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The impact of early mobilization through a tele-education program on health condition of mothers after caesarean section

Wpływ wczesnej mobilizacji poprzez program teleedukacji na stan zdrowia matek po cesarskim cięciu

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A – Development of the concept and methodology of the study/Opracowanie koncepcji i metodologii badań; B – Query - a review and analysis of the literature/Kwerenda – przegląd i analiza literatury przedmiotu; C – Submission of the application to the appropriate Bioethics Committee/Złożenie wniosku do właściwej Komisji Biotycznej; D – Collection of research material/Gromadzenie materiału badawczego; E – Analysis of the research material/Analiza materiału badawczego; F – Preparation of draft version of manuscript/Przygotowanie roboczej wersji artykułu; G – Critical analysis of manuscript draft version/Analiza krytyczna roboczej wersji artykułu; H – Statistical analysis of the research material/Analiza statystyczna materiału badawczego; I – Interpretation of the performed statistical analysis/Interpretacja dokonanej analizy statystycznej; K – Technical preparation of manuscript in accordance with the journal regulations/Opracowanie techniczne artykułu zgodne z regulaminem czasopisma; L – Supervision of the research and preparation of the manuscript/Nadzór nad przebiegiem badań i przygotowaniem artykułu

STRESZCZENIE

WPŁYW WCZESNEJ MOBILIZACJI POPRZEZ PROGRAM TELEEDUKACJI NA STAN ZDROWIA MATEK PO CESARSKIM CIĘCIU

Cel pracy. Pielęgniarki mogą świadczyć zdalną opiekę pielęgniarską bez fizycznej obecności pacjenta w środowisku klinicznym, szczególnie w zakresie teleedukacji, poradnictwa i telemonitoringu. Celem pracy było stworzenie i wdrożenie programu teleedukacji w zakresie aktywności fizycznej dla matek po cięciu cesarskim oraz analiza jego wpływu na kondycję fizyczną badanych.

Materiał i metody. Próba składała się z 411 uczestniczek, ich średnia wieku wynosiła 31 lat. Zastosowano quasi-eksperyment. Do oceny wpływu programu teleedukacji wykorzystano samodzielnie skonstruowany kwestionariusz. Dane zostały przeanalizowane przy użyciu testu Chi-kwadrat i współczynnika V Cramera.

Wyniki. Stwierdzono istotny statystycznie związek pomiędzy uczestnictwem w programie teleedukacji a lepszym stanem fizycznym matek po cięciu cesarskim, w szczególności w zakresie występowania bólu, gojenia się ran i komfortu żołądkowo-jelitowego.

Wnioski. Wyniki wskazują na istnienie korzyści płynących z teleedukacji w pielęgniarstwie ginekologiczno-położniczym, tym samym sugerując, że rozwój telepielęgniarstwa jest pożądany i może przyczynić się do zwiększenia jego dostępności, co wpłynie na jakość opieki pielęgniarskiej i satysfakcję matek po cięciu cesarskim.

Słowa kluczowe: zdrowie, telepielęgniarstwo, ćwiczenia, ginekologia

ABSTRACT

THE IMPACT OF EARLY MOBILIZATION THROUGH A TELE-EDUCATION PROGRAM ON HEALTH CONDITION OF MOTHERS AFTER CAESAREAN SECTION

Aim. Nurses can provide remote nursing care without the patient being physically present in a clinical setting, especially in the areas of tele-education, counselling, and telemonitoring. The goal was to create and implement the tele-education program of physical activity for mothers after a caesarean section and analyse its impact on their physical condition.

Material and methods. The sample consisted of 411 participants with an average age of 31 years old. It was a quasi-experiment. To evaluate the effect of the tele-education program a self-constructed questionnaire was used. Data were processed using the Chi-square test and Cramer's V.

Results. Statistically significant relationships were found between participation in the tele-education program and better physical condition of mothers after a caesarean section, specifically in terms of pain occurrence, wound healing, and gastrointestinal comfort.

Conclusions. The findings indicate the benefits of tele-education in gynaecological-obstetric nursing, suggesting that the development of telenursing is desirable and can contribute to increasing its accessibility, thereby affecting the quality of nursing care and satisfaction of mothers post-caesarean section.

