ($SpO_2$) | (98-100) 98.90±0.54 | (80-94) 86.37±3.81 | 17.876 0.000* |

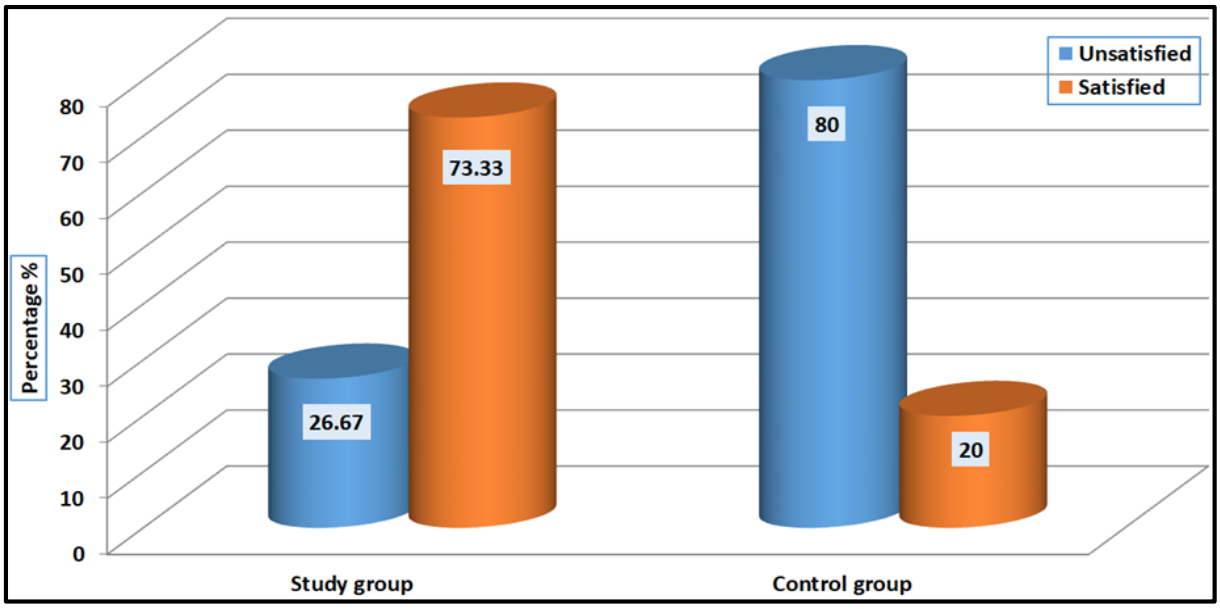


**Figure (1): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries regarding their satisfaction level (PSQ)**

**Table (7): Percentage comparison between behavioural pain level (BPS) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their respiratory distress level (RDOS) and satisfaction level (PSQ)**

| | The studied patients (n=60) Behavioral pain level (BPS) level | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Study group (n=30) | | | | | | Control group (n=30) | | | | | |
| | Mild pain | | Moderate pain | | Severe pain | | Mild pain | | Moderate pain | | Severe pain | |
| | N | % | N | % | N | % | N | % | N | % | N | % |
| **Respiratory distress level** | | | | | | | | | | | | |
| - No distress | 9 | 30.00 | 5 | 16.67 | 0 | 0.00 | 0 | 0.00 | 2 | 6.67 | 3 | 10.00 |
| - Respiratory comfort | 4 | 13.33 | 4 | 13.33 | 2 | 6.67 | 0 | 0.00 | 1 | 3.33 | 1 | 3.33 |
| - Respiratory distress | 0 | 0.00 | 0 | 0.00 | 2 | 6.67 | 2 | 6.67 | 4 | 13.33 | 3 | 10.00 |
| - Most severe distress | 3 | 10.00 | 1 | 3.33 | 0 | 0.00 | 1 | 3.33 | 5 | 16.67 | 8 | 26.67 |
| $\chi^2$ , P | 16.974, 0.009* | | | | | | 3.060 , 0.801 | | | | | |
| r , P | 0.097, 0.611 | | | | | | 0.059 , 0.758 | | | | | |
| **Satisfaction level** | | | | | | | | | | | | |
| - Unsatisfied | 5 | 16.67 | 2 | 6.67 | 1 | 3.33 | 2 | 6.67 | 10 | 33.33 | 12 | 40.00 |
| - Satisfied | 11 | 36.67 | 8 | 26.67 | 3 | 10.00 | 1 | 3.33 | 2 | 6.67 | 3 | 10.00 |
| $\chi^2$ , P | 0.405 , 0.817 | | | | | | 0.417 , 0.812 | | | | | |
| r , P | 0.076 , 0.689 | | | | | | -0.074 , 0.696 | | | | | |

