ORIGINAL ARTICLE

The Effect of Video Call with Family Members on Physiological Parameters of Critically Ill Patients in Intensive Care Unit: A Quasi-experimental Study

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Abstract

Aim and background: There are not enough studies on the direct effect of virtual patient visits on patients' vital signs in intensive care. The aim of this study is to determine the effect of video calls made between conscious patients and their families on the patient's vital signs and to determine the level of satisfaction.

Materials and methods: The research was carried out quasi-experimentally. Study data were collected from 135 patients and their relatives. The data were collected from the vital signs monitoring form and the Glasgow Coma Scale (GCS). Satisfaction with the video call was measured with a score scale between 0 and 5. Video calls were conducted by an intensive care unit (ICU) nurse every day between 13:00 and 15:00 for 5 days. Physiological parameters were measured 30 minutes before, during, and 30 minutes after the video calls.

Results: The mean patient pulse rate (PR) value was 92.04 ± 12.87, respiratory rate (RR) value was 22.89 ± 3.63, and GCS total score was 14.01 ± 0.12 during the call. There was a statistically significant difference between these values measured during the video calls and the values measured before and after the interview ($p < 0.00$). The mean score of patient satisfaction with the video call was 4.80 ± 0.44; for relatives, the mean score was 4.87 ± 0.33.

Conclusion: This study revealed that video calls with family members affected PR, RR, and GCS of patients hospitalized in ICU.

Clinical significance: Video calls can be implemented in all ICUs where visits are restricted. This practice is well recognized by both families and patients.

Keywords: Communication, Family, Intensive care unit, Intensive care unit patients.

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Highlights

Intensive care units (ICUs) are very stressful environments for patients. In these environments where patient visits are limited, video calls with patients and their families will positively affect their vital signs and satisfaction levels. Nurses can plan care by observing the effects of video calls on the patient.

Introduction

Advanced technology and infection control measures are applied at the highest level in intensive care units (ICUs). The ICU admissions are distressing to both patients and their relatives[1] and can cause them to experience stress, anxiety, and depression.[2,3] Patients experience stress and anxiety for reasons that include sensory deprivation, sensory overload, invasive procedures, excessive environmental stimuli, lack of social support systems, and an unfamiliar environment.[4,5] Stress can alter patients' body temperature, cardiac contractility and output, blood pressure (BP), pulse rate (PR), respiratory rate (RR), and oxygen saturation (SpO_2).[1,3,6,7] Pharmacological and nonpharmacological methods are used to reduce these problems in ICU patients.[1] One such nonpharmacological method is physical visits by family members to ICU patients; however, policies imposed by hospital and ICU management restrict such visits.[8–10] Studies show that physical or virtual visits of family members to ICU patients reduce the incidence of anxiety, depression,[8,11] confusion, agitation, and delirium,[12] promote oxygen saturation,[7] and result increase in the Glasgow Coma Scale (GCS) score.[4] These studies agree that visits, real or virtual, increase the satisfaction of patients and family members.[12,13] Mohammadi et al. determined that organized auditory stimulation by a familiar voice affects BP, body temperature, and consciousness level in patients admitted to the ICU and recommended habitual use of this application.[14,15] Meanwhile Karabacak et al. found that visits to ICU patients had no effect on PR, respiration, BP, and SpO_2 level.[16]

As in most countries,[10] in Turkey, where this study was conducted, relatives of patients receive information about the patient's clinical condition by phone. Visits to the ICU are limited in Turkey.[8] Negative perceptions and attitudes of health staff,

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the need to maintain patient protection, cultural considerations, and organizational challenges present challenges to adopting ICU visitation.[12] It becomes important for hospitals that restrict ICU visitation to adopt virtual visitation methods. To maintain communication between family members and critically ill patients, methods such as routine telephone calls; web-based family conferences,[17] daily video conferences; or phone calls are useful.[18] During the COVID-19 pandemic, the use of video communication technologies gained rapid and global acceptance for enabling communication between patients and their families both in end-of-life care and recovery. Especially virtual visits by telephone inICUs were widely used during the pandemic.[10] Because during the COVID-19 pandemic, many countries have restricted or completely stopped visits to the ICU.[19] Since then video communication has continued to be positively received by patients and family members.[20–23] Apps such as FaceTime and WhatsApp with video conferencing functionality have enabled family members to see and talk to ICU patients.[24] Today, intensive care visits focus on face-to-face visits, but virtual visits are preferred for family members who cannot come to the hospital due to distance, cost or health problems, or in case of patient need.[25] However, there is limited evidence of the effectiveness of video calls among critically ill patients and family members.[5,8]

Many studies have investigated the effect of various auditory stimuli on ICU patients at different levels of consciousness; a limited number have studied video calls between conscious patients and family members and their effect on physiological markers like BP, PR, respiration, GCS. In Turkey, where visits to ICUs are limited, there is a need to examine the physiological effects of video call on patients. The aim of this study is to determine the effect of video calls made between conscious patients and their families on the patient's vital signs and to determine the level of satisfaction.

