The Effect of Family-Centered Care on the Duration of Weaning From Mechanical Ventilation in Coronary Artery Bypass Surgery Patients: A Clinical Trial Study

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Abstract

Background: The use of nonpharmacological methods has been emphasized in the recent years. These methods are used to decrease the duration of weaning from mechanical ventilation after coronary artery bypass graft (CABG) surgery.

Objectives: The present study aimed at determining the effect of family-centered care on the duration of weaning from mechanical ventilation in patients undergoing CABG.

Methods: This clinical trial study was conducted in Jamaran Heart Subspecialty hospital in Tehran in 2016. Initially, convenient sampling method and random allocation were used by quaternary blocks to allocate patients into 2 groups of experimental and control, with 35 participants in each group. In the intervention group, the patients’ family member chosen by the patient was entered into the ward during the weaning process. Patient’s entrance time to the ward to extubation time was considered as the duration of weaning from mechanical ventilation in the 2 groups.

Results: Duration of weaning in the experimental group was 97 minutes less than the control group; in other words, the weaning duration of those in the control group was 1.4 times greater than those in the experimental group. This difference was statistically significant between the 2 groups (P = 0.05).

Conclusions: Family-centered care reduced the duration of weaning from mechanical ventilator in patients undergoing coronary artery surgery, which can remarkably decrease complications due to ventilation with positive pressure in these patients.

Keywords: Family-Centered Care, Mechanical Ventilator, Coronary Artery Bypass Graft (CABG), Weaning, Clinical Trial

1. Background

Cardiovascular diseases are the most common serious, chronic, and life-threatening diseases in the world (1). It has been estimated that the largest cause of worldwide death until 2020 would be coronary artery disease (2). American heart association (AHA) states that in the case of removing cardiovascular diseases, life expectancy would increase to 7 years in the United States. In England, cardiovascular diseases with 16,000 deaths per year is considered as the first cause of death. The growing trend of suffering from cardiovascular diseases is not specified to Western countries. In the study of Kita, it has been found that this group of diseases is increasing growing in Japan as well (3). In a study in Finland, it was found that 9.1% of males and 4.9% of females were suffering from angina pectoris (4). Cardiovascular diseases in Iran, like many other countries, are the leading causes of death and the lost years of life (5). In addition, among the cardiovascular diseases, coronary artery diseases are introduced as the first and the most common cause of death (6).

No action like cardiac surgery could influence the quality of life of patients suffering from cardiovascular diseases. Cardiac surgery is the most common therapeutic intervention for ischemic disease and valve problems. It has almost been about 35 years since CABG is being performed in the medical centers of the world (1). The prevalence of this surgery in North America, Asia, West Europe, and other areas is 26.79%, 0.72%, 17, 94%, and 18.14%, respectively. Of the open heart surgeries, 60% are specified to CABG in Iran (7). Following CABG, patients are directly transferred to ICU and are being observed by an experienced nurse who has specific and enough skills and knowledge in caring for such patients until they come out of anesthesia, and reach adequate oxygenation and hemodynamic stability.
After heart surgery, patients need meticulous monitoring in ICUs. Mechanical ventilation is one of the most common and most popular treatments in the period after surgery for all these patients (8). Patients undergoing mechanical ventilation experience many psychological and physiological negative complications (9, 10).

The process of weaning patients from mechanical ventilator in CABG patients, due to maintaining hemodynamic stability, is specifically important because inappropriate extubation could cause unpleasant complications (11).

Weaning from mechanical ventilator is one of the important processes of treatment in ICU because the process of weaning from mechanical ventilation allocates 40% of the whole duration of mechanical ventilation. Therefore, on time weaning from mechanical ventilation and extubation is clinically important (12).

In the recent years, nonpharmacological methods have been emphasized to decrease the duration of weaning from mechanical ventilator because one of the most important roles of nursing is early identification of psychological and physiological stresses (13). The presence of one member of the family as another nonpharmacological approach can control and decrease the physiological and psychological stress of the patients and their families (14). Family-centered care is not a new topic, but it is a growing philosophy and movement in a therapeutic care, resulting in improving quality of care and decreasing costs (15, 16). Family-centered care is has been indicated as one of the main implications of nursing in the 21st century, and its philosophy and movement in a therapeutic care, resulting in improving quality of care and decreasing costs (15, 16).

Family-centered education model, the active presence of the family is essential in assessing and diagnosing requirements and trainings because it is believed that illness of a family member results in the involvement of all the members of the family in the course of the disease cycle (19, 20).

