Journal of Iranian Medical Council, Volume 8, Issue no. 3
http://dx.doi.org/10.18502/jimc.v8i3.18806

Original Article

Prevalence of Postpartum Readmission in University Hospitals of Ahvaz, Southwest of Iran in 2020-2022

Zainab Zamanpour[1], Mozhgan Barati[1], Elham Kargarzadeh[1] and Sana Yektania[2]*

1. Department of Obstetrics and Gynecology, School of Medicine, Imam Khomeini Hospital, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
2. School of Medicine, Student Research Committee, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

Abstract

Background: The postpartum period, which includes the 12 weeks after delivery, is considered the fourth trimester. During this period, postpartum complications such as febrile morbidities, thromboembolic events, preeclampsia, etc. can lead to readmission and morbidity in mothers. Therefore, this study investigated the prevalence of postpartum patient readmission in university hospitals of Ahvaz, southwest of Iran during 2020-22.

Methods: This retrospective cross-sectional descriptive study was conducted in university hospitals affiliated to Ahvaz Jundishapur University of Medical Sciences during 2020-22. All pregnant mothers who were re-admitted to hospital during their postpartum period were examined.

Results: Between 2020 and 2022, a total of 21,498 births took place in Ahvaz University Hospitals. Of these, 8,071 were Vaginal Deliveries (VDs) and 13,427 were Cesarean Section (CS). The prevalence of readmission was 1.39%. The most common cause of readmission was febrile complications, with pelvic abscess (17.7%) and metritis (27%) being the most frequent. Pelvic abscess occurred only in women with cesarean delivery. Wound dehiscence rates were 3.3% for episiotomy and 4.7% for cesarean. Blood transfusion was required in 35.5% of cases, with 7.0% related to VD and 26.5% to CS.

Conclusion: This study showed that in patients undergoing CS, there were greater rates of postpartum readmission and morbidity and longer length of hospital stay. The most common cause of hospitalization was febrile morbidity followed by delayed postpartum hemorrhage, Abscess, Episiotomy, Hospitals, University, Iran

Keywords: Cesarean Section, Length of Stay, Patient Readmission, Postpartum Hemorrhage, Pre-Eclampsia, Prevalence, Retrospective

*** Corresponding author**

Sana Yektania, MD
School of Medicine, Student Research Committee, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
Email: Sana.salem96@gmail.com

Received: 20 Jul 2024
Accepted: 2 Nov 2024

Citation to this article
Zamanpour Z, Barati M, Kargarzadeh E, Yektania S. Prevalence of Postpartum Readmission in University Hospitals of Ahvaz, Southwest of Iran in 2020-2022. *J Iran Med Counc.* 2025;8(3):605-13.

Introduction

Post-partum readmission is considered a key indicator in evaluating the quality of healthcare services. Such readmissions can highlight existing medical issues and deficiencies in post-partum care, thereby holding significant importance. Various factors, including infections, surgical complications, psychological problems, and inadequate follow-up care, can lead to the readmission of patients after childbirth. The primary objective of this research is to determine the rate of post-partum readmission in university hospitals of Ahvaz and to identify the factors influencing it. The secondary objectives include examining the impact of demographic and clinical variables on the prevalence of readmission. A precise understanding of these factors can contribute to improving the quality of post-partum care and reducing health issues among mothers. Results of this study can assist policymakers and healthcare managers in enhancing care processes and elevating the quality of services provided to mothers after childbirth.

