The Impact of Tele-education on the Mobilization of mothers post Cesarean Section

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Original Article

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Abstract:

Starting points: When it comes to nursing, the incorporation of information and communication technologies represents a tool for improving the availability of nursing care, reducing costs for its provision, reducing disparities in the provision and access to nursing care, and, last but not least, the development of nursing as a scientific field. One rapidly developing nursing service abroad is, for example, telenursing, and in the

Slovak Republic it is tele-education.
Objectives: The objective was to create and implement a tele-education program for physical activity that was intended for respondents who had undergone a cesarean section. The program should be accessible using a QR Code created in Microsoft Sway, and the outcome should be the ability to analyze the impact of the tele-education program on the early mobility of postpartum women and the prevention of postpartum and postoperative complications.
Research sample and methods: The research sample consisted of 411 respondents from an obstetrics and gynecology clinic. The average age of the respondents was 31 years. It was a quasi-experiment. A self-constructed questionnaire was used for data collection. Statistical tests, including the Chi-square test and Cramer's V, were used for data analysis.
Results: We found statistically significant strong relationships between completing the tele-education program and the early mobility of respondents after a cesarean section in favor of its completion: an earlier start of exercise (V=0.571); getting out of bed with less assistance after surgery for the first time after 24 hours (V=0.428); more stable and confident walking 3 days after the surgery (V=0.386).
Conclusion: The development of various mobile platforms in the 21st century indicates the interest in tele-education and its positive impact on health and illness.

Introduction

Similar to the implementation of telemedicine across medical fields, tele-nursing can also be applied to all age categories and in several nursing domains. These areas include tele-education and remote counselling. Based on the WHO Health 21 document, the National Health Promotion Program of Slovakia includes the preparation and implementation of educational programs for individuals, families, and communities on the topics of health and illness. It also promotes the development of technologies and services supporting healthcare. Digital technologies in nursing and its applied fields, including gynecological and obstetric nursing, contribute to alleviating the concerns, biases, and prejudices of puerperal women and to close collaboration within nursing teams. Physical activity and the overall mobilization of postpartum women are significant components of therapeutic approaches aligned with nursing care and interdisciplinary collaboration in implementing non-pharmacological treatments. Prokešová (2018) points out the fact that without subsequent postpartum exercises with a longer interval, the function of pelvic floor muscles would be compromised, leading to pelvic organ prolapse, the development of stress incontinence with manifestations of sexual dysfunction, and lumbopelvic pain. Nursing care and physiotherapy complement each other, and therapeutic approaches and procedures are implemented to support, maintain, and restore health. Information and communication technologies can assist healthcare institutions in addressing the shortage of nurses. These technologies have emerged at a time when patients suffering from chronic illnesses require expanded consultations and services. This represents an opportunity for educated nurses to "go virtual" and enhance their value as healthcare professionals (Fadhila, Afrian, 2020). Trends in the development of nursing care in the 21st century are expanding the nurse's role to include the provision of tele-nursing through

information and communication technologies whenever physical distance exists between a patient and a nurse.

Goal

The goal was to implement the tele-education physical activity program for mothers after a cesarean section that was embedded in a QR code and to analyze its impact on the physical condition of the mothers – more specifically, their mobility. Through deliberate, methodical guidance and the repetition of selected exercises, we aimed to support the function of a specific organ system in postpartum women. We hypothesized tele-education would have a significant impact on the physical activity of the experimental group of respondents compared to the control group. We assumed there would be more significant differences in selected indicators of physical condition among respondents who completed the tele-education program compared to respondents after a C-section who did not complete the program: verticalization after 24 hours, walking stability, turning over in the bed, sitting after 24 hours, and self-sufficiency in daily activities.

The Sample

The sample consisted of 411 respondents who underwent obstetric surgery with the medical diagnosis of cesarean section according to ICD-10 code O82.0. They all expressed their consent to participate in the tele-education program and complete the provided questionnaire. The average age of the respondents was 31 years. The inclusion criteria were respondents after a cesarean section and having undergone general anesthesia. Out of the total number of respondents, 138 mothers (33.6%) voluntarily completed the tele-education program, 113 mothers (27.5%) partially completed the program, and 160 mothers (38.9%) did not complete the tele-education program. The age distribution of the sample is practically identical in the group that participated in the program and the group that did not participate in the program ($p = 0.943$).

