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Therapeutic Effect of Massage on the Patients in Intensive Care Unit

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Background: Different and unrelieved side effects of hospitalization in intensive care unit can easily affect the patients and cause irritabilities and fluctuations in different vital signs.

Objectives: To determine the effect of different massage therapists on the 6 vital signs of conscious hospitalized patients in ICU.

Patients and Methods: The study was a randomized controlled clinical trial, which was conducted in 33 patients and 33 family members in experimental group 1 and 33 patients and 33 nurses in experimental group 2 and 2, and 33 patients in the control group. Data collection tool consisted of demographic data and a checklist to record the patient's vital signs (systolic blood pressure, diastolic blood pressure, respiratory rate, temperature, pulse rate, pressure of oxygen saturated, and pain). All measurements were conducted at the same time in three groups as follow: before the intervention (30 minutes full-body massage therapy), and 1, 2, 3, and 4 hours after intervention. The massage techniques included static, surface tension, stretching, superficial lymph unloads, transverse friction, and myofacial releasing techniques.

Results: Multivariate analyses revealed significant differences between experimental groups 1 and 2 and the control group with regard to the systolic blood pressure (SBP), diastolic blood pressure (DBP), pulse rate (PR), respiratory rate (RR), temperature (T), saturated of peripheral oxygen (SPO_2), and pain in all time points after intervention ($P < 0.05$). The differences were more significant in experimental group one than group two.

Conclusions: Having different massage therapists have several unparalleled positive effects on the patients' clinical conditions; and therefore, it should be recognized as one of the most important clinical considerations for all hospitalized patients.

*Keywords:*Vital Signs; Pain; Visual Analog Scale; Intensive Care Units; Randomized Controlled Trial

1. Background

Critical care environment because of its multifactorial nature can impose different complications on the hospitalized patients, especially conscious patients (1, 2). Hemodynamic instabilities are one of the most common side effects of such environments (3, 4). Unrelieved hemodynamic instabilities influences different systems, including cardiovascular and sympathetic nerves (5). The most common result of such instabilities, are irritabilities of different vital signs, including systolic blood pressure, diastolic blood pressure, pulse rate, respiratory rate, temperature, pressure of oxygen saturated, and response to pain (3, 6).

Recently, to relieve vital signs irritabilities, alternative and complementary therapies, like massage therapy have been widely used (7-9). Massage therapy is a therapeutic technique, which because of improving hemodynamic and nervous system, has been gained popularity in a number of clinical trials (1-3). Massage effectively helps treating the nervous and cardiovascular system, and causes a feeling of well-being, relaxation and comfort (10). Using lubricant jell like Almond oil is also recommended to enhance the purposes of massage therapy.

In the meantime, several studies have focused on comparing the roles of family members with nurses in ICU settings to perform such manipulations (11-16). Family - centered care (FCC) as a natural extension of patient is so popular (17). This approach can mitigate and smooth symptoms including anxiety, stress, and depression (18).

This approach can mitigate and smooth symptoms including anxiety, stress, and depression (17-19). These results have encouraged conducting further studies on the importance of family involvement in ICU (20).

FCC is an approach to medical care, which believes that optimal health outcomes are obtained when patients' family members play an active role in providing physical, psychological, emotional, social, and developmental support (21). Family feedbacks on the interventions that provided by nurses in the healthcare settings are positive among patients who are mentally ill, critically ill, or elderly (13). Family support activities and programs are conducted with the purpose of helping families cope with the stress of having a patient in intensive care and supporting the family as they join in the care of their patient (12).

2. Objectives

The purpose of the study was to determine the effect of different massage therapists on the 6 vital signs of conscious hospitalized patients in ICU.

3. Patients and Methods

3.1. Study Design

This was a triple-blinded randomized controlled clinical trial study, which was conducted in one of the teaching hospitals in Tehran, capital of Iran. The present study was registered on Clinical Trials.gov with identifier NCT01909882.

3.2. Samples and Setting

The study was conducted in the Surgical Intensive Care Unit (SICU) of Shariati Hospital of Tehran University of Medical Sciences (TUMS), Tehran, Iran, from August 2012 to December 2013. The participants were all patients with prolonged hospitalization (more than 10 days) patients' families, and nurses. Inclusion criteria were as follows: more than 10 days of hospitalization; hemodynamic stability; having the Glasgow coma scale score of 10 to 15 (3); intracranial pressure less than 20 mmHg; no limitation or contraindication for changing body position (including active bleeding or flail chest) or body massage (including advanced burn degrees, severe dyspnea, fever, etc.); and willingness to participate in the study. Consensus opinions of 5 clinical experts (2 anesthesiologists, 2 surgeons, and 1 epidemiologist) were used to determine prolonged hospitalization (according to the nature of our hospitalized patients) because patients with prolonged hospitalization have more psychological needs due to unknown ICU environment.

