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THE EFFECT PF A DIGITAL DISCHARGE EDUACATION PROGRAM ON SELF-CARE ABILITIES : A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Bakcground: Post-section cesarean patients require discharge education to follow self-care instructions, regain independence, and improve recovery. Communication methods like verbal instructions, videos, phone calls, email correspondence, websites, and mobile/tablet applications can effectively manage self-care and prevent postoperative complications.
Objective: This study aimed to determine the effect of a digital discharge education program on self-care ability in women post section cesarean in Indonesia.
Method: : This study was a prospective, two-arm, single-blinded randomized controlled trial at six secondary level hospitals in West Java. The study included women post section cesarean on the first day. A randomization tool was used to allocate patients in a 1:1 ratio to either interevntion or control group. Each group consisted of 120 recruited women. Therapeutic Self-Care (TSC) was used to evaluate self-care abilities. The general estimating equation is use to investigate the simple main impact of various time points within each group.
Results: : The repeated ANOVA test revealed that the severity of self-care ability scores increased significantly in the intervention group after intervention (p-value= 0.001). With the effect size was 0.35, indicating moderate effect size. However, control group did not show a significant improvement. The GEE analysis showed a significant effect over time on self-care ability (p=.001) and regarding the difference between the groups, the results showed significant effects on self-care ability (p=.001). The results also showed significant effects in the interaction between time and group for self-care ability.
Conclusion *:* This study found that web-based discharge education program on self-care abilities among post C-section women in Indonesia. Future research should focus on developing innovative information technology treatments that involve healthcare consumers and practitioners to improve the delivery of prompt discharge education to general surgery patients.

Keywords: digital, discharge education, section cesarean, self-care, randomized controlled trial.

INTRODUCTION

Caesarean section (c-section) is the most common surgery in the world (Boerma et al., 2018). Over 30 years, facility-based births and c-section rates in Indonesia have increased significantly from 21.9% to 80.7%, with significant variations across regions, health facilities, residences, wealth quintiles, and maternal education (Sungkar & Basrowi, 2020; Zahroh et al., 2020). Indonesia has implemented health system reforms aimed at universal health coverage, ensuring equal access to health services across all regions and sociodemographic groups (Soedarmono, 2017). The implementation of various programmes and policy changes has led to a significant increase in skilled birth

attendance, health facility referrals, and a 72% reduction in maternal mortality ratio since 1990 (Diba et al., 2019; Hatt, 2007; Shankar et al., 2008; Sparrow et al., 2013; WHO, 2015, 2020). Despite these improvements, maternal mortality in Indonesia remains high compared to neighboring Southeast Asian countries (UNFPA, 2012).

Post-operative self-care management often altered due to pain, fatigue, and the presence of a surgical wound (Pieper et al., 2006). The first 30 days post-surgery are crucial for the post-operative recovery process, as most complications occur during this time (Kang et al., 2018). One in four surgical patients may develop post discharge complications within 14 days after discharge (Chang et al., 2020; Kazaure et al., 2012); with about 11.3% of general surgery patients readmitted within 30 days of discharge (Kassin et al., 2012). Moreover, unplanned readmission within 30 days due to postoperative complications cost the medicare program about USD$17 billion annually (Jencks et al., 2009). The information patients receive before leaving the hospital is crucial in ensuring they are aware of potential postoperative symptoms and indicators.

Discharge education is crucial for post-operative patients to help them follow self-care instructions, regain independence, and enhance their recovery (Collinsworth et al., 2018; Kang et al., 2018, 2020; Polster, 2015). Insufficient discharge education in surgical patients can lead to poor outcomes, including wound complications, gastrointestinal issues, pulmonary embolism, deep vein thrombosis, increased morbidity, and hospital re-admissions (Copeland et al., 2017; Sivarajan, 2012; Wainwright et al., 2020). Post-surgery care protocols in various surgical fields include early eating, hydration therapy, pain relief without narcotics, and early mobility, but they lack guidance on discharge education and do not cover specific goals or pain relief methods. Without this knowledge, patients may miss the signs and symptoms of potential postoperative complications (Kang et al., 2020; Tanner et al., 2013). Additionally, researchers have shown that discharge education is often delivered at inopportune moments when patients were not receptive to learning due to their medical condition or when caregivers were absent when inpatient teaching occurred (Kang et al., 2022). Consequently, surgical patients can be discharged home with incomplete understanding of postoperative recovery, including information on self-care and management of their postdischarge recovery (Kang et al., 2020). Providing discharge education is essential for surgical patients to independently manage and monitor their recovery after leaving the hospital, leading to improved outcomes after surgery.