The word postpartum is derived from Latin-*puer*, child+*parus*, bringing forth. It defines the time following delivery during which pregnancy-induced maternal anatomical and physiological changes return to the nonpregnant state. Its duration is inexact but is considered to last between 4 and 6 weeks (1). The postpartum period is a critical time when pregnancy-related and chronic diseases can dramatically affect the mother's health (2). Most deaths related to pregnancy occur after delivery, and recently there has been an increase in maternal complications. Previous studies have identified the factors leading to prolonged hospital stay or readmission. These include maternal age (3), comorbidities (4), multiple births (5), and cesarean delivery (6,7). Although several studies have identified what factors influence postpartum readmission, most focused on the relationship between postpartum readmission and mode of delivery, with Cesarean Section (CS) being particularly associated with postpartum readmission (8). In obstetrics and gynecology, post-partum readmission occurs almost in 1 out of every 50 births, with the most common cause of readmission being infection (15.5%), followed by high blood pressure (9.3%), and mental illnesses (7.7%). Some of these were of an unexpected origin, and many could have been prevented (8). Postpartum Hemorrhage (PPH) remains a leading cause of maternal morbidity and mortality worldwide. While the overall prevalence is estimated to be between 2% and 4%, the risk is significantly higher following CS, with rates reported between 2% and 6% (9). Uterine atony accounts for more than 50% of PPH cases, followed by residual tissue, wound dehiscence, coagulation problems, and uterine rupture (10). PPH has long-term and short-term effects such as chronic disease, disability, increased risk of death and/or poor growth and development of children, liver dysfunction, adult respiratory distress syndrome, and kidney failure (11-13). PPH occurs approximately at a rate of 8.7 million cases per year and causes 44,000 to 86,000 annual deaths, making it the leading cause of death during pregnancy worldwide (14). In developing countries, postpartum hemorrhage (PPH) is the primary cause of maternal death, accounting for 25 to 43% of all maternal mortality cases. In contrast, developed countries primarily experience maternal mortality due to pulmonary embolism (9). On the other hand, maternal morbidity and mortality is a global socioeconomic and health care burden, and infections are relatively common and preventable in the postpartum period, with 5 to 7 percent of women being affected during this period. Puerperal sepsis is one of the five leading causes of maternal mortality worldwide, accounting for 10-15% of all deaths in the postpartum period. Infections are also the most common cause of death following spontaneous or induced abortions (15). Other postpartum problems and complications include postpartum depression, sleep deprivation, and breastfeeding problems, although they rarely account for readmission (16). Despite the importance of postpartum hospitalization, few population-based studies have examined this topic (17). Postpartum care is an important part of maternal care, since life-threatening complications can occur in the postpartum period (18). On the other hand, compared to the ratio of maternal mortality, severe maternal morbidity is a useful indicator for evaluating and improving maternal health services (19). While postpartum readmission is commonly used as an indicator of postpartum maternal complications (20), its potential as a quality indicator in obstetrics and gynecology care has been less explored (21,22).

Therefore, this study investigated the prevalence of postpartum readmission in Imam Khomeini and Taleghani hospitals in Ahvaz during 2020-2022.

Materials and Methods

This study was registered with the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences under the code IR.AJUMS.HGOLESTAN.REC.1401.103.

This cross-sectional observational epidemiological study investigated the prevalence of postpartum readmissions of women in teaching hospitals in Ahvaz from 2020 to 2022. The selection of participants was based on all cases of postpartum readmission at Imam Khomeini and Taleghani hospitals during the study period from April 2020 to March 2022. The source population consisted of 21,489 women who gave birth in these hospitals, of which 300 were readmitted within the first six weeks postpartum. After excluding 85 cases due to incomplete data or inaccessible records, 215 patient records were included in the final analysis. Inclusion criteria encompassed all pregnant women (both singleton and multiple pregnancies) who delivered at these centers. Exclusion criteria included incomplete or inaccessible medical records or cases where the patients did not deliver at these centers.

For each eligible patient, the following information was collected and analyzed: type of delivery (vaginal or cesarean section), age, parity, underlying conditions (such as diabetes, hypo/thyroidism, asthma), cause of readmission (*e.g.*, postpartum hemorrhage, metritis, pelvic abscess, embolism, preeclampsia, hypertensive crisis, urinary complications, episiotomy dehiscence, cesarean wound dehiscence), need for ICU admission, need for blood transfusion, and discharge status. The study used SPSS software version 26 (IBM Corp., Armonk, NY, USA) for data analysis. Descriptive statistics, including frequency and percentage, were used for categorical variables. The chi-square test was applied to assess differences between qualitative variables. A p-value of less than 0.05 was considered statistically significant.