All parts of the study were reviewed according to the Consolidated Standards of Reporting Trials (CONSORT) statement (Figure 1) (22, 23). In the first step, convenience sampling method was used. All patients with prolonged hospitalization and nurses who met the inclusion criteria were recruited. The sample size was determined using the information obtained from a pilot study with 10 nurses, 10 patients and 10 family members. By considering a confidence level of 95% and a power of 80%, a sample size of at least 30 cases was determined for patients and family members, and patients and nurses. Moreover, same patients were selected for the control group.

To predict nurses, family members, and patients' attrition from the study process, 33 qualified patients and family members were asked to participate. In other words, from the 527 eligible patients and their 527 eligible family members, 33 patients, family members, and nurses were included in the study. Then, in the second step, random allocation was conducted using random allocation software (RAS); hence, 33 patients and 33 family members, and 33 patients and 33 nurses were placed in experimental group one and two, respectively and the equal number of participants were selected for the control group. Each group was considered as a separate block. The major reason for patients' attrition was failure to meet the inclusion criteria. Other reasons were family members' lack of interest to participate in the study (because they did not want to perform the massage routinely), and absence of comprehensive family involvement guiding protocol. A computer generated list of random numbers was used for allocation of the patients. Each block was randomly assigned to 1 of 2 treatment groups following simple randomization procedures (computerized random numbers). Block randomization was done by a computer-generated random number list prepared by an expert statistician who had no clinical involvement in the trial. Patients with prolonged hospitalization were categorized based on the treatment procedure and admission date. Before the research, a nurse obtained patients' consent from them or their next of kin. For allocation consignment, the researcher contacted a person who was not involved in the recruitment process. Patients and their family members, clinical nurses and data analyzer were kept blind to the allocation.

3.3. Ethical Considerations

The present study was registered on ClinicalTrials.gov with identifier NCT01909882 and was registered on the Research Committee of Baqiyatallah University of Medical Sciences under No. 388. The ethical considerations were related to the patients' autonomy, confidentiality, and anonymity during the study period and its publication. The purpose of the study was explained to all patients, and they were also informed that they were free to participate, decline participation, or withdraw from the study at any time. Informed consent was obtained from the patients, family members and nurses who agreed to be included in the study.

3.4. Intervention

Following the announced readiness of family members and nurses, they received massage training, and then

were tested; and after passing the test allowed to massage the patient. The training sessions of family members and nurses were conducted individually in two 2-hour sessions (one session for educating and one for practicing) on a human mannequin. All training sessions were conducted by the first researcher who had previously received the certificate in massage therapy. Then, the patients in intervention groups were massaged by a family member or nurse in a private atmosphere (the curtains were drawn around the patient) . In both intervention groups, each patient received one 3- minute massage therapy by his/her family member or nurse. Almond oil was used for effleurage and massage facilitation. Almond oil was accessed by researcher team to family members and nurses for massage of their patients.

Back, shoulder, deltoid muscles, front and posterior parts of the legs, arms, forearms, front and back parts of thighs, palms and fingers, metatarsus, front and back of feet and toes, belly and chest, auxiliaries and neck muscles of the patients were massaged. Massage techniques included static massage, surface tension techniques, stretching massage, superficial lymph unload, transverse friction techniques, and myofacial releasing techniques (24). All the massage sessions were conducted in the morning shifts. Areas with inflammation, petechiae, ecchymosis, subcutaneous hemorrhage, wounds and edema were not massaged.

During the massage therapy, sustainability of general, hemodynamic and airway conditions were considered. No intervention was provided for the control group, and they just received the routine care of the unit. In the control group, the vital signs were measured similar to the intervention groups.

3.5. Data Collection

Samples (nurses, patients and their families) were selected consecutively among the patients admitted to ICU. Nurses, patients and their families who entered the study were randomly allocated into the groups by RAS (Random Allocation Software) (Figure 1). Data-collection tool consisted of two parts. The first part included demographic data (age, sex, marital status and body mass index [BMI]). The second part included a checklist to record the patient's vital signs (systolic blood pressure, diastolic blood pressure, respiratory rate, pulse rate, temperature, pain, and pressure of oxygen saturated). Systolic and diastolic blood pressures were measured with a German Empire-N mercury sphygmomanometer from the left arm. Furthermore, the radial pulse rate of the left hand was measured and recorded. Respiratory rate was measured for one minute without patient's notice. Pressure of saturated oxygen, and temperature were measured with Samsung monitoring. All measurements were conducted simultaneously in three groups before the intervention, and then 1, 2, 3 and 4 hours after the intervention. For pain measurement, visual analog scale was used. To approve the correct score, the first and second authors conducted pain scoring. The value of Kappa agreement test between the first and second researchers was 0.9.

