Pain experiences and effectiveness of pain management after cesarean section in postpartum mothers at Hue University of Medicine and Pharmacy Hospital

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Abstract

Background: Pain following a cesarean section can hinder a mother's recovery after childbirth, disrupt the mother-child bond, negatively impact the mother's mental well-being, and hamper breastfeeding. The accurate assessment of pain levels and the proper use of pain relief methods can significantly improve the physical and mental health of mothers and babies. This support can aid in quick recovery after a cesarean section, create optimal conditions for mother-child bonding, and help develop future childcare skills. **Objectives:** 1) To describe pain experiences and effectiveness of pain management after cesarean section in postpartum mothers at the Obstetrics and Gynecology Department, Hue University of Medicine and Pharmacy Hospital; 2) To identify factors related to pain experiences after cesarean section in postpartum mothers. **Subject and methods:** Cross-sectional study design among 190 postpartum mothers after cesarean section on the 2nd day at the Obstetrics and Gynecology Department, Hue University of Medicine and Pharmacy Hospital from August 2021 to July 2022. **Results:** The average pain level of the study group was 5.98 ± 0.923/10. The percentage of postpartum mothers with moderate to severe pain at the time of the most pain was 95.2%. The pain relief method used was first-class analgesics, and the average pain relief level was 5. 47 ± 1.435/10. The study found a statistically significant association between pain experiences after cesarean section and the following factors: age, pregnancy status, number of births, prenatal complications, prenatal anxiety, number of cesarean sections, family support, and types of anesthesia ($p < 0.05$). ***Conclusion:*** The rate of postpartum mothers experiencing moderate to severe pain after a cesarean section is quite high. However, the effectiveness of postoperative pain management in postpartum mothers is still very low. More effective pain management methods should be applied, especially for individuals with risk factors that increase their pain experiences, to improve the effectiveness of postpartum care and treatment.

Keywords*: Caesarean section, effectiveness of pain management, pain severity, pain interference, pain experiences*.

1. INTRODUCTION

The cesarean section (CS) is a common major surgical procedure in obstetrics worldwide. The global CS rate was 21.1%, and it continues to increase [1]. At Hue University of Medicine and Pharmacy hospital, in 2017, the rate of caesarean section among first-time mothers was 58.8% [2]. Pain following a caesarean section is a major concern for postpartum mothers, not only affecting the mother's physical and mental health but also indirectly affecting the child's health. According to Annika Karlström (2007), pain after cesarean birth can be related to at least two factors: postoperative pain from the wound and uterine contractions [3]. The incidence of pain was 92.7% from the wound and uterine contractions [4]. The overall prevalence of moderate to severe postoperative pain after a cesarean section was 85.5% [5]. Moderate to severe post-cesarean pain may hinder the recovery process, negatively affect maternal psychological well-being, impair early mother-infant bonding, and complicate breastfeeding practices [6]. Effective management of post-cesarean pain is essential to facilitate enhanced postpartum recovery, promote successful breastfeeding and mother-infant bonding, and minimize other pain-related adverse outcomes [7].

In nursing practice, identifying postoperative pain and the factors influencing pain following a cesarean section is essential for planning and delivering effective pain management to postpartum mothers. In Vietnam, research has begun to explore optimal analgesic strategies, such as a study at

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DOI: 10.34071/jmp.2025.4.10

Received: 08/08/2024; Accepted: 25/07/2025; Published: 30/08/2025

Can Tho Obstetrics and Gynecology Hospital, which demonstrated that combining intrathecal bupivacaine with low-dose sufentanil and morphine provided effective and prolonged pain relief for more than 18 hours postoperatively, with minimal adverse effects [8]. Additionally, studies on Vietnamese women's preferences for childbirth and analgesia highlight a growing awareness and demand for individualized, effective pain control [9]. Despite these advances, data on actual pain experiences and the effectiveness of pain management remain limited, especially in Thua Thien Hue province. Addressing this gap, we conducted a study titled ***"Pain experiences and effectiveness of pain management after cesarean section in postpartum mothers at Hue University of Medicine and Pharmacy Hospital"*** with two primary objectives:

1) To describe pain experiences and effectiveness of pain management after cesarean section in postpartum mothers at the Obstetrics and Gynecology Department, Hue University of Medicine and Pharmacy Hospital.

2) To identify factors related to pain experiences after cesarean section in postpartum mothers.