Methodology

This was a quasi-experiment. Respondents were divided into control and experimental groups based on their expressed interest in participating in the tele-education program. To examine the established methodological phenomena, we used methods of analysis and synthesis to observe the relationships between various variables and the effect of the application of tele-education. An online self-constructed questionnaire and the Get Up and Go evaluation and measurement scale (Libová et al., 2020) were used for data collection. The questionnaire contained 26 items that identified the physical condition of mothers, specifically their mobility in relation to tele-education. Descriptive statistical characteristics were used for data analysis: n – frequencies, % – relative frequencies with first-degree and second-degree classification tables. To evaluate the individual objectives and compare the groups, we used the Chi-square test of homogeneity with a significance level of $\alpha=0.05$. The test assesses the overall statistical significance of differences in response options among examined subgroups.

To assess the strength of the relationship between the examined variables in conjunction with the Chi-square test, we used the value of Cramer's V. A V-value around 0.50 indicates a relatively strong relationship, while a value greater than 0.60 indicates a strong or very strong relationship.

The collection of empirical data was carried out at the Faculty Hospital in Nitra at the obstetrics and gynecology clinic in the postpartum department from June to November 2022 with written consent from the ethics committee. The tele-education program was created using the online presentation tool MS Sway. The content included an educational-instructional program on the principles of physical activity after cesarean delivery. The tele-education was structured for the first three days post-C-section, starting within the first two hours after delivery, with the aim of early mobilization and recovery. After completing the tele-education program, respondents filled out an online questionnaire that was part of a series of 10 instructional physical activity procedures to be done over time. Pilot testing was conducted in June 2022 at the Faculty Hospital in Nitra. Awareness of the tele-education program was promoted in the postpartum

department at the Faculty Hospital in Nitra with the help of nurses and midwives, who informed the respondents about the QR code that was laminated and placed in each room.

Figure 1 QR code of the tele-educational physical activity program (Source: author)

We implemented the physical activity tele-education program embedded in a QR code (Figure 1). Subsequently, we examined the impact of the tele-educational physical activity program on the early mobility of mothers after cesarean section.

The results

We present the responses to selected questions from the questionnaire and compare different areas in terms of completion, partial completion (experimental group), and non-completion (control group) of the tele-education program for mothers after C-section. We investigated when the respondents started exercising after the C-section in relation to their participation in the program. The results are presented in Table 1.

We found a statistically significant difference in exercising, specifically the start of exercising after the surgery in relation to participation in the tele-education program ($\chi^2(8)=267.7$, $p<0.001$; $V=0.571$, $p<0.001$). The relationship between the variables can be considered large ($V=0.571$).

We also analyzed a statistically significant difference in getting out of bed for the first time after the C-section in relation to participation in the tele-education program (Table 2).

We found a statistically significant difference in getting out of bed for the first time after the surgery in relation to participation in the tele-education program ($\chi^2(4)=150.6$, $p<0.001$; $V=0.428$, $p<0.001$). The relationship between the variables can be considered large ($V=0.428$).

Table 1 Differences at the beginning of exercise due to the completion of the TP

Exercise:		yes	partially	no	overall
2 hours after C-Section	n	65	6	5	76
	%	47.10%	5.30%	3.10%	18.50%
6 hours after C-Section	n	54	23	18	95
	%	39.10%	20.40%	11.30%	23.10%
12 hours after C-Section	n	16	21	23	60
	%	11.60%	18.60%	14.40%	14.60%
Later	n	3	59	49	111
	%	2.20%	52.20%	30.60%	27.00%
I did not exercise	n	0	4	65	69
	%	0.00%	3.50%	40.60%	16.80%
Overall	n	138	113	160	411
	%	100.00%	100.00%	100.00%	100.00%
			Value	df	P
		χ^2	267.7	8	<0.001
		Cramer V	0.571		<0.001

We also examined the difference in walking three days after the surgery in relation to participation in the tele-education program (Table 3).

We found a statistically significant difference in walking three days after the surgery in relation to participation in the tele-education program ($\chi^2(4)=122.2$, $p<0.001$; $V=0.386$, $p<0.001$). The relationship between the variables can be considered large ($V=0.386$).

We also investigated differences in turning over in bed three days after the C-section based on the completion of the tele-education program (Table 4).

We found a statistically significant difference in turning over in the bed three days after the surgery in relation to participation in the tele-education program ($\chi^2(4)=80.1$, $p<0.001$; $V=0.312$, $p<0.001$). The relationship between the variables can be considered moderately large ($V=0.312$).