3.6. Data Analysis

All analyses were performed using SPSS 11.0 (SPSS Inc. Chicago, IL). Frequency (percent) and mean (standard deviation) were presented for qualitative and quantitative variables, respectively. For the pain, due to non-normality of the variable, median (Quartile1- Quartile 3) was presented as summary statistics. The normality of the study variables was tested by one-sample Kolmogorov-Smirnov Test. Normality was confirmed for the SBP, DBP, Tem, SPO2, PR and RR. Therefore, repeated measures analysis of variance (ANOVA) was performed to assess the changes of the mean values over time for both experimental and control groups, followed by Sidak post hoc test. The assumption of the spherecity of the covariance matrix was evaluated using Machly test and depending on the results of this test; P values were presented based on Greenhouse-Geisser test. In addition, Hottelling T2 tests evaluated the differences between experimental and control groups in all time points, followed by independent samples t test for investigating the differences between experimental and control groups separately in each time point. Normality was not confirmed for pain; therefore, Friedman test was performed to assess the changes of the mean values over time for experimental and control groups. In addition, Mann-Whitney U tests were used to compare experimental and control groups separately in each time point. The comparisons of the background variables, including age, sex, marital status, and BMI categories were investigated between the three groups using ANOVA, chi-squared test or Fisher exact test. P values less than 0.05 were considered as significant.

4. Results

No significant differences were observed between experimental 1 and 2, and control groups with regard to demographic variables of age, sex, marital status and BMI categories ($P > 0.05$) (Table 1). The mean and standard deviation of age were 37 ± 5 y, 39 ± 2 y, and 36 ± 4 y in experimental groups 1 and 2 and control group, respectively. Regarding the sex perspective, 16 patients (49%) in experimental group one, 18 patients (55%) in experimental group two, and 17 patients (51%) in the control group were male. Other demographic characteristics were presented in Table 1.

Comparing the groups in all variables, the results showed that there are no significant differences between experimental groups and control group with respect to 6 vital signs before intervention, including SBP ($P > 0.205$), DBP ($P > 0.239$), PR ($P > 0.878$), RR ($P > 0.142$), Tem ($P > 0.326$), SPO2 ($P > 0.129$), and pain ($P > 0.205$). However, after intervention, the results showed that there are significant differences between all variables in all time points in experimental groups and control group for