2. RESEARCH METHODS

2.1. Research subjects

Postpartum mothers after cesarean section at the Obstetrics and Gynecology Department, Hue University of Medicine and Pharmacy Hospital.

Inclusion criteria: Postpartum mothers aged 18 years or older on the second day after cesarean section at the Obstetrics and Gynaecology Department, Hue University of Medicine and Pharmacy Hospital, agreed to participate in the study, and have the ability to communicate in Vietnamese.

Exclusion criteria: Postpartum mothers whose infants cannot be with them, have mental disorders, chronic pain, serious illness, or have severe complications that prevent them from participating in this study.

2.2. Research time and location

Research location: Obstetrics and Gynaecology Department, Hue University of Medicine and Pharmacy Hospital.

Research time: from August 2021 to July 2022.

2.3. Study design: A cross-sectional descriptive study.

2.4. Sample size: Apply the sample size calculation formula to estimate a population proportion in descriptive research.

$$n = Z^2_{1-\alpha/2} \frac{p \times (1-p)}{d^2}$$

In which: α = 0.05, comparing α from Table Z, we get $Z_{1-\alpha/2}$ = 1.96.

p = 0.855, the overall prevalence of moderate to severe postoperative pain after a cesarean section was 85.5% within the first 24 postoperative hours, according to Getamesay Demelash's research.

d = 0.05, allowable error is 5%.

Substituting the values into the formula, we calculate n ≈ 190. In fact, we collected 190 postpartum mothers to participate in this study.

2.5. Sampling method: The convenience sampling method. Postpartum mothers who met the inclusion criteria were to be included in the study until a sufficient sample size was collected.

2.6. Data collection method

2.6.1. Data collection instrument: The questionnaire was designed according to the research objectives, which included 2 parts:

Part A: General characteristics and obstetric characteristics of study subjects. **Part B:** Pain experience and the effectiveness of pain management were assessed using the **Modified Brief Pain Inventory – Postpartum Version (MBPI-PP)**, adapted from the original Brief Pain Inventory – Short Form (BPI-SF) developed by Charles S. Cleeland (1991) [10]. The original BPI-SF includes 9 items using numeric rating scales (NRS) from 0 to 10, measuring pain severity, pain interference with daily functions, pain location, medication use, and degree of pain relief. For this study, modifications were made to improve contextual relevance for postpartum inpatients. Specifically, the item "Average pain level" was clarified with "Most frequently perceived pain level" to better capture the typical pain intensity experienced throughout the assessed period in the Vietnamese language, rather than relying on a numerical mean of the highest and lowest pain level. In the Pain Interference domain, "Normal work" was substituted with "Self-care ability" as postpartum women in hospital settings are not typically engaged in occupational tasks. Additionally, two new items were added to assess how pain interfered with maternal roles: (1) "Interfered with the ability to care for the baby" and (2) "Interfered with the ability to breastfeed the baby."

The modified version underwent expert review for content validation. The expert panel consisted of a PhD-level obstetrician with 20 years of clinical experience, a senior midwife with 18 years of practice in a maternity department, and a nursing researcher with 10 years of experience in maternal

health. The Item-Level Content Validity Index (I-CVI) ranged from 0.66 to 1.00, while the Scale-Level Content Validity Index (S-CVI) for the entire instrument was 0.96, indicating excellent content validity. Scoring was performed by averaging two domains: the pain severity score (4 items, with pain classified as mild: 1 - 4, moderate: 5 - 6, severe: 7 - 10) and the pain interference score, calculated as the mean of 8 interference items (including the added maternal role items). The Vietnamese version of the MBPI-PP was used, and internal consistency reliability was confirmed with Cronbach's alpha coefficients of 0.786 for pain severity and 0.833 for pain interference. Higher scores indicated greater pain intensity and greater functional impairment.

2.6.2. Data collection techniques: Face-to-face interview research subjects with a pre-designed questionnaire on the second day after cesarean section.

2.7. Data analysis: The data were analyzed and processed using SPSS 20.0 software. Descriptive statistics algorithms were used to calculate frequency, percentage, mean value, standard deviation, median, interquartile range, maximum value, and minimum value. The Kolmogorov-Smirnov test ($n \geq 50$) was used to check the normal distribution of the data before choosing the validation test. Factors associated with pain experiences after cesarean section were identified using Nonparametric Test Analysis (NPTESTS), One-way ANOVA, and Multivariate Linear Regression Analysis.