Table 2 Differences in the first movement - getting out of bed after 24 hours in relation to the completion of the tele-education program

Getting out of bed for the first time:		**yes**	**partially**	**no**	**Overall**
Without any help	n	52	4	3	59
	%	37.70%	3.50%	1.90%	14.40%
With the help of hands	n	78	85	72	235
	%	56.50%	75.20%	45.00%	57.20%
With the help of medical staff	n	8	24	85	117
	%	5.80%	21.20%	53.10%	28.50%
Overall	n	138	113	160	411
	%	100.00%	100.00%	100.00%	100.00%
			value	df	p
		χ^2	150.6	4	<0.001
		Cramer V	0.428		<0.001

Table 3 Differences in walking three days after surgery in relation to the completion of the tele-education program

Walk:		**yes**	**partially**	**no**	**Overall**
Steady	n	83	17	19	119
	%	60.10%	15.00%	11.90%	29.00%
Unsteady	n	50	63	70	183
	%	36.20%	55.80%	43.80%	44.50%
Unstable	n	5	33	71	109
	%	3.60%	29.20%	44.40%	26.50%
Overall	n	138	113	160	411
	%	100.00%	100.00%	100.00%	100.00%
			Value	df	P
		χ^2	122.2	4	<0.001
		Cramer V	0.386		<0.001

We also analyzed a statistically significant difference in sitting up three days after the C-section in relation to the completion of the tele-education program (Table 5).

We found a statistically significant difference in sitting up three days after the surgery in relation to participation in the tele-education program ($\chi^2(4)=65.3$, $p<0.001$; $V=0.282$, $p<0.001$). The relationship between the variables can be considered moderately large ($V=0.282$).

We also investigated a statistically significant difference in the assessment of self-sufficiency in daily activities based on the completion of the tele-education program. The results are presented in Table 6.

We found a statistically significant difference in the assessment of self-sufficiency in daily activities based on the completion of the tele-education program ($\chi^2(4)=113.7$, $p<0.001$; $V=0.372$, $p<0.001$). The relationship between the variables can be considered large ($V=0.372$).

Table 4 Differences in turning over in the bed three days after the C-section based on the completion of the tele-education program

Turning over in the bed		yes	partially	no	Overall
Certain	n	27	13	2	42
	%	19.60%	11.50%	1.30%	10.20%
Uncertain	n	106	66	85	257
	%	76.80%	58.40%	53.10%	62.50%
Significantly uncertain	n	5	34	73	112
	%	3.60%	30.10%	45.60%	27.30%
Overall	n	138	113	160	411
	%	100.00%	100.00%	100.00%	100.00%
			value	df	p
		χ^2	80.1	4	<0.001
		Cramer V	0.312		<0.001

Table 5 Differences in sitting up three days after surgery based on the completion of the tele-education program

Sitting up in bed:		yes	partially	No	Overall
Without any help	n	40	10	4	54
	%	29.00%	8.80%	2.50%	13.10%
With the help of hands, leaning	n	92	76	112	280
	%	66.70%	67.30%	70.00%	68.10%
Significantly uncertain, help needed	n	6	27	44	77
	%	4.30%	23.90%	27.50%	18.70%
Overall	n	138	113	160	411
	%	100.00%	100.00%	100.00%	100.00%
			value	df	p
		χ^2	65.3	4	<0.001
		Cramer V	0.282		<0.001

Discussion

The aim of the study was to compare various aspects of mobility based on the completion, partial completion, and non-completion of the implemented tele-education program among mothers after cesarean section. Maskalová (2018) highlights the most common problems faced by mothers, such as getting out of bed and surgical scar pain. Libová et al. (2020) emphasize the objective assessment of a patient's condition, the application of new scientific knowledge, and effective nursing procedures for patients after surgery. In the context of investigating the impact of the tele-education program (TP) on the mobility of mothers, we evaluated the relationship between the tele-education program and the variables of physical activity immediately after 2, 6, and 12 hours post-C-section, categorizing the impact as significant. Out of 411 mothers, 14.6% to 27.0% used each of the online physical activity time options, clearly indicating that mothers who completed the TP, or even partially completed it, began exercising earlier after the cesarean section compared to mothers who did not participate in the TP at all. We found a statistically significant difference when getting out of bed for the first time after the operation with regard to the completed program. Mothers were significantly more capable of standing up without assistance if they completed the entire TP. Conversely, only a small number of mothers who partially completed or did not complete the program were able to stand up without assistance. After completing the TP, a greater proportion of mothers had a stable walk on the third day post-operation. In contrast, those who did not complete the program continued to experience unstable walking on the third day post-operation. The relationship between the variables concerning turning over in the bed can be considered moderate. The difference was most noticeable in the evaluation of turning as significantly uncertain; very few mothers who completed the program exhibited this, whereas nearly half of those who did not complete the program did. Approximately 1/3 of the mothers were able to sit up without assistance if they completed the TP. Regardless of program completion, about 2/3 of the mothers used hand support or leaning to sit up. Mothers required more significant assistance in sitting up even after 3 days, with about 1/4 of the mothers who did not complete or partially completed the program needing assistance. The largest statistically significant difference favors the group that completed the entire TP, as mothers were self-sufficient and independent in 63% of these cases. Conversely, in the group that did not complete the program, self-sufficiency was at the level requiring substantial assistance in nearly 1/3 of cases. The results indicate relative-