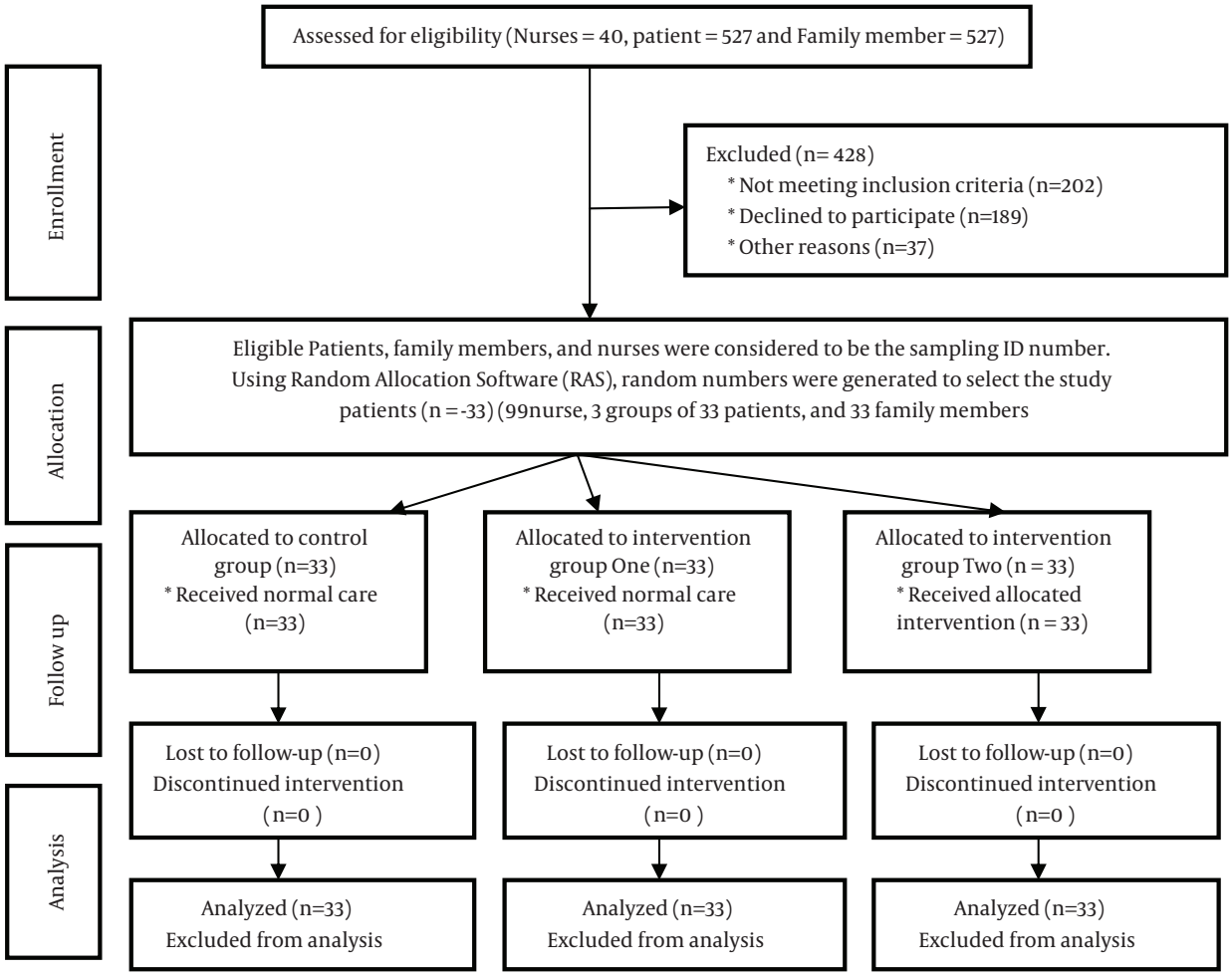

Figure 1. Fellow Chart of Sampling Process

SBP, including SBP1 ($P < 0.004$), SBP2 ($P < 0.008$), SBP3 ($P < 0.010$), and SBP4 ($P < 0.033$) and For DBP, including DBP1 ($P < 0.020$), DBP2 ($P < 0.036$), DBP3 ($P < 0.047$), and ($P < 0.022$). Other statistical differences between all variables in all points in experimental groups and control group for PR, RR, Tem, and SPO2 are presented in Table 2 and for pain in Table 3. Comparing all variables in all time points between experimental groups, the statistical differences in all variables in experimental group 1 were more than experimental group 2 (Table 2).

Multivariate analysis revealed no statistical differences within control group in all time points for all variables, including SBP ($P > 0.391$), DBP ($P > 0.148$), PR ($P > 0.436$), RR ($P > 0.528$), Tem ($P > 0.435$), SPO2 ($P > 0.234$), and pain ($P > 0.251$) (Table 3). Moreover, this analysis showed statistical differences within the experimental group in all time points for all variables, including SBP ($P < 0.001$), DBP ($P < 0.020$), PR ($P < 0.001$), RR ($P < 0.003$), Tem ($P < 0.021$), SPO2 ($P < 0.034$) (Table 2), and pain ($P < 0.001$) (Table 3). Finally, multivariable analysis revealed statistical differences between groups in all time points for DBP ($P < 0.042$), PR ($P < 0.003$), RR ($P < 0.022$), Tem ($P < 0.009$), and SPO2 ($P < 0.001$) (Table 2) and for pain, no Hottelling T2 test had been performed for comparison of experimental groups 1 and 2, and control groups (Table 3).

Table 1. Summary Statistics and the Results of the Tests for Comparing Groups for Background Variables [a]

	Experimental 1	Experimental 2	Control	P Value [b]
Sex (female)	17 (51)	15 (45)	16 (49)	0.325 [c]
Marital status(married)	21 (63)	19 (58)	20 (60)	0.814 [c]
Smoking	5 (15)	7 (21)	6 (18)	0.810 [c]
BMI category				0.640 [b]
≤ 19.9	0 (0.0)	0 (0.0)	0 (0.0)	
20 0-24.9	12 (36)	10 (30)	12 (36)	
25-29.9	15 (45)	15 (45)	14 (42)	
≥ 30	3 (9)	5 (15)	4 (12)	

[a] Data are presented as No. (%).
[b] Based on Fisher's Exact Test.
[c] Based on Chi-Squared Test.