2.8. Ethical consideration

The study was approved by the Faculty of Nursing, Hue University of Medicine and Pharmacy, and the Department of Obstetrics and Gynecology - Hue University of Medicine and Pharmacy Hospital. Subjects participating in the study are completely voluntary and are not under any pressure to participate in the study. The goal and content of the study were made clear to all research participants. The information provided by the subject is completely anonymous, confidential, and for research purposes only.

3. RESEARCH RESULTS

3.1. General characteristics of research subjects

Table 1. Demographic characteristics

Characteristics		Frequency (n)	Percentage (%)
Age group	< 20	2	1.1
	20 - 35	151	79.5
	> 35	37	19.5
	Median (Q1-Q3)	30 (27 - 34)	
Ethnicity	Kinh	11	5.8
	Other	179	94.2
Education level	≤ Primary school	11	5.8
	Secondary school-High school	110	57.9
	> High school	69	36.3
Occupation	Housewife	50	26.3
	Government job	76	40
	Business	25	13.2
	Other	39	20.5
Average income/person/month	≤ 3 million	108	56.8
	> 3 million	82	43.2
Family size	Nuclear family	129	67.9
	Extended family	61	32.1
Marital status	Married	190	100

The median age of the study group was 30 years old (27-34); the postpartum mothers in the study mainly had a secondary school or high school education level, accounting for 57.9%; 67.9% of postpartum mothers lived in nuclear families.

Table2. Obstetric characteristics (n = 190)

Characteristics		Frequency (n)	Percentage (%)
Current pregnancy status	Normal	182	95,8
	Abnormal	8	4.2
Prenatal complications	Yes	25	13.2
	No	165	86.8
Prenatal anxiety	Yes	123	64.7
	No	67	35.3
Number of births	Primipara	66	34.7
	Multipara	124	65.3
Total number of C-section births	1	101	53.2
	> 1	89	46.9
Type of C-section	Elective cesarean section	91	47.9
	Emergency cesarean section	99	52.1
The method of anesthesia for this cesarean section	General anesthesia	4	2.1
	Spinal anesthesia	186	97.9
Location of C-section incisions	Low transverse incision	190	100
Postpartum pain relief method	Analgesic	190	100
Postpartum complications	Postpartum lochia retention	2	1.1
	Bleeding	2	1.1
	No complications	186	97.9
Apply skin-to-skin contact after birth	Yes	66	34.7
	No	124	65.3
Sources of family support after delivery	Yes	183	96.3
	No	7	3.7
Current obstetric and gynecological pathology	Yes	9	4.7
	No	181	95.3

The rate of postpartum mothers with prenatal complications is 13.2%; 64.7% of postpartum mothers were worried before giving birth. With this birth, the rate of postpartum mothers giving birth to the second child onwards is high at 65.3%; The majority of postpartum mothers undergoing cesarean section for the first time, 53.2%; The anesthetic method used is mainly spinal anesthesia with 97.9%; Only 3.7% of postpartum mothers do not have support and care from relatives after giving birth.

3.2. The pain experience and effectiveness of pain management

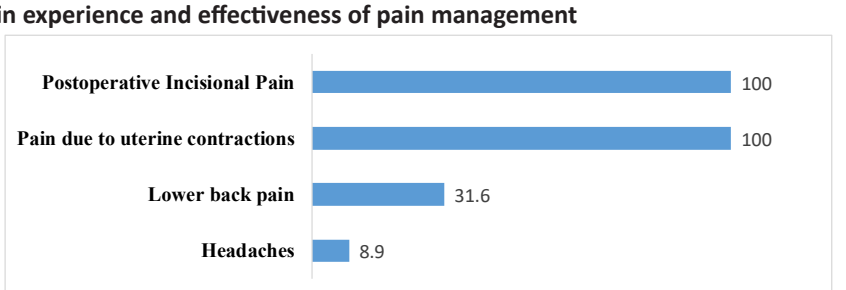

Chart 1. Pain locations in postpartum mothers

All postpartum mothers had pain at the incision and uterine contractions 100%, followed by lumbar spine pain, accounting for 31.6%, and the lowest rate was headache with 8.9%.