Research indicates that various communication methods, including verbal and written instructions, videos, follow-up phone calls, email correspondence, websites, and mobile/tablet applications, can effectively manage self-care and prevent postoperative complications (Fredericks & Yau, 2013; Semple & Armstrong, 2017; Wittink & Oosterhaven, 2018). However, the implementation of accelerated postoperative pathways has led to shorter inpatient stays, posing challenges for healthcare providers to develop and provide patient-centered discharge education (Taurchini et al., 2018). This study developed digital discharge education aimed to improve the self-care abilities among women post C-sections in Indonesia.

METHODS

Study design and setting

This study was a prospective, two-arm, single-blinded randomized controlled trial. The research has been reported following the Consolidated Standards of Reporting Trials extension for randomized trials, as outlined by Eldridge et al (Eldridge et al., 2016). The procedure of collecting data was repeated three times in each of the groups. In the intervention group, measurements were taken at baseline (T0), one month after the intervention (T1), and one month after T1 (T2). Next, the control group was assessed at baseline (T0), one month after T0 (T1), and one month after T1 (T2).The study took place at six secondary level hospitals in West Java. The number of patients post C-sections every day is estimated to be between 10 and 15.

Randomization and blinded

A randomization tool was used to allocate patients in a 1:1 ratio to either get the traditional predischarge education or the digital discharge education utilizing randomization software. Because of the inherent characteristics of the intervention, both patients and doctors were unable to be blinded to the assignment of groups. Patients in both groups got routine treatment during their hospital stay, which included a training

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session before they were discharged by their healthcare professionals.

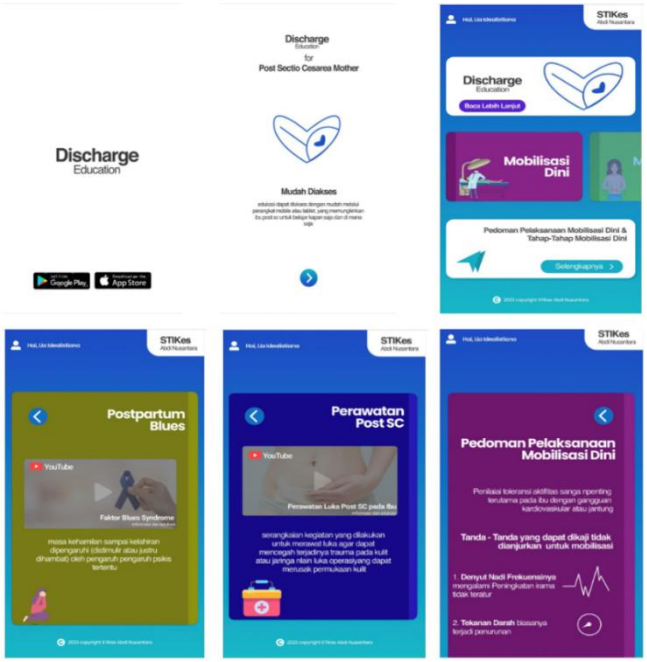
Sample

The sample in this research consisted of women who had undergone C-section on the first day. The inclusion criteria required participants to be above the age of 18, capable of giving informed consent, having had a primary C-section procedure, competent in speaking and understanding Bahasa, and able to independently access the web-based education intervention on their smartphone or tablet device. The exclusion criteria included patients who had ambulatory or day surgical procedures, as well as patients who were released as hospital in the home patients or sent to residential care as their intended discharge destination. The sample size was determined using G-Power Software Version 3.1.9.4, using a t-test with the assumption of α = 0.05, an expected effect size of 0.40 (Cohen, 1988), a power level of 0.80, and considering two groups with three repeated measurements. The minimum sample size is estimated to be 200, with an assumed attrition rate of 20%. This means that a total minimum sample of 120 participants has to be recruited for each group.