Table 2. Summary Statistics and the Results of the Tests for Comparing the Repeated Measures Within Groups and Comparing Groups for Study Variables [a]

	Experimental 1	Experimental 2	Control	P Value [b]	Within Control P Value [b]	Within Experimental P Value [c]	Between Groups P Value [d]
SBP	127.77 ± 12.92	126.65 ± 11.90	127.94 ± 13.40	0.205	0.391	< 0.001	0.013
SBP 1	121.97 ± 12.21	124.56 ± 11.54	128.06 ± 13.05	0.004			
SBP 2	121.37 ± 11.43	125.56 ± 10.12	128.20 ± 12.21	0.008			
SBP 3	120.51 ± 10.60	124.13 ± 12.00	127.57 ± 12.12	0.010			
SBP 4	123.31 ± 12.30	122.12 ± 13.90	127.94 ± 13.09	0.032			
DBP	74.34 ± 11.60	73.34 ± 12.9	73.34 ± 9.42	0.239	0.148	0.020	0.042
DBP 1	74.80 ± 11.16	73.68 ± 12.14	72.14 ± 9.15	0.020			
DBP 2	74.57 ± 10.90	75.17 ± 11.09	72.40 ± 9.43	0.036			
DBP 3	73.26 ± 8.28	74.12 ± 8.09	72.43 ± 9.40	0.047			
DBP 4	75.09 ± 11.08	76.09 ± 12.01	72.46 ± 9.55	0.022			
PR	78.14 ± 11.61	78.41 ± 11.50	77.71 ± 11.74	0.878	0.436	< 0.001	0.003
PR 1	74.40 ± 10.08	73.14 ± 8.09	77.83 ± 11.85	0.046			
PR 2	75.86 ± 10.52	74.19 ± 8.9	78.00 ± 12.00	0.043			
PR 3	74.89 ± 9.84	73.05 ± 8.97	77.91 ± 11.59	0.033			
PR 4	72.77 ± 9.58	71.19 ± 10.02	77.97 ± 11.37	0.042			
RR	18.71 ± 2.59	17.17 ± 2.19	18.40 ± 3.82	0.142	0.528	0.003	0.022
RR 1	16.51 ± 2.37	15.99 ± 2.15	18.51 ± 3.67	0.040			
RR 2	15.37 ± 3.29	14.98 ± 2.15	18.49 ± 3.69	0.017			
RR 3	15.91 ± 2.86	14.78 ± 2.14	18.46 ± 3.78	0.039			
RR 4	13.63 ± 2.46	14.16 ± 3.01	18.54 ± 3.50	0.026			
Tem	36.90 ± 1.60	37.00 ± 0.10	36.90 ± 0.10	0.326	0.435	0.021	0.009
Tem 1	36.80 ± 0.20	36.60 ± 0.10	37.00 ± 0.10	0.047			
Tem 2	36.50 ± 0.20	36.60 ± 0.10	36.90 ± 0.20	0.048			
Tem 3	36.70 ± 0.10	36.80 ± 0.10	37.00 ± 0.10	0.047			
Tem 4	36.50 ± 0.30	36.70 ± 020	36.90 ± 0.10	0.049			
SPO 2	90.00 ± 2.00	91.00 ± 2.00	90.00 ± 1.00	0.129	0.234	0.034	0.001
(SPO 2) 1	95.00 ± 3.00	96.00 ± 4.00	90.00 ± 3.00	0.039			
(SPO 2) 2	96.00 ± 2.00	95.00 ± 3.00	91.00 ± 2.00	0.045			
(SPO 2) 3	97.00 ± 3.00	95.00 ± 1.00	92.00 ± 2.00	0.048			
(SPO 2) 4	98.00 ± 4.00	99.00 ± 3.00	92.00 ± 3.00	0.048			

[a] Data are presented as mean ± SD.
[b] P value Based on Repeated Measures ANOVA For Testing Within Control Changes Over Time. Dependent on The Results for Mauchly Test, P Values presented Based on Greenhouse-Geisser Test.
[c] P value Based on Repeated Measures ANOVA For Testing Within Experimental Changes Over Time. Dependent on The Results For Mauchly Test, P Values Presented Based on Greenhouse-Geisser Test.
[d] P value Based on Hottelling T 2 For Comparison of Experimental Groups 1 and 2, and Control Group Overall.