2. Objectives

The importance of this issue, insufficiency, and deficiencies of the family-centered nonpharmacological studies at the time of weaning from mechanical ventilator in ICU, encouraged the researchers to assess the effect of family-centered care on the duration of weaning from mechanical ventilator in CABG patients in ICU as a type of nonpharmacological intervention in these patients.

3. Methods

This was a clinical trial study documented in Iran clinical trials recording center with IRT201609014299N4 code. The study population included all the patients’ candidates for open heart surgery who were hospitalized in Jama’ran hospital in Tehran from May 2015 to October 2016; they were transferred to ICU after undergoing open heart surgery by mechanical ventilator. Inclusion criteria were as follow: patient’s willingness to participate in the study; age 18 to 75 years; performing heart surgery for the first time; nonemergency heart surgery; cardiac ejection fraction greater than 30% (EF > 30%); and lack of psychological problems. Exclusion criteria were as follow: bleeding more than 300 mL per hour; a need for surgical intervention; any type of neurological disorder after surgery; unusual events during surgery (such as pumping time more than 2 hours and severe bleeding during surgery); lack of hemodynamic stability during weaning; and compromising patient’s health and the need for health team intervention; delay in weaning process based on the physician order; returning to the operating room; requiring tranquilizers and painkillers more than the current treatment protocols; having IABP (Intra-Aortic Balloon Pump) after surgery; rhythm dependence to pacemaker; coagulation problems; and receiving more than one type of inotrope, or receiving inotrope with an unusual dose after surgery. Number of the samples was calculated to be 64 by considering Alpha equals (5%), Beta (10%) and power (80%) using Altman’s Nomogram and according to standard difference (21). Considering 10% sample loss, 70 individuals (35 in each group) were studied. Convenient sampling method was used initially based on the inclusion criteria, and then random allocation with foursome blocks was done for the 2 groups.

Data collection tools included a researcher-made sheet for collecting demographic features, 3 underlying diseases, underlying risk factors, and underlying factors related to heart surgery, and recording the sheet of weaning duration from mechanical ventilator, in which the duration of the patient’s entrance to ICU to the time of extubation was recorded. The validity of the collection sheet was examined by 10 experienced instructors. For sampling, samples who met the inclusion criteria were selected and provided written informed consent a day before surgery. Then, one member of the family, who was preferred by the patient, was familiarized with the ward environment by the researcher and received some explanations about the patient’s conditions (tracheal tube, mechanical ventilator, chest tube, and other cards). Moreover, entering time and ways of providing care to the patient in the ICU after the surgery were explained to the patient’s entourage. Furthermore, the necessary training was provided by the researcher considering the following points: patient’s entourage should stay somewhere that does not disturb the medical team or other patients, and only he/she has to pay attention to the patient; he/she has to talk to the patient.

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Table 1 demonstrates the quantitative demographic features based on the results of the independent t test ($P > 0.05$).

Table 2 demonstrates the qualitative demographic characteristics of the hospitalized patients in cardiac intensive care unit in the 2 groups. The results of the Chi-square statistical test revealed no statistical differences between the 2 groups with respect to qualitative demographic characteristics ($P > 0.05$).

Table 3 displays the underlying diseases of the hospitalized patients in cardiac intensive care unit in the 2 groups. Chi-square statistical test results showed no statistical differences between the 2 groups in underlying diseases ($P > 0.05$).

Table 4 demonstrates the underlying risk factors of hospitalized patients in cardiac intensive care unit in the 2 groups. Chi-square statistical test results revealed no statistical differences between the 2 groups in underlying risk factors ($P > 0.05$).

Table 5 presents the underlying factors related to the cardiac surgery of the hospitalized patients in cardiac intensive care unit in the 2 groups. Independent sample t test results showed no statistical differences between the 2 groups in underlying factors ($P > 0.05$).

Table 6 exhibits the weaning time between the 2 groups. The mean and standard deviation of weaning time in the intervention group was less than that of the control group; in other words, the mean of weaning time in the control group was 1.4 times higher than that of the intervention group. Independent sample t test results showed statistical differences between the 2 groups in weaning time ($P < 0.05$).

5. Discussion

The results of the present study revealed that family-centered care was useful in decreasing the duration of weaning patients from mechanical ventilation. Tables 1 and 5 present qualitative and quantitative demographic features, underlying diseases, and underlying risk factors related to heart disease of the patients participating in the study, which were homogeneous and were not significantly different from one another prior to the study.