Table 3. Pain severity, pain interference, and the pain experience (n=190)

The severity of pain in the last 24 hours	Mild pain (0 - 4)	Moderate pain (5 - 6)	Severe pain (7 - 10)	Mean (SD)
	n (%)	n (%)	n (%)	
The worst level of pain	9 (4.7)	39 (20.5)	142 (74.7)	7.29 (1.43)
The least level of pain	127 (66.8)	59 (31.1)	4 (2.1)	3.83 (1.39)
Average pain level (most frequently perceived pain level)	34 (17.9)	113 (59.5)	43 (22.6)	5.53 (1.28)
The level of pain right now	65 (34.2)	100 (52.6)	25 (13.2)	4.95 (1.42)
The impact of pain in the last 24 hours.			**Mean (SD)**	**Min - Max**
Interfered with general activities			6.47 (1.74)	2 - 10
Interfered with mood			4.13 (2.30)	0 - 9
Interfered with walking ability			7.48 (1.78)	3 - 10
Interfered with self-care ability			5.37 (1.53)	0 - 10
Interfered with sleep			6.81 (1.74)	2 - 10
Interfered with the enjoyment of life			4.81 (1.68)	0 - 9
Interfered with the ability to care for the baby			7.71 (1.98)	2 - 10
Interfered with the ability to breastfeed the baby			7.41 (2.15)	0 - 10
Pain severity score			**5.40 (1.18)**	**1.0 - 8.0**
Pain interference score			**6.27 (1.19)**	**3.0 - 9.0**
The pain experience score			**5.98 (0.92)**	**3.33 - 8.17**

During the 24 hours after giving birth, when the pain was at its worst, the average pain score was 7.29 (1.43), and the proportion of postpartum mothers with moderate to severe pain was 95.2%. The activities most affected by pain were the ability to care for the baby, with a mean (7.71 ± 1.98), walking ability (7.48 ± 1.78), and the ability to breastfeed the baby (7.41 ± 2.15). Pain experience scores of postpartum mothers ranged from 3.33 - 8.17, with an average pain experience score of 5.98 (0.92).

Table 4. Pain management methods and pain relief effectiveness (n = 190)

Characteristics		Frequency (n)	Percentage (%)
Use analgesic	Only Paracetamol (500mg orally)	11	5.8
	Combination of Paracetamol (500mg orally) and Voltaren (100mg rectally)	179	94.2
Level of pain relief	30%	32	16.8
	50%	65	34.2
	60%	46	24.2
	70%	33	17.4
	80%	14	7.4

Most postpartum mothers use analgesics, combining Paracetamol and Voltaren, at a rate of 94.2%. Pain relief effectiveness ranges from 30 - 80%, of which the majority of postpartum mothers feel their pain is reduced by 50% after using analgesics, accounting for 34.2%.

3.3. Factors related to pain experiences after cesarean section

Table 5. Association between pain experience and related factors (n=190)

Characteristics		$\overline{X}$ Mean $\overline{X}$ (SD)	*p*
Age group	< 20	4.13 (0.06)	**0.004**
	20 - 35	5.91 (0.92)	
	> 35	6.37 (0.77)	
Number of births	Primipara	5.76 (0.90)	**0.008**
	Mutipara	6.10 (0.92)	
Pregnancy status	Normal	5.96 (0.93)	**0.044**
	Abnormal	6.56 (0.42)	
Total number of C-sections	1	5.82 (0.94)	**0.002**
	> 1	6.17 (0.87)	
C-section anesthesia method	General anesthesia	6.94 (0.28)	**0.013**
	Spinal anesthesia	5.96 (0.92)	
Prenatal complications	Yes	6.33 (0.90)	**0.04**
	No	5.93 (0.92)	
Prenatal anxiety	Yes	6.17 (0.89)	**< 0.001**
	No	5.64 (0.89)	
Postpartum family support	Yes	5.95 (0.92)	**0.013**
	No	6.82 (0.68)	

There is a statistically significant association between the mother's pain experience and: age, number of births, pregnancy status, number of C-sections, C-section anesthesia method, prenatal complications, prenatal anxiety, and Postpartum family support ($p < 0.05$).