This study adhered strictly to ethical principles outlined in the Declaration of Helsinki. All the patients' information was anonymized and kept confidential, and the data were used solely for research purposes. The Declaration of Helsinki, first adopted by the World Medical Association in 1964 and most recently amended in 2008, provides ethical guidelines for medical research involving human subjects. This ensures that the rights and welfare of participants are protected.

In terms of statistical analysis, the significance level was set at $p<0.05$. Although hypothesis testing using p-values was applied, additional attention was paid to the representation of effect sizes where appropriate. The statistical design and methodology were selected following standard works in epidemiology, and all the statistical terms, abbreviations, and symbols were clearly defined to facilitate the interpretation of results by knowledgeable readers.

Results

Between April 2020 and March 2022, 21,489 women delivered at Ahvaz University Hospitals (Imam Khomeini and Taleghani). Of these, 300 were readmitted within six weeks postpartum. The overall readmission rate was 1.39% (higher for cesarean section: 1.21% *vs*. vaginal delivery: 0.61%) (Table 1). Due to incomplete data and unavailability of some records owing to administrative restrictions in the hospital archives and statistics departments, 85 records were excluded, leaving 215 patient records for review. In this cohort, 75.81% of the patients were readmitted after CS, 23.2% after Vaginal Deliveries (VD), and 0.93% after cesarean hysterectomy (due to placenta accreta syndrome and uterine atony). The majority of

Table 1. Prevalence of readmission

	Total	Cesarean Section	Vaginal Delivery
Prevalence of readmission	1.39%	1.21%	0.61%
Number of deliveries	21489	13427	8071
Number of readmissions	300*(215 studied)	165	50

*Out of the 300 patients who were readmitted, only 215 were examined and included in the study.

Table 2. Demographic and clinical characteristics of the patients

Category	Subcategory	Vaginal Delivery	Cesarean Section	Hysterectomy	Total
Age	Under 21 years old	9(4.2%)	21(9.8%)	0(0.0%)	30(14.0%)
	Age range 21-35 years	35(16.3%)	104(48.4%)	2(0.9%)	141(65.6%)
	Age range 35-50 years	12(5.6%)	32(14.9%)	0(0.0%)	44(20.5%)
Gravidity	1-2	30(14.0%)	80(37.2%)	2(0.9%)	112(52.1%)
	2-5	24(11.2%)	68(31.6%)	0(0.0%)	92(42.8%)
	5-7	2(0.9%)	9(4.2%)	0(0.0%)	11(5.1%)
	>7	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)
Parity	Nulliparous	23(10.7%)	71(33.0%)	2(0.9%)	96(44.7%)
	Multiparous	33(15.3%)	86(40.0%)	0(0.0%)	119(55.3%)
Past medical history	Asthma	2(0.9%)	3(1.4%)	0(0.0%)	5(2.3%)
	Diabetes mellitus	14(6.5%)	9(4.2%)	0(0.0%)	23(10.7%)
	Hypertension	4(1.9%)	7(3.3%)	0(0.0%)	11(5.1%)
	Hypothyroidism	6(2.8%)	8(3.7%)	0(0.0%)	14(6.5%)
Past surgical history	Cesarean Section	0(0.0%)	101(47.0%)	2(0.9%)	103(47.9%)
	Other	3(1.4%)	7(3.3%)	0(0.0%)	10(4.7%)
Total		50(23.25)	163(75.81)	2(.93)	215(100)

the patients (65.6%) were in the age range of 21-35 years. More than half of the women (55.3%) in this study were multiparous, and 44.7% were nulliparous. The most common comorbidity among the patients was diabetes mellitus (10.7%), followed by hypothyroidism (6.5%) and asthma (2.3%) (Table 2).