Intervention

The digital discharge education package aimed to promote patient engagement in self-care through interactive learning and self-evaluation of postoperative symptoms and recovery. The initiative was developed using the UK MRC methodology and the Knowledge-to-Action methodology (Craig et al., 2008; Graham et al., 2006). The program was developed in collaboration with consumers and healthcare providers, based on Knowles' theory of adult learning, patient activation, and recent research on discharge education for general surgical patients (Kang et al., 2020). The program consisted of three elements: guidelines for recognizing post-surgery warning signals, directions for daily care, surgical wound care, and indications of wound problems. The first component included a traffic light system with common indicators of postoperative problems, helping patients distinguish between normal and atypical symptoms. The second component provided guidelines for postoperative care, including activities, wound care, medicine, pain management, and follow-up visits, assisting patients in their recovery after discharge. The final element was an animated film illustrating the identification of probable indicators and symptoms of surgical wound problems and the proper method for removing a surgical wound dressing.

Figure 1. Discharge Education Application



The study involved patients who were given login credentials to access an online education course. The course lasted about 15 minutes and a customized SMS was sent 48 hours after discharge to encourage them to visit the website. The intervention fidelity was assessed by ensuring at least 90% of patients received the prescribed dosage and substance. Adherence to the intervention was tracked using Google Analytics, which measured the frequency of patients accessing the web-based instruction. The research period was used to calculate the aggregate number of patient logins for reviewing discharge education. Google Analytics was also used to gather additional data on website visits and most commonly accessed sections.

Measures

The data were gathered using a demographic characteristics questionnaire that included information on age, education level, any problems, early commencement of breastfeeding, and job status.

Therapeutic Self-Care (TSC) was used to evaluate self-care abilities in both prehospital and

posthospital discharge contexts. The TSC scale quantifies patients' subjective perception of their capacity for self-care, as shown by actions pertaining to medication adherence, symptom recognition and management, performance of daily tasks, and adaptation to changes in health status (Sidani & Doran, 2014). The scores might vary from 1 (indicating poor self-care) and 5 (indicating independence in self-care). The TSC scale, as assessed by Chaboyer et al. (2013), has been shown to be both valid and reliable in measuring self-care in patients with traumatic injuries in both home and acute care settings, as confirmed by Sidani (2008). The Content Validity Index for the TSC scale varied between 0.73 and 1.00. The loading factor for 15 items ranges from 0.448 to 0.761. The research reported a Cronbach's Alpha coefficient of 0.762.

Data collection procedure

The letters acquired from the University Malaysia Sabah were thereafter presented to the local government agencies in the study vicinity. The ward nurses identified potential patients, and the nurse or midwives addressed individuals who expressed interest in the research to assess their eligibility. Prior to obtaining written permission, patients were have the opportunity to peruse the offered information sheet or seek clarification via inquiries. During the recruiting process, demographic and socioeconomic data were gathered in order to provide a comprehensive understanding of the sample. The assessment of self-care ability was conducted both during the recruiting process and via telephone interviews with a research assistant, which took place two weeks after the patients were released. Post-test evaluation was administered immediately after the intervention and again one month later to both groups. The investigator provided training to the research assistants, and all submitted data were meticulously verified for correctness. The data was obtained using an electronic device. This study adhrece to the declaration Helsinki but not yet registred to the clinical trial registery due to time constraint.

Data analysis

Descriptive data analysis was conducted on clinical outcome data and baseline demographic information. The mean and standard deviation were used to analyze continuous data, while frequencies and percentages were computed for categorical variables. The feasibility results for recruitment, randomization, retention, treatment fidelity, and the fraction of missing data were evaluated using descriptive statistics that were suitable for the level and distribution of the data. The data were examined for homogeneity of variances ($p>0.05$) and covariances ($p>0.001$) using Levene's test of homogeneity of variances and Box's M test, respectively. The research used ANOVA with repeated measures to evaluate the alteration in recovery quality between the two groups at baseline, post-test 1, and post-test 2. General estimate equations were used to assess the simple main impact of various time points within each group for variables exhibiting a significant interaction. The data were analyzed using SPSS version 25. The presence of statistical significance was shown by a p-value of less than 0.05.