Table 6. Multivariate regression analysis between pain experience and some related factors

Characteristics	Unstandardized Coefficients		Standardized Coefficients	t	R^2 (adjusted R-squared)	F	*p*
	β	SD	β				
Age > 35	0.398	0.156	0.171	2.552	0.214 (0.193)	10.031	**0.012**
C-section anesthesia method	-0.92	0.423	-0.143	-2.175			**0.031**
Prenatal anxiety	-0.327	0.132	-0.169	-2.482			**0.014**
Postpartum family support	0.695	0.325	0.135	2.025			**0.044**
Pain relief effectiveness	-0.171	0.043	-0.265	-3.965			**< 0.001**

In multivariate regression, all 5 factors only explained 21.4% ($R^2 = 0.214$) of the change in mother's pain experience scores. 5 independent variables had statistical significance in explaining the change in pain experience scores with $p < 0.05$: age > 35 ($p = 0.012$); the method of anesthesia ($p = 0.031$); prenatal anxiety ($p = 0.014$); Postpartum family support ($p = 0.044$); pain relief effectiveness ($p < 0.001$).

4. DISCUSSION

In this study, 100% of research subjects had pain at the surgical incision and uterine contraction pain, higher than Natalia's research results. C. B et al (2016) found that 92.7% of women after cesarean section experienced pain from the incision and pain from uterine contractions [4]. In general, postpartum mothers experienced moderate pain, and the overall impact of pain on postpartum mothers was also moderate, with average pain experience scores ranging from 3.33 to 8.17 and average pain level 5.98 ± 0.92/10 points. The average pain severity of postpartum mothers was 5.40 ± 1.18. The impact level of pain 24 hours after giving birth was 6.27 ± 1.19. On the first day after giving birth, the proportion of postpartum mothers with moderate to severe pain at the most painful time was 95.2%. This rate is higher than the studies

of Natalia et al [11] and Demelash (2021) [5]. This difference may be explained by factors influencing pain perception, such as the anesthesia method, the level of anxiety, and the quality of postpartum care. The moderate pain level in the first 24 hours was 5.53 ± 1.28, the worst level was 7.29 ± 1.43, and the least pain level was 3.83 ± 1.394. The results of our study were higher than Natalia C. B's study and et al (2016), the average pain score at the time of worst pain was 6.6 ± 2.2, and the least pain score was 3.3 ± 2.0 [4]. The findings indicate that although post-cesarean pain is a common and significant issue, the pain management methods currently applied at Hue University of Medicine and Pharmacy Hospital have not achieved optimal effectiveness. Specifically, given the severity of the pain, its impact extends beyond physical health to directly affect the psychological well-being of the postpartum mothers, as well as their ability to care for and breastfeed their child. This highlights the necessity of improving post-cesarean pain management to ensure better health outcomes for both mother and child.

In the first 24 hours after birth, the activities most affected were the ability to care for the baby (7.71 ± 1.98), walking ability (7.48 ± 1.78), and the ability to breastfeed the baby (7.41 ± 2.15). The results of this influence are equivalent to the study of Annika Karlström (2007), where pain after cesarean section negatively affects breastfeeding and newborn care [3]. Therefore, effective pain management will contribute to promoting early breastfeeding after birth and create favourable conditions for children to receive adequate care and develop healthier.

In thí curent study, it was shown that the analgesics used were first-line analgesics: Paracetamol (500 mg orally) and Voltaren (100 mg rectally). Although the majority of postpartum mothers widely use a combination of both types of analgesics (94.2%), their pain-relieving effectiveness is limited, with only 34.2% of postpartum mothers achieving a 50% decrease in pain. This emphasizes the need for stronger and more effective pain management methods, such as second- or third-line analgesics, especially in cases where postpartum mothers are at risk of experiencing severe or prolonged pain. Our results were similar to the study of Dang Nguyen Doan Trang (2019), the majority of postpartum mothers (93.12%) used a combination of paracetamol with 1 - 2 other analgesics [2]. Postpartum mothers in the age group > 35 years old had a pain level 0.398 times higher than the other two age groups (β = 0.398; p = 0.012). The mechanism underlying this difference may be related to physiological changes associated with aging, including a decline in the ability to inhibit endogenous pain, resulting in heightened pain perception [12]. The results of the analysis showed that women giving birth to multiple babies had higher pain experiences than women giving birth to their first babies. And women with abnormal pregnancy processes will experience more pain than women with normal pregnancies. The pain score of the group giving birth by cesarean section more than once was higher than the group giving birth by cesarean section for the first time; this difference was statistically significant, with p = 0.002. Research by Guangyou Duan (2019) also shows that multiparas may be more prone to experiencing pain after surgery compared to primiparas [13]. Our study also indicates that the group of postpartum mothers who used general anesthesia experienced a higher average pain level compared to the group who received spinal anesthesia. Moreover, multivariate regression analysis in Table 3.9 reveals that the group of postpartum mothers under spinal anaesthesia experienced 0.920 times less pain than the group under general anesthesia/intravenous anaesthesia (β = -0.920; p = 0.031). This difference may be attributed to the fact that general anesthesia has a greater impact on the central nervous system, causing the postpartum mothers to experience more pain upon awakening. In contrast, actually, spinal anaesthesia is prescribed more frequently because it has several benefits, including a straightforward approach, minimal effect on the infant, and the ability for the mother to remain awake during surgery.