The most common causes of readmission included febrile morbidity (comprising metritis and pelvic abscess) and postpartum hemorrhage. Febrile morbidity affected 44.7% of the patients. Metritis was observed in 27% of the patients, with a significantly higher incidence in the cesarean section group (15.8 *vs*. 10.7% in vaginal delivery; p=0.001). Pelvic abscess was reported in 17.7% of the cesarean cases and was not observed in the vaginal deliveries (p<0.001). Postpartum hemorrhage occurred in 44.2% of the patients, with 11.6% following vaginal delivery and 32.6% following cesarean section (p=0.26). Other causes included episiotomy dehiscence in 3.3% of the vaginal delivery patients (p<0.001), cesarean wound dehiscence in 4.2% of the cesarean section cases (p=0.23), and postpartum urinary complications in 3.7% of the cesarean section patients (p=0.27). There were no statistically significant differences between the groups in terms of the occurrence of embolism (0.9% of patients, p=0.65), preeclampsia (1.9% of cesarean cases, p=0.53), or hypertensive crisis during pregnancy (1.39% of cesarean cases, p=0.51). Emergency hysterectomy was required in 0.9% of the cesarean section cases (p=0.69) while elective hysterectomy was performed in 2.3% of the cesarean cases. ICU admission occurred in 13% of the patients, with 5.1% following vaginal delivery and 7.9% following cesarean section (p=0.05). Blood transfusion was administered to 33.5% of the patients, with 7.0% related to vaginal delivery and 26.5% to cesarean section (p=0.50). At discharge, 78.1% of the patients were discharged with medical approval and 21.9% discharged upon personal consent. The length of hospital stay was 1-3 days in 54.9% of the patients, 3-14 days in 42.8%, 14-21 days in 0.9%, and more than 21 days in 1.4% of the patients (p=0.70) (Table 3).

Additionally, chi-Square test results indicated that postpartum hemorrhage (p=0.006), metritis (p=0.002), and pelvic abscess (p< 0.001) were significantly more prevalent in the age range of 21-35 years (Table 4).

Discussion

Results of this study showed that the overall prevalence of readmission in the studied teaching hospitals in Ahvaz during 2020-22 was 1.39 cases, of which 76.74% were related to CSs and 23.25% to VDs. Of all the studied patients, two had hysterectomy during CS: one due to accreta syndrome, and the other due to atony during labor. The most common cause of readmission in this study was puerperal infections (44.47%), bleeding (44.42%), afebrile wound complications (7.5%), pre-eclampsia (1.9%), blood pressure crisis (1.39%), and embolism 0.93%. Patients undergoing CS were readmitted about 3 times more than patients with VD. Moreover, bleeding complications leading to hysterectomy, embolism and pelvic abscess were observed only in patients having CS. Finally, 7 patients (3.3%) underwent hysterectomy, and all were among those having cesarean delivery.

In Matas *et al*'s study in 2017, the prevalence of readmission was 1.4-9.4, which is consistent with our results (23). Fein *et al* investigated the risk factors of bleeding leading to postpartum readmission, and the prevalence of bleeding and readmission was reported to be 6.06%, with 14.28% of the cases undergoing CS (24). In the current study, 44.2% of the patients were admitted with bleeding, of whom 26.5% received pack cell, which could explain why the rate obtained in this study was higher than that in Finn *et al*'s. In La Rosa *et al*'s study, the most common causes of postpartum readmission were febrile complications and high blood pressure (25). In the present study,

Table 3. Cause of readmission and postpartum complications (from 215 cases)