Ethical consideration

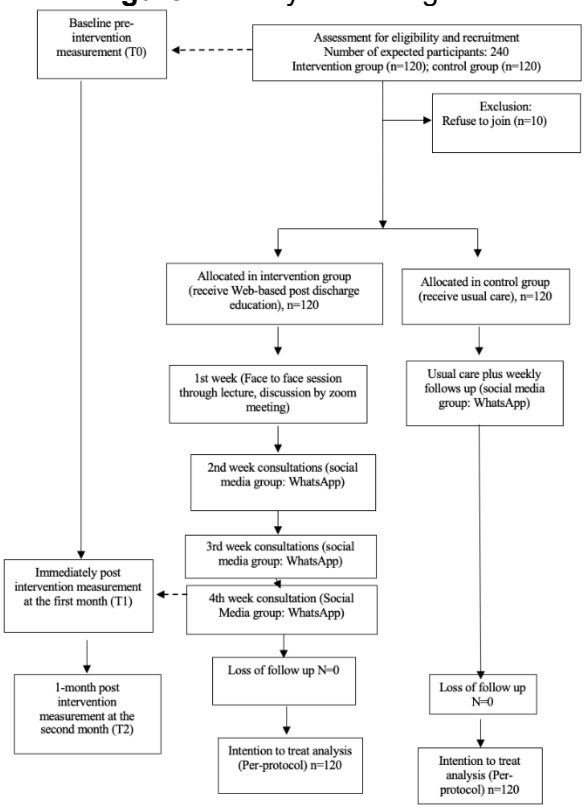
The ethics permissions were acquired from STIKEP PPNI Jawa Barat with the reference number III/078/KEPK/STIKep/PPNI/Jabar/II/2023. All stages of this research project were conducted in accordance with the rules of ethics. Every participant provided their signature on a permission form subsequent to receiving detailed information about the study's objectives, methodologies, and ethical precautions. Every participant received a copy of the consent form, with a strong recommendation to retain a personal copy. Participants were informed of their right to withdraw from the research at any given time. The researcher used all necessary measures to safeguard the privacy and anonymity of the subjects. No participants have reported experiencing any health hazards or negative emotional states, such as feeling depressed or worried, as a consequence of their involvement in this research.

RESULTS

There were a total of 240 women who had undergone a C-section in the baseline data collection. During the registration process, over 220 women who had previously had a C-section participated, leading to a baseline response rate of 95.6%. A total of 10 individuals declined to participate, accounting for 4% of the total. All individuals successfully completed the intervention and subsequent follow-up assessment (Figure 2)

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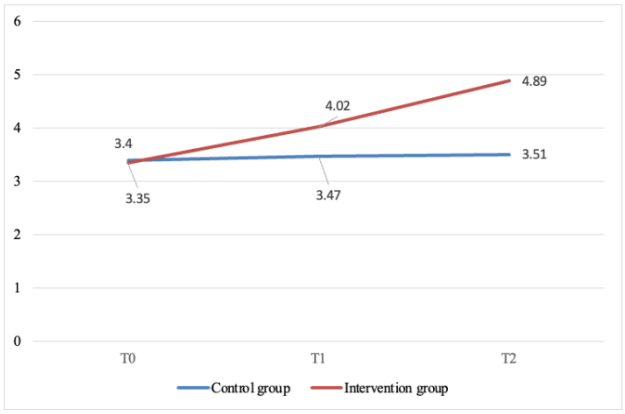
Figure 2. Study Flow Diagram



Out of the 120 women who had a C-section, the average age of those in the intervention group was 33.7 years with a standard deviation of 2.55. Additionally, 41.7% of these women had completed junior to senior high school. Approximately 96.7% of individuals had no complications, whereas 93.3% began breastfeeding early, and 58.3% were employed. In the control group, the average age was 33.7 years with a standard deviation of 2.39. Additionally, 457.5% of individuals in this group had completed junior to senior high school. Approximately 94.2% of individuals had no complications, 94.2% began breastfeeding early, and 37.5% were employed. There were no notable disparities in demographic features between the intervention and control groups.

Figure 3 shows that in the intervention group, the score of self-care was increased from baseline to two-months follow up (3.35 ± 1.21 to 4.89 ± 1.89, respectively). While in control group the mean score before intervention was 3.40 ± 1.33 and 2-months after intervention was 3.51 ± 1.56 (p=0.336).

Figure 3. self-care ability scores in control and intervention group at different time points



There was no significant difference between the intervention and control groups at the beginning of the study. The repeated ANOVA test revealed that the severity of self-care ability scores (as measured by the TSC scale) increased significantly in the intervention group after intervention (p-value= 0.001). With the effect size was 0.35, indicating moderate effect size. However, control group did not show a significant improvement (Table 2).