**Control group:** receive routine hospital care such as head nodding

**Study group:** undergo communication board that implemented by the researcher

FE: Fisher' Exact test

**Table (8): Association between total behavioural pain score (BPS) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their biosocio-demographic characteristics**

| Characteristics | The studied patients (n=60) Behavioural pain score (BPS) Mean ± SD | | | |
|---|---|---|---|---|
| | Study group (n=30) | F/t P | Control group (n=30) | F/t P |
| **Age (in years)** | | | | |
| - (21-<30) | 5.00±1.16 | 0.147 | 9.00±1.67 | 1.057 |
| - (40-<50) | 5.80±3.03 | 0.864 | 7.00±4.24 | 0.361 |
| - (50-60) | 5.62±2.31 | | 7.50±2.39 | |
| **Gender** | | | | |
| - Male | 5.29±2.37 | 0.557 | 7.79±2.58 | 0.002 |
| - Female | 5.92±2.18 | 0.462 | 7.75±2.27 | 0.968 |
| **Educational level** | | | | |
| - Read and write | 7.00±2.00 | | - | |
| - Primary | 4.67±1.03 | 1.921 | 6.00±1.67 | 2.843 |
| - Secondary | 7.00±2.97 | 0.151 | 9.00±1.67 | 0.076 |
| - University | 5.07±2.15 | | 7.94±2.51 | |
| **Type of surgery** | | | | |
| - CABG | 5.21±1.98 | 3.221 | 7.46±2.45 | 2.102 |
| - Heart valve repair/replacement | 7.00±2.97 | 0.084 | 9.00±1.67 | 0.158 |

**Control group:** receive routine hospital care such as head nodding

**Study group:** undergo communication board that implemented by the researcher

**Table (9): Association between total respiratory distress level (RDOS) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their socio-demographic characteristics**

| Characteristics | The studied patients (n=60) Respiratory distress level (RDOS) Mean ± SD | | | |
|---|---|---|---|---|
| | Study group (n=30) | F/t P | Control group (n=30) | F/t P |
| **Age (in years)** | | | | |
| - (21-<30) | 4.50±7.68 | 4.542 | 9.33±7.47 | 0.451 |
| - (40-<50) | 9.20±8.44 | 0.090 | 14.50±2.12 | 0.641 |
| - (50-60) | 1.62±3.53 | | 10.00±6.84 | |
| **Gender** | | | | |
| - Male | 2.53±5.22 | 0.643 | 11.71±6.32 | 1.414 |
| - Female | 4.23±6.41 | 0.429 | 8.81±6.96 | 0.244 |
| **Educational level** | | | | |
| - Read and write | 1.33±1.16 | | - | |
| - Primary | 0.33±0.82 | 1.124 | 6.50±7.12 | 1.430 |
| - Secondary | 2.83±5.53 | 0.358 | 9.33±7.47 | 0.257 |
| - University | 5.00±6.98 | | 11.67±6.18 | |
| **Type of surgery** | | | | |
| - CABG | 3.38±5.88 | 0.042 | 10.38±6.67 | 0.112 |
| - Heart valve repair/replacement | 2.83±5.53 | 0.840 | 9.33±7.47 | 0.740 |

**Control group:** receive routine hospital care such as head nodding
**Study group:** undergo communication board that implemented by the researcher

**Table (10): Association between total satisfaction level (PSQ) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their socio-demographic characteristics**