Early weaning from mechanical ventilator is important in all the cardiac surgery units in the world because of some benefits such as faster recovery, faster discharge from ICUs, and preventing several complications of mechanical ventilation (12, 22). The results of the present study revealed that the presence of a member of the family could make a significant difference in decreasing the duration of patient’s weaning from mechanical ventilator so the time in experimental group had decreased 97 minutes compared with the control group.
The results of this study were significant during weaning from mechanical ventilator, which could be due to the introducing and explaining the surgery process from the beginning of the study until ICU postdischarge because the patient’s entourage, due to his/her friendly and emotional relationship with the patient, introduced the

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<tr>
<th>Table 1. The Quantitative Demographic Characteristics of the Hospitalized Patients$^a$</th>
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<td><strong>Variable</strong></td>
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<td></td>
</tr>
<tr>
<td>Age</td>
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<tr>
<td>BMI</td>
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$^a$Values are expressed as mean ± SD.

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<th>Table 2. The Qualitative Demographic Characteristics of the Hospitalized Patients$^a$</th>
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<tbody>
<tr>
<td><strong>Variable</strong></td>
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<td></td>
</tr>
<tr>
<td>Sex (Male)</td>
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<tr>
<td>Marital (Married)</td>
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<tr>
<td>Job (Retired)</td>
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<tr>
<td>Education (Diploma)</td>
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$^a$Values are expressed as No. (%).

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<th>Table 3. Underlying Diseases of the Hospitalized Patients$^a$</th>
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<tr>
<td><strong>Variable</strong></td>
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<tr>
<td>Hypertension (No)</td>
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<tr>
<td>Diabetic Mellitus (No)</td>
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<tr>
<td>Hyperlipidemia (Retired)</td>
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<td>Pulmonary disorders (No)</td>
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<td>Neurological disorders (No)</td>
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$^a$Values are expressed as No. (%).

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<th>Table 4. The Underlying Risk Factors of the Hospitalized Patients$^a$</th>
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<td><strong>Variable</strong></td>
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<tr>
<td>History of surgery</td>
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<td>Sedative consumption (No)</td>
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<td>Inotrope drug use (No)</td>
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<td>Smoking (No)</td>
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<td>Opium consumption (No)</td>
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<td>Cardiac medications use (No)</td>
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$^a$Values are expressed as No. (%).
surgery process to the patient at home with the patient's comfort and tranquility in mind when the patient has not yet experienced pain or restlessness and has not learned the confounding factors. Safavi et al. by quoting from Hosseiny, stated that introduction process has a significant positive effect on patients before the surgery, which is inconsistent with the results of the present study (23). The same results were achieved in the study of Mary Beth Happ et al. In their study, with the aim of family presence and observation during weaning from mechanical ventilator, they found that family presence influenced the duration of weaning from mechanical ventilator (24).

In addition to the sessions of introducing the unit and process of the surgery, which could play an important role in the duration of weaning from the mechanical ventilator in the 2 groups, the same quantitative and qualitative demographic information, underlying diseases, underlying risk factors, and underlying risk factors related to heart disease of the patients prior to the study between the 2 groups could be another factor in confirming the effect of family member presence because the studies have shown that these factors can significantly influence the success rate of weaning from mechanical ventilator. Jalalian et al. had stated that they had 63% success rate in their study, and one of the causes of such high statistic was the similarity between demographic information and underlying factors and disease (25). In addition, in other studies, the success rate in weaning from mechanical ventilator was 38% to 70%; the authors believed that one of the causes of this success was the similarity between demographic information and lack of remarkable risk factors prior to the intervention (26).

The underlying diseases of the patients who underwent cardiac surgery and were hospitalized in the ICU are presented in Table 3. One of the causes of the high success in weaning from mechanical ventilator in the 2 groups is that these diseases were not significant in these 2 groups although the duration of weaning from mechanical ventilator in the experimental group was 1.4 time less than the control group. Studies have indicated that preoperative, transoperative, and postoperative variables are related to the prolonged mechanical ventilation time (27). Some studies have found that some demographic factors such as age (28), heart surgery, and underlying factors such as the number of heart surgery, and the amount of ejection fraction (29), and underlying diseases such as the history of mental disease, diabetes mellitus, and hyperlipidemia (30) can independently predict complications after heart surgery such as the longtime of weaning from mechanical ventilator.

Performing family-centered care had 97-minute effect on the duration of weaning from mechanical ventilator in the experimental group compared with the control group. In other words, patients in the experimental group were separated from mechanical ventilator 97 minutes earlier than patients of the control group. The weaning patients of the control group from the mechanical ventilator was totally 1.4 times of those in the experimental group. More-
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Footnotes

Authors’ Contribution: Leila Safaeepour: searching, data gathering, and writing the manuscript; Seyed Tayeb Moradian: data analysis. Jamileh Mokhtari Nouri, Seyyed Mohammad Saied Ghiasi: study design, data gathering, and writing the manuscript.

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