Table 2. Comparison of self-care ability scores in control and intervention group at different time points by ANOVA test

Variable	T0	T1	T2	F	ANOVA Test	Cohen's test
	Mean ± SD	Mean ± SD	Mean ± SD		p-value	
Control Group[a]	3.40± 1.33	3.47± 1.33	3.51± 1.56	.33	0.215	0.101
intervention	3.35± 1.21	4.02± 1.54	4.89± 1.89	.11	0.001	0.35

Note: P < 0.05 are considered significant; baseline (T0), at the end of the 4th week (T1), and at the end of the 8th week (T2)

Generalized Estimating Equations (GEE) analysis showed a significant effect over time on self-care ability (p=.001) and regarding the difference between the groups, the results showed significant effects on self-care ability (p=.001). The results also showed significant effects in the

interaction between time and group for self-care ability (Table 3).

Table 3. Intention-to-treat (ITT) analysis of self-care abilities using generalized estimating equations (GEE)

Source	Type III Wald Chi-Square	df	p-value
Time	16.452	2	0.001
Group	17.321	2	0.003
Time* Group	17.571	2	0.001

DISCUSSION

The study found that digital discharge education improved self-care in post-section caesarean mothers. Kang et al (2022) developed web-based discharge education to improve patients' knowledge, skills, and confidence in self-managing their recovery after general surgery found that there was a significant association between the intervention and patient activation, but not for self-care ability and unplanned healthcare utilisations. However, previous study suggested that web-based education have proven beneficial in helping patients with self-regulatory behaviors, including self-care (Saidinejad & Zorc, 2014). Other study reported that patients who received a discharge education intervention showed higher self-confidence in self-care performance compared to the standard discharge education group (Yun et al., 2016). In a study conducted by Newnham et al. (2017), it was shown that implementing discharge education methods tailored to patients' preferences resulted in enhanced comprehension of their medical condition among medical/surgical patients. The study suggests that IT-based discharge education initiatives can potentially increase patient involvement in their own care.

Technology is increasingly being adopted to address the information gap patients face after hospital discharge (Martorella et al., 2012). Both patients and healthcare providers expressed higher levels of satisfaction and a preference for IT-based education treatments (Newnham et al., 2017). However, few studies investigated the impact of discharge education interventions based on their content or who provided and/or conveyed the information to patients. Nevertheless, there is some early evidence that patient education applications for smartphones and tablets may be effective (Timmers et al., 2020). Patients were more satisfied with their care, were more likely to stick to their treatment plans, and were able to communicate more easily with their healthcare providers thanks to these electronic devices. However, the methodological quality of most of the included studies was restricted due to concerns about the danger of bias. Further investigation into the efficacy of IT-based education should be the focus of future research, considering the desire of both patients and healthcare practitioners for this form of intervention.

The process of assisting a pregnant woman who has recently undergone a caesarean section and transitions from hospital to home with her newborn is a complex and emotionally significant task. The middle-range situation-specific theory provides a framework for understanding how first-time mothers adapt to the transition to their home environment (Weiss & Lokken, 2009). The theory emphasizes four key components: transition characteristics, environments that facilitate change, nursing interventions for transition, and patterns of response during transition (Meleis, 2010). To better involve patients in their treatment, a web-based discharge education program was designed to equip them with the necessary informatio tools, improve their self-care abilities, and motivation to take charge of their recovery after C-sections.

This approach can help mothers navigate the transition to motherhood and improve their self-care over time.

Our research has many benefits. Firstly, we have successfully used randomization, ensuring that our study participants are assigned to different groups in a fair and unbiased manner. Additionally, we have managed to gather a bigger sample size, allowing us to get more reliable and accurate results. Furthermore, we have utilized standard measures, which are well accepted and recognized in the field. Lastly, we have included a control group, which enables us to compare the effects of our intervention with a group that did not receive it. There are several limitations. Our investigation was limited to a particular low-risk population inside a hospital environment. Therefore, the extent to which our results can be applied to the whole community and their capacity to be generalized to other contexts is restricted. It is recommended to do further investigation using

a larger sample size, obtained from a more varied population.

CONCLUSION

This study found that digital discharge education program on self-care abilities among post C-section women in Indonesia. To further understand the impact of the discharge education interventions on this group, robust multicenter RCTs with parallel process assessments should be developed and implemented. Improving patients' health literacy and surgical recovery management makes fundamental rationale. To further enhance the delivery of prompt discharge education to general surgery patients, future research should prioritize the collaborative development of innovative information technology treatments involving both healthcare consumers and practitioners.

Conflict of interest

None declared.

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