Key words: health, telenursing, exercise, gynaecology

INTRODUCTION

The increasing trend in caesarean section rates, the rising age of first-time mothers, and the growing number of mothers undergoing assisted reproduction or operation create opportunities for the development of telehealth care in gynaecology and obstetrics [1-2]. The authors state that the COVID-19 pandemic has changed traditional approaches in healthcare and forced the implementation of remote healthcare systems. Studies indicate that telehealth is effective in obstetrical care, yet with the lack of limited scientific evidence on its implementation [3]. The specific effectiveness of telehealth in obstetric care is reflected in results across areas such as monitoring, education, remote data collection, nursing interventions, pain management, family support, and multidisciplinary care. The telehealth is recommended as innovative way to improve quality and safe care [4]. The results assign that telehealth can be especially beneficial for patients/mothers at higher risk of morbidity or poor birth outcomes. It is estimated that positively evaluated telehealth applications support healthy habits, perinatal care, and breastfeeding issues among rural and uneducated mothers [5]. Tele--nurses educated first-time mothers and family members about the benefits of breastfeeding and guided them on proper lactation techniques, thus supporting their health literacy in newborn and infant care. An important topic in post-caesarean section care is early mobilization. Early mobilization can reduce the risk of complications during postpartum period, enhance maternal and child safety and health [6]. Early mobilization after caesarean section performed by a multidisciplinary team can shorten hospitalization, reduce the incidents of complications, and improve recovery [7]. The authors also state that education in postoperative caesarean delivery directly impacts postoperative rehabilitation. Education was provided through various forms including C- section recovery manual with text and images, wall posters and videos at the maternity ward. These educational activities resulted in increased adherence to postoperative activity plans among mothers after the C-section.

AIM

The aim of our research was to apply tele-educational physical activity program for mothers after a caesarean section and to analyse its impact on physical condition of mothers, the occurrence of pain, wound healing, nausea, nutrition, and bowel peristalsis.

MATERIALS AND METHODS

The participant group consisted of 411 mothers who underwent a caesarean section and agreed to participate in the study. The average age of the participants was 31 years old. Inclusion criteria were general anaesthesia for Caesarean delivery, consent to participate and willingness to cooperate. All participants attended childbirth education classes. Exclusion criteria were mothers with immediate postoperative complications, caesarean section under spinal anaesthesia, refusal to consent, and inability to participate. The care for mothers and newborns was provided by the rooming-in system. Out of the total number of participants, 138 mothers (33.6%) with written permissions completed the tele-educational program, for various reasons 113 mothers (27.5%) partially completed the program, and 160 mothers (38.9%) did not participate in the tele-educational program. Those participants who completed the entire program in full were included in the experimental group (n = 138) and those who completed the program only partially or did not participate in it were included in the control group (n = 273). The distribution of births was as follows: 15% for first-borns, 32.1%, for second--borns 43.3% for third-borns, and 9.2% fourth-borns.

It was a quasi-experiment. There was a control and an experimental group, however they were not statistically equivalent as no randomization was performed. Participants were divided into experimental and control groups based on their interest in participating in the program. A self-constructed questionnaire was used for data collection evaluating mothers' physical condition. A proprietary questionnaire was used to collect data, assessing the mothers' physical condition, specifically the intensity of pain on a scale from 1 to 10, which was categorized as no pain, mild, moderate, severe, worst pain imaginable; then wound healing, nausea and vomiting, dietary intake, and recovery of intestinal peristalsis were assessed by answering questions with yes, partially, no, and overall options. Statistical tests, including the Chi-square test for homogeneity, were conducted, resulting in a marginal significance level of p=0.05. Additionally, Cramer's V was used to assess the strength of the association between two categorical variables.

The collection of empirical data was carried out at the Faculty Hospital in Nitra, at the Obstetrics and Gynaecology Clinic in the postpartum department, with written consent from the ethics committee, from June to November 2022.

Pilot testing was conducted in June 2022. The tele-education program was created using an online presentation tool MS Sway and embedded into QR code. The QR code was provided to the respondents during psychophysical preparation for childbirth. The content included an educational-instructional program on the principles of physical activity after caesarean delivery. Tele-education was structured for the first three days, three times a day, 15 minutes post-C-section with the aim of an early mobilization and recovery. The tele-education programme was developed on the basis of the acquired expertise and in accordance with the professional scientific literature. The nurses were trained to use the tele-educational program.

Physical activities included relaxation, breathing exercises, vascular gymnastics, pelvic floor exercises, verticalization, exercises supporting bowel peristalsis, scar massage and supplementary exercises for sitting and lying down. After completing the tele-education program, respondents filled out an online questionnaire which was part of a series of 10 instructional physical activity procedures over time. Awareness of 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. Patients who did not participate were educated through the standard process by a nurse during the provision of nursing care in the gynaecology and obstetrics clinic.

RESULTS

A statistically significant difference was found in the intensity of pain on the 3rd day after C-section in relation to participation in the tele-education program ($\chi^2(8) = 71.9$, $p < 0.001$; $V = 0.277$, $p < 0.001$). The relationship between the variables can be considered moderately strong (Tab. 1).