Table 6 Differences in self-sufficiency in daily activities based on the completion of the tele-education program

Self-sufficiency:		yes	partially	no	Overall
I am self-sufficient and independent	n	87	16	22	125
	%	63.00%	14.20%	13.80%	30.40%
I need minimal help	n	46	72	90	208
	%	33.30%	63.70%	56.30%	50.60%
I need a lot of help	n	5	25	48	78
	%	3.60%	22.10%	30.00%	19.00%
Overall	n	138	113	160	411
	%	100.00%	100.00%	100.00%	100.00%
			value	df	p
		χ^2	113.7	4	<0.001
		Cramer V	0.372		<0.001

ly strong relationships between the early mobility of mothers and completing the implemented TP. The tele-education on breathing, vascular gymnastics for arms and legs, gradual verticalization, and exercises for sitting and lying down were confirmed to have a significant effect on the mobility of mothers, and this was directly targeted by individual studied variables. Jingru et al. (2020) conducted a prospective randomized study implementing ERAS, including lateral rotation within 6 hours and post-operative verticalization within 24 hours. Movement was assessed using the VAS scale on the first and the second day postpartum. The VAS scale was also used to evaluate the satisfaction of mothers, showing that the satisfaction of the group using the ERAS protocol was significantly higher and included various therapeutic approaches in contrast to the control group. Research has shown that delayed mobilization, functional recovery, and breastfeeding difficulties have a significant impact on pain and postoperative complications. Sancho et al. (2015) conducted a cross-sectional experimental study in Portugal investigating the impact of abdominal exercises on mothers after cesarean section (CS). The intervention involved three abdominal drawing-in exercises. Subsequently, ultrasound produced three images of the abdominal wall above and below the umbilicus in JPG format, concluding that the exercise results were more effective below the umbilicus than above it. Laronche et al. (2017) characterized early mobilization within 6-8 hours post cesarean section in a comparative multicenter prospective study. Their assessment included sitting ability, early fluid intake, light food intake within 8 hours, infusion therapy lasting less than 12 hours, the removal of the urinary catheter within 12 hours, and oral analgesics limited to the first day post-operation. The study found higher satisfaction among mothers and lower pain scores on the third day in the group using Enhanced Recovery After Surgery (ERAS) programs, which has been confirmed. Boden et al. (2018) investigated the impact of physiotherapeutic care, breathing exercises, and early mobilization on the health of mothers. The results favored physiotherapeutic care, which prevented postoperative complications and improved physical health compared to mothers receiving standard nursing care. Physiotherapy is an effective and cost-effective treatment with minimal harm to mothers. Breathing techniques and the effects of core exercises post C-section were also reviewed by Gürsen et al. (2016), who evaluated this through muscle and abdominal tests after 4 weeks. Mothers' problems decreased, and postpartum complications were eliminated. Based on the results of our study, exercises added through the TP are more effective than the exercise alone.

In a study by Chermak et al. (2016), the benefits of incorporating physical activity into comprehensive post-C-section care management to improve treatment outcomes and alleviate surgical procedure consequences were confirmed. The purpose of the randomized controlled study by Weerasinghe et al. (2022) was to examine the effectiveness of personalized physiotherapy training and education for mothers undergoing a C-section. They similarly assigned benefits to physical activity, breathing techniques, and postural care, which reduced the immediate pain associated with the surgical incision and difficulties in functional activities, as we also presented in our research. Mothers who completed the tele-education program had significantly better outcomes compared to the group receiving standard nursing care, suggesting that physical activity can be a beneficial adjunct in improving postpartum recovery.

Conclusion

In Slovakia, the utilization of tele-nursing is still in its early stages. Physical activity represents a significant part of therapy in both prenatal and especially postnatal periods. Movement and vitality among the current "digital" generation of mothers are declining sharply, making it appropriate to focus mothers' attention on a new way of delivering and presenting nursing care online via QR codes. We identified the positive impact of an online tele-education program on the mobility of respondents after a cesarean section. Mobile platforms are currently used across all sectors; therefore, it is desirable to implement them in various applied fields of nursing, including preoperative and postoperative patient care. Tele-education interventions in

physical activity that were tailored to the needs of mothers, creative, and engaged nurses in information and communication technologies and tele-nursing contributed to the postpartum health of respondents.

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