Materials and Methods

This quasi-experimental study of a single group utilized a pretest–posttest research design. The study conducted in a 40-bed adult ICU of a private university hospital between 15 January and 30 June 2022. Adult ICU consists of five departments. Mostly elderly and critically ill patients with underlying chronic conditions admitted to this unit. Patients who test positive for COVID-19 treated in a separate department.

Population and Sample of the Research

G-Power analysis with Cohen's effect size table determined the sample size. The minimum number for repeated measures variance test was calculated as 132 (effect size, 0.25; α, 0.05; power, 0.95). The study sample included 135 patients who met the following inclusion criteria: Patients who were 18 years of age or older, ICU stay of more than 24 hours, O_2 saturation at least 95%, GCS score at least 13, verbal communication ability, unsedated, willing to meet with family members *via* WhatsApp, and agreeing to participate in the study. Dementia or mental health diagnosis, cognitive impairment, without endotracheal tube inserted, hearing or speech impairment disqualified candidates from the study.

For each patient, only one first-degree relative was included in the study (spouses, children, parents, sisters, or brothers). The cell phone number of this family member was recorded and the patient and family members were informed that there would be a video call *via* WhatsApp between 13:00 and 15:00. Interviews started 24 hours after the patient's admission and lasted for 5 days.

Data Collection Tools

The data collected using the sociodemographic data form, a vital signs follow-up form, and GCS. Satisfaction with the video call was measured with a score scale between 0 and 5 (5 = Very satisfied; 0 = Not satisfied at all). Sociodemographic data form records age, gender, educational status, and length of hospitalization in the ICU. Vital signs monitoring form records PR, BP, RR, and SpO_2 value measured with calibrated monitors by medical technicians.

The Glasgow Coma Scale

Adopted from Teasdale and Jennett in 1974 to assess the patient's level of consciousness, the scale is based on numerical assessment of three responses, namely, eye opening, verbal, and motor responses. The responses together consist of 15 items, though each response was scored separately (eye opening response score out of 4, verbal out of 5, and motor out of 6). The total score possible was between 3 and 15, with score 3 severe indicating neurological deficits (deep coma) and score 15 representing no deficits (full consciousness). The GCS scores of 3–8 indicate poor cognitive recovery, scores of 9–12 indicate average cognitive recovery and scores of 13–15 indicates good cognitive recovery. The GCS assessment of the patients was performed by the researchers.

Data Collection

Video calls were conducted by an ICU nurse every day between 13:00 and 15:00 for 5 days. The calls were made *via* the WhatsApp application for an average of 10 minutes. Patients made video calls with a first-degree relative once a day. During the video call a curtain was closed around the bed to ensure patient's privacy and the nurse waited bedside to ensure patient safety. Family members who conducted video interviews with patients were asked not to talk about their experiences with other patients' families to reduce bias and safeguard the quality of the study. The researcher recorded patient vital signs (PR, BP, RR, and oxygen saturation) and GCS score 30 minutes before, during and 30 minutes after the telephone video call. The researcher asked the patient's relatives to rate their satisfaction with the video call on a scale of 1–5 before the end of the call. Those who rated the interview below 5 were asked for their suggestions. The same scoring was also done by the patient after the video call and the patient's opinions were recorded. The data were analyzed in Statistical Package for the Social Sciences (SPSS) software, version 26. Descriptive data were evaluated with number, percentage and arithmetic mean. Repeated measures ANOVA test was used to compare vital signs, SpO_2 and GCS scores before, during and after the video call.

Results

Of the participating patients, 60.8% were 66 years and older, 51.1% were male, 67.4% were secondary school graduates, and 60.8% were in the ICU for 3–12 days (Table 1).