Tab. 1. Differences in pain intensity three days post-operation based on participation in the tele-education program

Pain intensity:		Yes	Partially	No	Overall
No pain	n	23	2	15	40
	%	16.70	1.80	9.40	9.70
Mild	n	92	49	57	198
	%	66.70	43.40	35.60	48.20
Moderate	n	17	38	54	109
	%	12.30	33.60	33.80	26.50
Severe	n	6	23	31	60
	%	4.30	20.40	19.40	14.60
Worst pain imaginable	n	0	1	3	4
	%	0.00	0.90	1.90	1.00
Overall	n	138	113	160	411
	%	100.00	100.00	100.00	100.00
			Value	df	p
		χ^2	71.9	8	<0.001
		Cramer V	0.277		<0.001

Legend: n – absolute frequency; % – relative frequency; χ^2 – Chi-square coefficient; df – degrees of freedom; p – value of statistical significance

A statistically significant difference was found in wound healing in relation to participation in the tele-education program ($\chi^2(4) = 61.2$, $p < 0.001$; $V = 0.273$, $p < 0.001$). The relationship between the variables can be considered moderately strong (Tab. 2).

Tab. 2. Differences in wound healing in relation to completion of the tele-education program

Wound healing:		Yes	Partially	No	Overall
No inflammation	n	124	68	79	271
	%	89.90	60.20	49.40%	65.90
Mild inflammation	n	11	39	58	108
	%	8.00	34.50	36.30	26.30
Wound exudate	n	3	6	23	32
	%	2.20	5.30	14.40	7.80
Overall	n	138	113	160	411
	%	100.00	100.00	100.00	100.00
			Value	df	p
		χ^2	61.2	4	<0.001
		Cramer V	0.273		<0.001

Legend: n – absolute frequency; % – relative frequency; χ^2 – Chi-square coefficient; df – degrees of freedom; p – value of statistical significance

A statistically significant difference was found in the feeling of nausea or vomiting in the first three days post operation in relation to participation in the tele-education program ($\chi^2(6) = 65.1$, $p < 0.001$; $V = 0.281$, $p < 0.001$; Tab. 3), as well as in dietary intake ($\chi^2(4) = 55.2$, $p < 0.001$; $V = 0.259$, $p < 0.001$; Tab. 4) and the recovery of bowel peristalsis ($\chi^2(6) = 63.4$, $p < 0.001$; $V = 0.291$, $p < 0.001$; Tab. 5). Correlation between the studied variables related to gastrointestinal functions after the C-section given the participation in the tele-education program can be considered moderately strong.

Tab. 3. Differences in postoperative nausea and vomiting in relation to completion of the tele-education program

Nausea:		Yes	Partially	No	Overall
Without nausea	n	52	11	32	95
	%	37.70	9.70	20.00	23.10
Nausea	n	67	51	50	168
	%	48.60	45.10	31.30	40.90
Occasional vomiting	n	18	43	53	114
	%	13.00	38.10	33.10	27.70
Vomiting requiring treatment	n	1	8	25	34
	%	0.70	7.10	15.60	8.30
Overall	n	138	113	160	411
	%	100.00	100.00	100.00	100.00
			Value	df	p
		χ^2	65.1	6	<0.001
		Cramer V	0.281		<0.001

Legend: n – absolute frequency; % – relative frequency; χ^2 – Chi-square coefficient; df – degrees of freedom; p – value of statistical significance

Tab. 4. Differences in postoperative dietary intake in relation to completion of the tele-education program

Dietary intake:		Yes	Partially	No	Overall
Not affected	n	90	30	52	172
	%	65.20	26.50	32.50	41.80
Reduced food intake	n	43	70	78	191
	%	31.20	61.90	48.80	46.50
Inability to eat	n	5	13	30	48
	%	3.60	11.50	18.80	11.70
Overall	n	138	113	160	411
	%	100.00	100.00	100.00	100.00
			Value	df	p
		χ^2	55.2	4	<0.001
		Cramer V	0.259		<0.001

Legend: n – absolute frequency; % – relative frequency; χ^2 – Chi-square coefficient; df – degrees of freedom; p – value of statistical significance

Tab. 5. Differences in recovery of bowel peristalsis in relation to completion of the tele-education program

Nausea:		Yes	Partially	No	Overall
Within one day	n	44	8	25	77
	%	31.90	7.10	15.60	18.70
Within two days	n	58	27	33	118
	%	42.00	23.90	20.60	28.70
Within three days	n	31	60	66	157
	%	22.50	53.10	41.30	38.20
Later with the help of medication	n	5	18	36	59
	%	3.60	15.90	22.50	14.40
Overall	n	138	113	160	411
	%	100.00	100.00	100.00	100.00
			Value	df	p
		χ^2	63.4	6	<0.001
		Cramer V	0.291		<0.001

Legend: n – absolute frequency; % – relative frequency; χ^2 – Chi-square coefficient; df – degrees of freedom; p – value of statistical significance

DISCUSSION

The aim of the research was to innovate and improve traditional nursing care by creating and implementing the tele-education program of physical activity for mothers after caesarean section leading to a faster recovery, reduction of hospital stay after C-section, and minimizing complications. This correlates with the basic attributes of the multimodal perioperative ERAS (Enhanced Recovery After Surgery) program, where education is the key element [8].