Table 3. Summary Statistics and the Results of the Tests for Comparing the Repeated Measures Within Groups and Comparing Groups for Study Variables

	Median	Quartile 1–Quartile 3	P Value [a]	Within Control P Value [a]	Within Experiment P Value [b]
Pain			0.205	0.251	< 0.001
Experimental 1	7	(7–8)			
Experimental 2	8	(7–8)			
Control	7	(7–8)			
Pain1			0.014		
Experimental 1	5	(5–6)			
Experimental 2	5	(5–6)			
Control	7	(6–7)			
Pain2			0.038		
Experimental 1	5	(4–5)			
Experimental 2	5	(4–5)			
Control	6	(6–7)			
Pain3			0.040		
Experimental 1	5	(4–5)			
Experimental 2	4	(4–5)			
Control	6	(6–7)			
Pain4			0.021		
Experimental 1	5	(4–5)			
Experimental 2	5	(4–5)			
Control	6	(6–7)			

[a] P value Based on Friedman Test For Testing Within Control Changes Over Time.
[b] P value Based on Friedman Test For Testing Within Experimental Changes Over Time. Note That For Pain no Hottelling T 2 Test Has Been Performed For Comparison of Experimental Groups 1 and 2, and Control Groups Overall.

5. Discussion

The results of this study showed that full-body massage therapy improves the different aspects of vital signs in hospitalized patients in ICU.

5.1. Effects of Massage on Vital Signs

The finding of reducing systolic blood pressure is highly consistent with other studies (4-6). This result implicates parasympathetic activation following full-body message, which results in decreasing physiological responses. This decrease in systolic blood pressure may indicate why the patients feel more relaxed (4). To justify the effect of full-body massage therapy on blood pressure, Adib-Hajibagheri et al. (2012) explained that massage increases the pressure in tissues. Moreover, as the gradient of pressure between the tissues and vessels increases, it facilitates the movement of liquids between tissues and vessels and vice versa. Such movement adjusts physiological criteria like blood pressure (24). From mental perspective, full-body message may distract the patient and consequently, reduce anxiety (25), which finally lead to decrease in blood pressure. In addition, message may induce the patients a sense of comfort and relaxation (26) and then endorphins may be secreted (27), vessels become more dilated, the blood flow increases within the superficial vessels of body (28), and blood pressure (BP) will reduce.

Meanwhile, the mean diastolic pressure, pulse rate, temperature, pressure of saturated oxygen, and respiratory rate of the patients significantly change over time after full-body massage therapy session in this study. Previous research studies on the topic of BP change through massage therapy demonstrated either no change or a significant decrease in systolic and diastolic BP; however, results of Cambron et al. (2006) study demonstrated that the change in BP may be based on the massage type, when certain forms of massage actually increase the systolic BP. In this regard It should be noted that, there was no consistency because Cambron et al (2006) explained that trigger point therapy and sports massage were significantly associated with an increase in systolic BP, while there appeared to be a decrease in systolic BP with Swedish massage although, this result was not statistically significant (5).

Extensive review of the literature demonstrated that massage therapy could decrease respiratory rate, heart rate, temperature, and pulse rate and increase SPO2. The results of the present study showed that these variables

significantly improve over time. One possible reason is the inclusion criteria. One of the inclusion criteria was stability in hemodynamic variables and all non-statistically significant variables were in this domain. This does not mean that instabilities in hemodynamic variables are ideal inclusion criteria; it rather means that researchers need to define a border range slightly higher than their normal range for these sensitive variables. Another reason was patients' selection. All selected patients in three groups had partially clinical stable status. This means that clinical parameters such as RR, PR, SOP2, Temperature, and SDB were in normal range, and it is possible that full body massage therapy had positive effects on the mentioned variables, but these effects were not statistically significant.

5.2. Effect of Massage by Family Members

The results of the present study demonstrated that full-body massages therapy by family members, and nurses decreases the level of pain's response of patients. Although few studies have been conducted on this subject, the significance of family participation in providing care to hospitalized patients in ICU has been illuminated by previous studies. Optimal health outcomes are achieved when patients' family members play an active role in providing physical, psychological, emotional, social, and developmental care for their patients (12). In the present study, full-body massage therapy by family members had more positive effects than massage therapy that provided by nurses. Furthermore, family members are most effective as contributors to the medical decision-making and healing process when they are engaged in an open and honest communication with care providers, and when care is tailored to the patient and family's cultural and ethical beliefs, family structure, and traditions (29).

The possible reason for the effectiveness of family members more than nurses' involvement can be explained through transfer of their familiarized emotional powers to patients. ICU is an unknown environment with lots of unfamiliar subjects, and patients try to find more familiar things while hospitalized there. Family members, in the context of their familiarized and desirable emotional help, are excellent medical personnel that can conduct the best non-drug interventions such as full-body massage therapy. Researchers think that the significant results of pain relief can be explained through this familiarized and desirable emotional contact with patients.