The mean patient PR value was 85.37 ± 13.00 before the video call, 92.04 ± 12.87 during the call, and 85.94 ± 12.01 after the call. A statistically significant difference existed between the mean patient PR values ($p < 0.001$). Patient PR values were higher during the video call (Table 2). Table 2 presents patient SBP, DBP and SpO_2 values before, during, and after the video call. No statistically significant difference was found between the values measured at three different times ($p > 0.05$). The mean patient RR value was 19.54 ± 5.11 before the video call, 22.89 ± 3.63 during the call, and 19.06 ± 2.69 after the call. A statistically significant

difference was found between the mean RR values ($p < 0.001$). The RR value was higher during the call than before and after the video calls (Table 2).

Table 1: Characteristics of patients ($n = 135$)

Characteristics of patients	*Number (n)*	*Percentage (%)*
Age (years)		
40–65	53	39.2
66–90	82	60.8
Gender		
Woman	66	48.9
Male	69	51.1
Education status		
Secondary school	91	67.4
High school	16	11.9
University	28	20.7
ICU length of stay (days)		
3–12	82	60.8
13–24	53	39.2
Clinical diagnoses		
Respiratory system diseases	87	64.4
Heart and circulatory system diseases	58	42.9
Kidney diseases	21	15.5
Cancer	15	11.1
Infection–sepsis	14	10.4
Digestive system diseases	13	9.6
Neurology diseases and trauma	12	9.0
Chronic diseases		
Hypertension	85	62.9
Hypertension + diabetes	76	56.3
Diabetes	75	55.5
Chronic kidney failure	21	15.5
Chronic obstructive pulmonary disease	20	15.8

ICU, intensive care unit

The mean GCS total scores of the patients were 13.27 ± 0.96 before the call, 14.01 ± 0.12 during the call, and 13.79 ± 0.93 after the call. The difference between these values was statistically significant ($p < 0.001$). The mean GCS total scores of the patients were higher during the video call (Table 2).

The mean score of patient satisfaction with the video call was 4.80 ± 0.44; for relatives the mean score was 4.87 ± 0.33. No difference was determined between the satisfaction level of the two groups ($p > 0.05$). Patients who gave a score of 3 and 4 for satisfaction explained that the transition from their accustomed roles to the role of patient was difficult and impacted them negatively although they stated that they were satisfied with the meetings with their families. Some of the patients' relatives ($n = 32$) expressed a preference for a slightly longer the video call duration (Table 3).

Discussion

There have been studies on the efficacy of auditory stimuli applied with music, nature, voices of nurses or family members in comatose patients, but few studies of video calls between conscious ICU patients and their families and the effects of these calls on patient physiologic markers. This study's results revealed that video calls with family members of critically ill patients caused an increase on HR, RR, and GCS values, but had no effect on BP and SpO_2.

This study determined that HR and RR values of the patients increased during the video call. Research conducted with stroke patients found a difference between PR and RR measured before, during and after visits, determining that the values measured before visits were lower than the others and stating that the increased pulse and RR did not pose a risk for the patient.[26] A study in which patients with impaired consciousness were made to listen to music and voice messages of relatives determined that auditory stimuli increased oxygen saturation and RR.[27] Another study determined that relatives' visits to surgical ICU patients were positively received by the patients, but the visits did not cause a significant physiological change in vital signs;[16] these results differ from those of this study. However, another study determined that auditory stimulus given to comatose patients by a family member did not cause any change in HR and RR values.[28,29]

Table 2: Comparison of vital signs, SpO_2, and GCS score of patients (5-day average)

	Before VC[a] Mean ± SD	*During VC[b] Mean ± SD*	*After VC[c] Mean ± SD*	*F-value*	*p-value*
PR	85.37 ± 13.00	92.04 ± 12.87	85.94 ± 12.01	306.239	**0.000*** b > a, b > c
SBP	115.58 ± 20.97	115.80 ± 20.89	115.76 ± 20.67	0.969	0.358
DBP	75.53 ± 14.61	75.60 ± 14.58	75.57 ± 14.61	0.648	0.524
RR	19.54 ± 5.11	22.89 ± 3.63	19.06 ± 2.69	73.710	**0.000*** b > a, b > c
SpO_2	95.96 ± 1.69	96.03 ± 1.75	96.07 ± 1.52	2.566	0.083
GKS–eye movements	3.55 ± 0.34	3.98 ± 0.47	3.80 ± 0.37	30.455	**0.000*** b > a, b > c
GCS–verbal response	4.51 ± 0.42	4.98 ± 0.2	4.87 ± 0.39	79.866	**0.000*** b > a, b > c
GKS–motor movements	4.98 ± 0.65	5.69 ± 0.69	5.42 ± 0.62	67.924	**0.000*** b > a, b > c
GKS–total	13.27 ± 0.96	14.01 ± 0.12	13.79 ± 0.93	154.710	**0.000*** b > a, b > c, c > a