Additionally, our study also shows that the presence of prenatal complications will affect the experience of pain by postpartum mothers, which is statistically significant with p = 0.040. Comparison with Guangyou Duan's (2019) study showed that the group of pregnant women with preoperative complications was identified as a significant factor for inadequate postoperative pain treatment [13]. There is a difference in pain level and prenatal anxiety among postpartum mothers that is statistically significant (p < 0.001). According to multivariate regression analysis, the group of postpartum mothers without prenatal anxiety had pain levels 0.327 times lower than the group with prenatal anxiety (β = -0.327; p = 0.014). Natalia et al.'s study (2016) showed that preoperative anxiety had an increased risk of reporting postoperative pain as moderate to severe [11]. Reducing prenatal

anxiety may contribute to pain reduction and help improve the effectiveness of pain management. Our study has demonstrated that postpartum moms without relatives to support or provide postpartum care have higher pain levels than the group that does, and the difference is statistically significant ($p = 0.013$). The group of postpartum mothers receiving care and support from family members had a pain level 0.695 times lower than the group without support, according to the multivariable regression model ($\beta = 0.695$; $p = 0.044$). This may reflect the importance of psychological factors and family support in alleviating pain and improving the mental well-being of postpartum mothers.

The effectiveness of pain management was found to be independently correlated with postpartum mothers' pain experience in multivariable regression, with a statistical significance of $p < 0.001$. More specifically, if the pain relief effectiveness is good, the pain level of the postpartum mothers will decrease by more than 0.171 units. The truth is that postpartum mothers' pain will lessen if they receive adequate postpartum pain treatment and utilize pain management techniques to obtain a high degree of pain reduction. This demonstrates that the selection and implementation of appropriate pain management methods are crucial in controlling pain intensity, improving postpartum recovery, and enhancing the quality of postpartum care.

5. CONCLUSION

The average pain level of the study group was 5.98 ± 0.923/10. The percentage of postpartum mothers with moderate to severe pain at the time of the most pain was 95.2%. The majority of postpartum mothers feel their pain is reduced by 50% after using analgesics, accounting for 34.2%. The pain relief method used was first-class analgesics, the average pain relief level was 5. 47 ± 1.435/10. The study found a statistically significant association between pain experiences after cesarean section and the following factors: age, pregnancy process, number of births, prenatal complications, prenatal anxiety, number of cesarean sections, support from family, and the method of anesthesia ($p < 0.05$). Multivariate regression analysis showed that 5 statistically significant independent variables explained 21.4% of the change in pain experience scores with $p < 0.05$: age > 35 ($p = 0.012$); the method of anesthesia ($p = 0.031$); prenatal anxiety ($p = 0.014$); support from family ($p = 0.044$); pain relief effectiveness ($p < 0.001$). Healthcare providers should prioritize effective pain management strategies, particularly in postoperative care, and implement routine screening and interventions for prenatal anxiety. Additionally, strengthening family involvement and support in the postpartum period may contribute positively to maternal well-being and recovery.

6. RECOMMENDATION

Nurses and midwives should pay close attention to monitoring and actively managing pain in patients who are at a high risk of experiencing increased pain, including elderly postpartum mothers, those with abnormal pregnancy processes, postpartum mothers with prenatal complications, a history of previous cesarean section, general anesthesia, and multiparas. The rate of postpartum mothers experiencing moderate to severe pain after cesarean section is quite high, but the effectiveness of postoperative pain management in postpartum mothers is still very low. More effective pain management methods should be applied, especially for patients with risk factors of increased pain experiences, to improve the effectiveness of postpartum care and treatment. Future research should explore additional psychosocial and environmental variables to further enhance model predictability and to inform the development of targeted, culturally sensitive interventions for improving maternal outcomes.

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