5.3. Limitations of the Study

For these types of researches, pilot study is necessary because treatment protocol in different countries and even in different intensive care units may be different. Furthermore, researchers used previous researches for sample determination; and therefore, statistically significant unit specialized for each study was not defined.

The major limitation of this research was lack of restricted methodology to control extraneous variables, which influenced the family members' intervention. Another limitation was the number of patients with prolonged hospitalization who met our inclusion criteria. This was a relatively small study conducted in one hospital in Iran; therefore, the generalizability of our findings may be limited.

5.4. Implications for Nursing and Health Policy

Nursing practice should incorporate the concept of combining nursing care and family members' care to improve physical and psychological states of prolonged hospitalized patients during the acute phase of their hospitalization. The study was carried out to assess the impact of family members' massage therapy on 6 vital signs of hospitalized patients in ICU. The results of this study revealed that complementary approaches, like massage therapy have a beneficial effect on improving the vital signs of the patients. The results also showed that family members' message therapy rather than nurses had several effects on patients' clinical conditions. However, for exact determination of such effects, rigorous design is mandatory to reduce the majority of extraneous variables. Furthermore, family members' involvement should be recognized as one of the most important clinical considerations for all hospitalized patients, especially patients in intensive care unit, as family members are an effective bridge between patients and medical personnel.

5.5. Recommendation of This Study

According to this study, several recommendations were expressed as follows:

1) It is recommended that future studies be conducted on the effects of allowing family members to provide primary care to patients to further clarify the effect of this involvement on different body systems of patients, including their hemodynamic status and response to therapeutic process.

2) Before starting the intervention, family members should develop a positive attitude toward providing primary care to the patient in order to dominate the extraneous variables resulting from cultural inconsistency, especially in Iranian ICU context.

3) Regarding the inclusion criteria, it is recommended that all studies' variables have a defined range slightly higher than normal so that the intervention effect can be demonstrated and differentiated more easily between the variables.

4) Before starting the intervention, the purpose of the study should be clarified and based on this clarification, massage therapy type should be selected.

5) Family members' selection should be designed according to a regular and purposeful protocol. The purposes of the protocol are twofold: identifying more suitable family members, and continuing family involvement in the caring process.

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Authors' Contributions

Hamidreza Jamaati, Amir Vahedian-Azimi, Abbas Ebadi, Fazlollah Ahmadi, Soheil Saadat, Mohammad bagher kashafi, Mohammad Asghari-Jafarabadi, Azar Avazeh, and Seyed Mohammad Reza Hashemian were equally contributed to all aspects of the study such as study concept, and design; data collection, and analysis; drafting of the manuscript; and critical revisions of the paper for important intellectual content and English editing