DBP, diastolic blood pressure; SBP, systolic blood pressure; SpO_2, oxygen saturation; SS, standard deviation; VC, video call; *Significant when $p < 0.001$

Table 3: Satisfaction levels of patients and their relatives from video calls (n = 135)

	Points				
	3 points	*4 points*	*5 points*	*Mean ± SD*	*t-value p-value*
Satisfaction with the interview					
Patients	3	20	112	4.80 ± 0.44	t = –1.386
Family members	0	17	118	4.87 ± 0.33	p = 0.167
Interview time					
Patients	0	3	133	4.94 ± 0.22	t = 4.042
Family members	0	32	103	4.78 ± 0.41	p = 0.000

In our study, video calls increased patient GCS values. Studies of comatose patients listening to the voices of family members have observed increased patient GCS scores;[4,15,28–31] yet there are also studies that have found GCS scores unchanged when comatose patients listen to the voices of family members.[28] Despite the differences in results, it has been suggested that auditory stimuli can used for neurorehabilitation in critically ill patients.[32]

This study found video calls had no effect on BP and SpO_2 of the patients. Some studies examining the effectiveness of a family member's recorded voice message in comatose patients found that voice stimulation did not change BP and SpO_2 values.[28,29] In contrast to this study's results, sensory and tactile stimulation applied to critically ill patients by family members increased patient SpO_2 values.[7,26] In a study conducted with patients hospitalized in the stroke unit, BP and SpO_2 values during and after family visits increased compared to values before.[26] Further, organized auditory stimulation with a familiar voice caused significant differences in BP and body temperature in critically ill patients.[14]

Auditory and visual stimulations are known to have effects on hemodynamic indicators in critically ill patients. Auditory and sensory stimuli can increase cognitive function level and initiate the reticular activation system, helping the patient emerge from coma.[30] Interaction of conscious patients with family members decreases sympathetic system activity and lowers stress and consequently may lead to hemodynamic changes.[14,31]

This study found that patients and their relatives were very satisfied with video call visits. Sometimes, patients find transition from their accustomed roles to the role of patient difficult. They often feel uncomfortable when family members see them lying helplessly in bed. For this reason, it is important to prepare the patient physically for the video call.

Studies have determined that when ICU visits are restricted, patients and family members welcome virtual visits.[5,8,22] Family members consider the use of technology and video communication effective in combination with face-to-face bedside visits.[5,22] Virtual visits allow patients and their relatives to communicate face-to-face and to see and hear family members clearly during live communication. Video visits in the ICU are easy to implement and contribute to improving patient and family centered care.[5] Especially during the COVID-19 pandemic, patient anxiety decreased after video calls, which contributed to patient recovery.[8,22] Today, many software are being developed to facilitate patient and family communication, and these programs are used with the help of smart phones or tablets. The use of various applications and technologies for patient and family member communication is promising as it will improve patient satisfaction and enable the healthcare provider to provide better care to the patients.[33]

Limitations

Because this is a single-center study, it cannot generalize to other ICUs with different characteristics. Patients' satisfaction levels with the interview may have been affected by factors such as the stress of being in the ICU and the effect of the medications administered.

Conclusion

This study revealed that video calls with family members affected PR, RR, and GCS values of patients hospitalized in ICU, but had no effect on BP and SpO_2. The study determined that patients and their relatives were very satisfied with the video visit as practiced. ICU video calls can be applied to supplement face-to-face visits, providing additional options for patients and their families. As there is an insufficient number of studies in the literature examining the effect of video visitation on vital signs of conscious critically ill patients, further research is needed.

Clinical Significance

Video calls can be implemented in all ICUs where visits are restricted. This practice is well recognized by both families and patients.

Authors' Contributions

NU conceived the study idea, designed the study and conducted the data collection. NU and DV conducted statistical analyses, reviewed the literature, drafted the manuscript, and wrote the article. NU and DV take responsibility for the article.

Ethical Approval

Written permissions were obtained from the Human Research Ethics Committee of İstinye University (Date: 22.12.2021/Decision No.: 21-124) and the hospital administration for the implementation of the study. The researcher obtained written informed consent from patients and family members.

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