| Characteristics | The studied patients (n=60) Satisfaction level (PSQ) Mean ± SD | | | |
|---|---|---|---|---|
| | Study group (n=30) | F/t P | Control group (n=30) | F/t P |
| **Age (in years)** | | | | |
| - (21-<30) | 41.25±0.50 | 1.624 | 36.33±4.03 | 2.562 |
| - (40-<50) | 41.80±1.30 | 0.216 | 41.50±0.71 | 0.096 |
| - (50-60) | 39.33±3.58 | | 36.82±2.67 | |
| **Gender** | | | | |
| - Male | 38.76±3.42 | 7.098 | 36.00±1.11 | 3.178 |
| - Female | 41.62±2.02 | 0.013* | 37.94±3.92 | 0.085 |
| **Educational level** | | | | |
| - Read and write | 39.33±3.06 | | - | |
| - Primary | 40.33±3.78 | 0.236 | 37.83±4.07 | 0.342 |
| - Secondary | 39.17±4.75 | 0.871 | 36.33±4.03 | 0.713 |
| - University | 40.33±2.47 | | 37.00±2.47 | |
| **Type of surgery** | | | | |
| - CABG | 40.21±2.78 | 0.502 | 37.21±2.87 | 0.379 |
| - Heart valve repair/replacement | 39.17±4.75 | 0.485 | 36.33±4.03 | 0.543 |

**Control group:** receive routine hospital care such as head nodding
**Study group:** undergo communication board that implemented by the researcher

## Discussion

The aim of the current study was to evalute the effect of using communication board on clinical outcomes for mechanically ventilated patients post open heart surgeries.

One of the greatest challenges for critical care nurses is communication with intubated patients that are connected to mechanical ventilation especially after open heart surgeries. Communication difficulties are the primary issues reported by patients in the ICU receiving MV support. Communication impairment is one of the most important factors affecting the outcome of treatment **(Berenguer, Martínez, De Stasio, & Baixauli, 2022).**

Communication board is an evidence-based, patient communication strategy supported by clinical research to meet patients' basic needs, improve patients' satisfaction, reduce frustration, and improve patients' outcomes. It can serve as a bridge between patients and health care team and help critical care nurses to give holistic care to intubated patients **(Kuruppu, Chaboyer, Abayadeera, & Ranse, 2023)**.

**Socio- demographic characteristics of the current study**

**Regarding age,** the findings of the present study revealed that the mean age of the control and the study groups was 48.73years. This result can be explained by lifestyle changes, such as changes in eating habits, consuming fast food or food with high fat and cholesterol. Also, family history of heart diseases, hyperlipidemia and hypercholesterolemia, diabetes mellitus, diagnosis of hypertension are the main risk factors for ischemic heart diseases and mitral valve disease **(Folkestad e al., 2025)**.

This result was supported by the findings reported by Szymkowicz, Bodet-Contentin, Marechal, & Ehrmann, (2024), who revealed that the mean age of the studied sample was 48.67 years. On the other hand, this result is contradicted by Sidhu, Kaur, Kaur, Charan, & Kaur, (2024), who revealed that the mean age of the studied sample was similar across the studied groups at approximately 54 years.

**In relation to gender,** the present study showed that more than half of studied patients were males. This could be explained by males are more likely to develop coronary artery diseases twice than females because males spent most of the time out of the home which obliged them to eat fast and unhealthy food. Also, unhealthy lifestyles such as smoking, alcohol consumption. Genetic factors that proposed that estrogen hormone protect women from cardiac diseases. Furthermore, male individuals are at risk of open-heart surgery due to the nature of the work difficulties of their daily living **(Manikpurage et al., 2025).**

**Regarding marital status,** the present study revealed that, about three quarters of the studied patients were married. This may be due to social and psychological stress of Egyptian societies which puts burden on married patients. Additionally, the mean age of the studied patients was 48.73years and people in this age group are usually married.

This finding was supported by Holm & Dreyer, (2018), who described that three quarters of the studied patients were married. Also, Albayram & Guner, (2025), revealed that nearly three quarters of the studied sample were married. On the other hand, this finding was contradicted by Rose et al., (2021), who found that half of the studied sample was married.

**Regarding educational level,** the findings of the present study described that half of the studied patients had university education. This result could be explained by highly educated people are more aware with their illness and the recommended treatments. So, they are brave to take the decision to perform the open-heart surgeries.

This result was supported by **Sidhu, Kaur, Kaur, Charan, & Kaur, (2024),** who found that about one half of sample had university education. While, this finding was contradicted with **JamunaRani, Gowri, & Elizabeth, (2024),** who concluded that half of the studied patients were secondary educated.

**In relation to current diagnosis,** the present study showed that majority of studied patients had myocardial infarction. This could be due to the most sample were males, in the age group of (50-60 years) and had diabetes mellitus which all of that are predisposing factors of myocardial infarction. This finding was supported by **Hosseini, Valizad-Hasanloei, & Feizi, (2018),** who concluded that common primary diagnosis among the participants was myocardial infarction.