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References

1. Cutshall SM, Wentworth LJ, Engen D, Sundt TM, Kelly RF, Bauer BA. Effect of massage therapy on pain, anxiety, and tension in cardiac surgical patients: a pilot study. *Complement Ther Clin Pract.* 2010;**16**(2):92–5.
2. Voskresensky IV, Rivera-Tyler T, Dossett LA, Riordan WP, Jr, Cotton BA. Use of scene vital signs improves TRISS predicted survival in intubated trauma patients. *J Surg Res.* 2009;**154**(1):105–11.
3. Middleton PM. Practical use of the Glasgow Coma Scale; a comprehensive narrative review of GCS methodology. *Australas Emerg Nurs J.* 2012;**15**(3):170–83.
4. Hayes JA, Cox C. Immediate effects of a five-minute foot massage on patients in critical care. *Complement Ther Nurs Midwifery.* 2000;**6**(1):9–13.
5. Cambron JA, Dexheimer J, Coe P. Changes in blood pressure after various forms of therapeutic massage: a preliminary study. *J Altern Complement Med.* 2006;**12**(1):65–70.
6. Kaye AD, Kaye AJ, Swinford J, Baluch A, Bawcom BA, Lambert TJ, et al. The effect of deep-tissue massage therapy on blood pressure and heart rate. *J Altern Complement Med.* 2008;**14**(2):125–8.
7. Smith CA, Collins CT, Cyna AM, Crowther CA. Complementary and alternative therapies for pain management in labour. *Cochrane Database Syst Rev.* 2006(4):CD003521.
8. Sherman KJ, Cherkin DC, Kahn J, Erro J, Hrbek A, Deyo RA, et al. A survey of training and practice patterns of massage therapists in two US states. *BMC Complement Altern Med.* 2005;**5**:13.
9. Karagozoglu S, Tekyasar F, Yilmaz FA. Effects of music therapy and guided visual imagery on chemotherapy-induced anxiety and nausea-vomiting. *J Clin Nurs.* 2013;**22**(1-2):39–50.
10. Kimber L, McNabb M, Mc Court C, Haines A, Brocklehurst P. Massage or music for pain relief in labour: a pilot randomised placebo controlled trial. *Eur J Pain.* 2008;**12**(8):961–9.
11. Ladak LA, Premji SS, Amanullah MM, Haque A, Ajani K, Siddiqui FJ. Family-centered rounds in Pakistani pediatric intensive care settings: non-randomized pre- and post-study design. *Int J Nurs Stud.* 2013;**50**(6):717–26.
12. Gooding JS, Cooper LG, Blaine AI, Franck LS, Howse JL, Berns SD. Family Support and Family-Centered Care in the Neonatal Intensive Care Unit: Origins, Advances, Impact. *Semin Perinatol.* 2011;**35**(1):20–8.
13. Lee AC, Leung SS, Mak YW. The application of family-nursing assessment skills: from classroom to hospital ward among final-year nursing undergraduates in Hong Kong. 2012;**32**(1):78–84.
14. Blom H, Gustavsson C, Sundler AJ. Participation and support in intensive care as experienced by close relatives of patients: a phenomenological study. *Intensive Crit Care Nurs.* 2013;**29**(1):1–8.
15. Al-Akour NA, Gharaibeh M, Al-Sallal RA. Perception of Jordanian mothers to nursing support during their children hospitalisation. *J Clin Nurs.* 2013;**22**(1-2):233–9.
16. Tobiano G, Chaboyer W, McMurray A. Family members' perceptions of the nursing bedside handover. *J Clin Nurs.* 2013;**22**(1-2):192–200.
17. Azoulay E, Pochard F, Kentish-Barnes N, Chevret S, Aboab J, Adrie C, et al. Risk of post-traumatic stress symptoms in family members of intensive care unit patients. *Am J Respir Crit Care Med.* 2005;**171**(9):987–94.
18. Azoulay E, Sprung CL. Family-physician interactions in the intensive care unit. *Crit Care Med.* 2004;**32**(11):2323–8.
19. Heyland DK, Rocker GM, Dodek PM, Kutsogiannis DJ, Konopad E, Cook DJ, et al. Family satisfaction with care in the intensive care unit: results of a multiple center study. *Crit Care Med.* 2002;**30**(7):1413–8.
20. Garrouste-Orgeas M, Willems V, Timsit JF, Diaw F, Brochon S, Vesin A, et al. Opinions of families, staff, and patients about family participation in care in intensive care units. *J Crit Care.* 2010;**25**(4):634–40.
21. Mitchell ML, Chaboyer W. Family Centred Care–a way to connect patients, families and nurses in critical care: a qualitative study using telephone interviews. *Intensive Crit Care Nurs.* 2010;**26**(3):154–60.
22. Hopewell S, Altman DG, Moher D, Schulz KF. Endorsement of the CONSORT Statement by high impact factor medical journals: a survey of journal editors and journal 'Instructions to Authors'. *Trials.* 2008;**9**:20.
23. Moher D, Schulz KF, Altman DG, Consort.. The CONSORT statement: revised recommendations for improving the quality of reports of parallel group randomized trials. *BMC Med Res Methodol.* 2001;**1**:2.
24. Adib Hajbaghery M, Abasi A, Rajabi Beheshtabad R, Azizi-Fini I. The Effects of Massage Therapy by the Patient's Relative on Vital Signs of Males Admitted in Critical Care Unit. *Nurs Midwifery Stud.* 2012;**1**(1):16–21.
25. Billhult A, Maatta S. Light pressure massage for patients with severe anxiety. *Complement Ther Clin Pract.* 2009;**15**(2):96–101.
26. Buttagat V, Eungpinichpong W, Chatchawan U, Kharmwan S. The immediate effects of traditional Thai massage on heart rate variability and stress-related parameters in patients with back pain associated with myofascial trigger points. *J Bodyw Mov Ther.* 2011;**15**(1):15–23.
27. Kaada B, Torsteinb O. Increase of plasma β-endorphins in connective tissue massage. *Gen Pharmacol-Vasc S .* 1989;**20**(4):487–9.
28. Eungpinichpong W. *Therapeutic Thai Massage.*Bangkok: Suwiriyasan; 2008.
29. Griffin T. Family-centered care in the NICU. *J Perinat Neonatal Nurs.* 2006;**20**(1):98–102.