		Vaginal Delivery	Cesarean Section	Hysterectomy	Total	p-value**
Postpartum Hemorrhage		25(11.6%)	70(32.6%)	0(0.0%)	95(44.2%)	0.26
Episiotomy dehiscence		7(3.3%)	0(0.0%)	0(0.0%)	7(3.3%)	00.00
Cesarean wound dehiscence		0(0.0%)	9(4.2%)	1(0.5%)	10(4.7%)	0.23
Metritis		23(10.7%)	34(15.8%)	1(0.5%)	58 27.0%)	0.001
Pelvic abscess		0(0.0%)	38(17.7%)	0(0.0%)	38(17.7%)	00.00
Emboli		1(0.5%)	1(0.5%)	0(0.0%)	2(0.9%)	0.65
Pre-eclampsia		0(0.0%)	4(1.9%)	0(0.0%)	4(1.9%)	0.53
Pregnancy hypertension crisis		0(0.0%)	3(1.39%)	0(0.0%)	3(1.39%)	0.51
Postpartum urinary complications		0(0.0%)	8(3.7%)	0 (0.0%)	8(3.7%)	0.27
Emergency hysterectomy		0(0.0%)	2(0.9%)	0(0.0%)	2(0.9%)	0.69
Elective hysterectomy		0(0.0%)	5(2.3%)	0(0.0%)	5(2.3%)	
ICU admission		11(5.1%)	17(7.9%)	0(0.0%)	28(13%)	0.05
Blood transfusion		15(7.0%)	57(26.5%)	0(0.0%)	72(33.5)	0.50
Discharge status	Discharge	40(18.6%)	126(58.6%)	2(0.9%)	168(78.1)	0.58
	Personal Consent	9(4.2%)	38(17.7%)	0(0.0%)	47(21.9)	
Duration of Hospitalization	1-3 days	23(10.7%)	93(43.3%)	2(0.9%)	118(54.9%)	0.70
	3-14 days	24(11.2%)	68(31.6%)	0(0.0%)	92(42.8)	
	14-21 days	1(0.5%)	1(0.5%)	0(0.0%)	2(0.9%)	
	more than 21 days	1(0.5%)	2(0.9%)	0(0.0%)	3(1.4%)	

**Chi-Square Test

Table 4. Distribution of postpartum complications by age group

Complication	Under 21 years	Age range 21-35 years	Age range 35-50 years	p-value**
Emboli	1(0.5%)	1(0.5%)	0(0.0%)	0.30
ICU Admission	2(0.9%)	20(9.3%)	6(2.8%)	0.53
Postpartum Hemorrhage	6(2.8%)	72(33.5%)	17(7.9%)	0.006
Blood transfusion	6(2.8%)	50(23.3%)	16(7.4%)	0.23
Episiotomy dehiscence	1(0.5%)	6(2.8%)	0(0.0%)	0.38
Cesarean wound dehiscence	0(0.0%)	7(3.3%)	2(0.9%)	0.46
Metritis	16(7.4%)	31(14.4%)	11(5.1%)	0.002
Pelvic abscess	13(6.0%)	19(8.8%)	6(2.8%)	00.00
Pre-eclampsia	1 (0.5%)	2(0.9%)	1(0.5%)	0.76
Emergency Hysterectomy	0(0.0%)	2(0.9%)	0(0.0%)	0.43
Elective Hysterectomy	0(0.0%)	5(2.3%)	0(0.0%)	
Postpartum Urinary Complications	0(0.0%)	4(1.9%)	4(1.9%)	0.08

**Chi-Square Test

the most common cause was febrile morbidities and bleeding, which were more common in CS cases, and a small percentage of patients were hospitalized due to high blood pressure (44.6 *vs*. 1.39), which is not consistent with La Rosa *et al*. In 2016, Clapp et al reported the prevalence of readmission to be 1.72-2.16%, with the most common causes being infections, high blood pressure, and psychiatric diseases (21). These results are not in line with ours where the readmission prevalence was 1.39% and the most common cause was metritis followed by bleeding. The prevalence of readmission in Clapp *et al*'s study in 2017 in Boston (26), Hamilton *et al*'s study in 2023 in Maryland (27) and Liu *et al*'s study in 2005 in Canada (28), was 1.34, 1.5 and 1.3%, respectively, which is consistent with the current study (1.39%). In Liu *et al*'s study, the most frequent causes of readmission were febrile complications including metritis and pelvic abscess, followed by thromboembolism (28), which was consistent with this study in terms of the prevalence of metritis, but not in terms of the prevalence of thromboembolism. Based on the results obtained, it can be concluded that despite the increase in the prevalence of CS over the past years, the prevalence of readmission has not increased. However, readmission among CS patients is of paramount importance since complications such as pelvic abscess, thromboembolism, and bleeding complications leading to hysterectomy were only observed in this group of patients.