**Regarding the type of cardio-thoracic surgery,** the present study showed that majority of the studied patients had coronary artery bypass graft (CABG) surgeries. This finding was explained by the majority of the studied sample had myocardial infarction for which CABG surgeries were one of the treatment options.

This finding was consistent with a study done by Pakhide, (2019), who found that majority of studied patients had CABG surgeries. While **Albayram & Guner, (2025),** conducted a study entitles " The determination of the efficiency of visual communication cards developed for the purpose of communication with the intubated patients in the intensive care unit of cardiovascular surgery" concluded that less than half of the studied patients had CABG and valve surgeries.

In terms of past medical history, the current study presented that diabetes mellitus was the most common past medical history in the studied groups. This finding may be justified by diabetes mellitus, which is a risk factor for cardiovascular diseases, and it is thought that the higher incidence of myocardial infarction in patients with diabetes mellitus is attributed to increased coagulability **(Loh, 2025)**.

Also, the high incidence of diabetes mellitus may be due to unhealthy life style such as tobacco use, unhealthy diet, and inadequate physical activity. This finding was in line with **Alaparthi et al., (2021) & Jarrah et al., (2022),** who reported that diabetes mellitus was the most common past medical history in the studied patients.

On the other hand, this finding was disagreed by **Adeniyi & Kayembe, (2021),** who found that majority of the studied sample had endocrine and renaldiseases.

**In the context of ventilator parameters**, the findings of the present study concluded that no statistical significant differences were found between the two studied groups regarding fraction of inspired oxygen ($FiO_2$), tidal volume, respiratory rate, and positive end expiratory pressure (PEEP). The findings were consistent with **Bhardwaj & George, (2023),** who revealed that no significant differences were found between the two studied groups in relation to ventilator parameters (fraction of inspired oxygen ($FiO_2$), tidal volume, respiratory rate, and PEEP.

**Regarding pain severity measured by behavioral pain scale (BPS)**, pain severity was significantly lowered in the study group than in the control group. This result could be attributed to communication board which contained pictures and symbols that helped patients describe pain and its characteristics, so the appropriate pharmacological and non-pharmacological pain treatments were administered **(Kuruppu, Chaboyer, Tobiano, Abayadeera, & Ranse, 2023).**

This result was in accordance with **Kolcak, Ayhan, & Tastan, (2023),** who concluded that using illustrated communication materials significantly reduced pain severity in the intervention group. Also, **Sabater-Gárriz, Molina-Mula, Montoya, & Riquelme, (2024),** reported that pain severity was significantly reduced in the intervention group using communication board.

**Regarding total respiratory distress observation scale**, the current study presented that severe respiratory distress was significantly higher in the control group than in the study group. This result could be explained by effective communication provided better assessments of patients and their health. So, appropriate treatments were provided which helped alleviating dyspnea and anxiety **(Szymkowicz, Bodet-Contentin, Marechal, & Ehrmann, 2024)**.

This finding was supported by **Kuruppu, Chaboyer, Tobiano, Abayadeera, & Ranse, (2025); Cingi & Eroğlu, (2023),** who concluded that the use of communication board significantly reduced level of respiratory distress in the intervention group than the control group. Also, **Adeniyi & Kayembe, (2021),** found that the use of communication board significantly reduced level of respiratory distress in the intervention group.

**Regarding satisfaction level of the studied patients**, the present study revealed that satisfaction level was significantly higher in the study group than in the control group. This result may be due to the use of communication board which facilitated communication, helped the patients express their feelings and demands achieved appropriate response to the needs, and so, anxiety was reduced and satisfaction was higher **(Sharma, 2020)**.

This finding was in line with **Hosseini, Valizad-Hasanloei, & Feizi, (2018),** who revealed that communication board significantly increases satisfaction level in the study group than in the control group. Additionally, **Sharma, (2020),** presented that communication board was effective in improving level of satisfaction among mechanically ventilated conscious patients.

Another study conducted by **Bhardwaj & George, (2023),** who aimed to determine the level of satisfaction in patients under mechanical ventilation at the time of using communication boards, reported that using communication boards significantly increased satisfaction in the intervention group than in the control group.