We evaluated the impact of the tele-education program on physical condition of mothers using five indicators: intensity of pain, wound healing, feeling of nausea and vomiting, dietary intake, and recovery of bowel peristalsis within three days after caesarean section. The physical activity during postpartum period plays a very important role in physical and mental health [9]. It helps the body to recover faster, prevents complications, helps the body returning to its original state, strengthens the abdominal wall and pelvic floor, supports uterine involution, strengthens, and improves blood circulation in pectoral muscles, improves the performance of all organs, and prevents thromboembolic, urinary, and gastrointestinal complications.

The nursing intervention in post-caesarean care through education significantly supports postoperative activities in bed, promotes early mobilization and rehabilitation, alleviates postoperative pain, shortens hospital stay, and reduces the occurrence of infections [7].

The excessive use of analgesics is associated with side effects not only for the mother but also for the child, and it emphasizes the possibility of reducing pain through the education of mothers and perinatal care [10]. It is recommended reconsidering postoperative analgesia more broadly, as the pain score in mothers due to an early mobilization was slightly lower on the 3rd day [11]. The muscle relaxation in the intervention group 2 hours before the surgery and within 24 hours [12]. Pain was assessed using the VAS at 1, 6, and 24 hours after the surgery. The difference was 24 hours after the surgery and the average pain score was lower in the intervention group. They recommended physiotherapy for prevention and pain relief. Our research results indicate statistically significant difference in pain intensity on the 3rd day after the surgery relative to participation in the tele-education program. Given the simplicity of application, low cost, and safety, we recommend incorporating physical activity interventions as an additional therapy in pain reduction.

The aim of the randomized controlled study by Weerasinghe et al. was to examine the effectiveness of personal physiotherapy training and education of mothers who underwent caesarean delivery [13]. Similarly, they present the benefits of physical activity, breathing techniques, and postural care, which reduced immediate pain associated with the surgical wound and difficulties with functional activities. Mothers who underwent physical therapy had significantly better outcomes compared to the group with standard nursing care, indicating that physical therapy can be a useful adjunct to improve postpartum recovery. It is estimated that as many as two sessions of tactile pressure on surgical wound of C-section scar are very beneficial, correlating with our findings [14]. The guideline for improving recovery after the C-section emphasizes the importance of preventing nausea and vomiting, providing nutritional care, controlling glucose levels, preventing thromboembolism, promoting peristalsis recovery, encouraging early mobilization, and offering discharge instructions and counselling [15]. The authors examined the effectiveness of exercise after the C-section using the Paula method (ring muscle exercises) compared to standard care in restoring gastrointestinal activity [16]. They measured the time of the first flatulence, bloating, and first defecation. The results revealed a significant difference in the time to the first flatus and defecation after 48 hours, favoring intervention group compared to the control group. Paula method exercises were used as very convenient and cost-effective alternative for gastrointestinal reactivation post-elective caesarean delivery alongside the standard conservative treatment supporting the prevention of paralytic ileus and other postoperative complications after the C-section. Our research results confirm the effectiveness of physical activity through the tele-education program on gastrointestinal activity, specifically in reducing the feeling of nausea and vomiting, improving food intake, and restoring bowel peristalsis in mothers after the caesarean section.

Our study has some limitations, including the intentional selection of the sample, data collection within one hospital, and the chosen method of data collection via questionnaires. The study does not account for the influence of medications that participants may have been taking postpartum. The study does not address whether participants had previous pregnancies or if they are planning future pregnancies. Different healthcare providers might have varying practices in managing pain, promoting mobility, and providing education on self-care after caesarean sections. Additionally, the authors' attempt to present findings from a study design that, despite being

quasi-experiment, provides relevant insights supporting the development of tele-nursing.

CONCLUSIONS

After participating in the tele-education program focused on physical activity post-caesarean section, mothers experienced pain at lower intensity, demonstrated better wound healing, experienced nausea and vomiting less frequently, had better food intake, and experienced earlier restoration of peristalsis compared to the control group. The benefits of tele-education include time savings, cost efficiency, energy conservation, high number of educated individuals, repeated information over a 24-hour period, universality, care coordination, and the opportunities offered by the implementation of tele-nursing. Tele-nursing technologies in obstetrics positively influenced the adherence of mothers and reduced the risk of complications after caesarean section, therefore we recommend continuing the development and research on tele-nursing.

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