Also, **JamunaRani, Gowri, & Elizabeth, (2024),** concluded that higher satisfaction level was found post implementing therapeutic communication using communication board. On the other hand, this result is not supported by **Qadir, (2023),** who concluded that the use of communication board does not sigficantly affect satisfaction level among the studied patients.

**Regarding hemodynamic parameters**, the current study presented that heart rate, respiratory rate, mean arterial blood pressure, and saturation of peripheral oxygen ($SpO_2$) were significantly maintained in the normal range in the study group than in the control group. This finding could be attributed to using communication board that are effective in expressing needs, reducing anxiety, pain and respiratory distress and so, hemodynamic parameters were maintained in the normal level **(Szymkowicz, Bodet-Contentin, Marechal, & Ehrmann, 2024)**.

This finding was consistent with Burgener, (2020), who found that statiscal significant differences regarding respiratory rate and heart rate were found between the study group and the control group. On the other hand, this finding was contradicted by **DS, (2020),** who found no statiscal significant differences regarding hemodynamic parameters between the study group and the control group.

In the context of the comparison between behavioral pain level (BPS) of respiratory distress level (RDOS) and satisfaction level (PSQ) among the studied groups, the findings of the present study concluded that no significant correlations were found between behavioral pain level (BPS) of the studied patients and their respiratory distress level (RDOS) and satisfaction level (PSQ) among the studied groups.

These findings were in accordance with **Hamdan, (2019),** who concluded that no significant correlations were observed between behavioral pain level (BPS) of the studied patients and their respiratory distress level (RDOS) and satisfaction level (PSQ) among the studied groups.

Regarding associations between total behavioral pain score (BPS) of the studied patients and their biosocio-demographic characteristics, the current study presented that no significant associations between total

behavioral pain score (BPS) of the studied patients and their biosocio-demographic characteristics (age, gender, educational level, and type of surgery).

This result was in the same line with **Rababa, Al-Sabbah, Eyadat, and Abusbaitan, (2023),** who revealed no significant associations between total behavioral pain score (BPS) of the studied patients and their age, gender, educational level, and type of surgery. On the other hand, **Melile Mengesha, Moga Lencha, & Ena Digesa, (2022),** found that total behavioral pain score was significantly increased in the age group between 50- 60 years and in female patients.

In relation to associations between total respiratory distress level (RDOS) and biosocio-demographic characteristics, the findings of the current study revealed no significant associations between total respiratory distress level (RDOS) of the studied patients and their biosocio-demographic characteristics (age, gender, educational level, and type of surgery).

This finding was in accordance with **Wachalovsky, (2020),** who found no significant differences between total respiratory distress level (RDOS) of the studied patients and their age, sex, and type of surgery.

Regarding associations between total satisfaction level (PSQ) and bio-sociodemographic characteristics, the current study showed no significant associations between total satisfaction level (PSQ) of the studied patients and their bio-sociodemographic characteristics (age, gender, educational level, and type of surgery).

This result was contradicted with **Baltaci et al., (2023),** who observed that the patient's satisfaction level was higher in female than male patients and in married than unmarried patients. Additionally, **Adhikari, Paudel, Mishra, Shrestha, & Upadhyaya, (2021),** concluded that age, gender, and education were significantly associated with majority of the patients' satisfaction. **Kamberi, Tanushi, Kadrija, Kamberi, & Jerliu, (2023),** discovered that socio-demographic characteristics significantly correlated with the level.

## Conclusion

Communication board for patients undergoing open heart surgeries is effective nursing strategy in achieving effective communication which helped in anticipating and meeting patients' needs. Communication board reduced severity of pain measured by behavioural pain scale. Communication board reduced severity of respiratory distress measured by respiratory distress observation scale. Communication board was effective in enhancing satisfaction among mechanically ventilated patients in ICUs. Communication board maintained hemodynamic parameters such as heart rate, respiratory rate, systolic, diastolic, and mean arterial blood pressure, and saturation of peripheral oxygen (SpO2) within normal range.

## Recommendations

**In the light of the current study findings, the following recommendations are suggested**

- Communication board is recommended for communicating with conscious mechanically ventilated patients.
- The implementation of effective communication interventions in the ICU is essential for the management of mechanically ventilated patients and to support patient-centered care.
- Replication of the study on a larger sample size and with long term follow up can validate and help generalize the results
- Further researches are needed in this area for nursing staff to provide more information about the advanced methods for communication with conscious mechanically ventilated patients.

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