According to the results, postpartum hemorrhage, metritis, and pelvic abscess were significantly more prevalent in the age range of 21 to 35 years. Axelsson *et al* demonstrated that advancing age and higher Body Mass Index (BMI) are associated with an increased prevalence of postpartum infections. Their study, which included women aged 15 to 50 years, reported that both advanced age and elevated BMI correlate with heightened risks of surgical site infections, urinary tract infections, and metritis (29). Aviram *et al* found that younger mothers (≤21 years) are at a greater risk of short-term postpartum complications such as postpartum hemorrhage and lower neonatal Apgar scores, when compared to older age groups (22-25, 26-30, 31-35, and 36-40 years) (30). Furthermore, Watts *et al* reported that women under 25 years with bacterial vaginosis are at increased risk for postpartum endometritis (31). A study conducted by Shmueli *et al* in 2019 indicated that women older than 30 years with endometriosis are more likely to undergo cesarean delivery and experience postpartum hemorrhage (32).

Several factors might contribute to these findings. Firstly, heightened hormonal activity in younger

women could potentially increase the risk of infections and postpartum complications (33). Additionally, vaginal delivery, which is more prevalent in younger women, is associated with a higher risk of infections and hemorrhage. A previous study noted that vaginal delivery could be a factor in rehospitalization due to postpartum metritis (34). Other common risk factors such as a history of infections or similar medical conditions also play a significant role (35). Moreover, multiple pregnancies and deliveries in this age group may further elevate the risk of postpartum complications (36). Therefore, a combination of physiological factors, type of delivery, and medical history can elucidate why women in this age group are more susceptible to rehospitalization due to hemorrhage and febrile morbidity (comprising metritis and pelvic abscess).

In this study, the length of hospital stay in the CS group was longer than that in the VD group. Overall, postpartum complications in CS patients were more common compared with those having vaginal delivery. Since postpartum metritis and bleeding were the most common causes of readmission after vaginal and caesarean delivery in the present study, future studies are recommended to focus more carefully on these two risk factors in order to find ways for reducing and eliminating them in postpartum mothers.

Conclusion

The current study showed that the most common cause of postpartum readmission was febrile complications and bleeding, which were observed more commonly among women with CS. Also, these women had longer hospital stay and a greater number of morbidities.

Research limitations

The data were extracted from the patient records and are therefore subject to miscoding and unreported information. Also, the data do not provide information on clinical management parameters including medications, vital signs, laboratory values, or severity of illness conditions, all of which could have influenced the risk of postpartum readmission. Although Ahvaz has a diverse and large population, examining data from only teaching hospitals may affect the generalizability of the results. Given that metritis and postpartum hemorrhage were the primary causes of readmission in women following cesarean and vaginal deliveries in this study, implementing strategies to mitigate these risk factors could significantly decrease the overall readmission rate. Therefore, future studies are recommended to accurately focus on these risk factors.

Suggestion for future research

Further research is essential to comprehensively understand the risk factors associated with metritis and postpartum hemorrhage.

Conflict of Interest

There was no conflict of interest in this manuscript.

References

1. Cunningham FG, Leveno KJ, Dashe JS, Hoffman BL, Spong CY, Casey BM. The Puerperium. Williams Obstetrics, 26e. New York, NY: McGraw Hill; 2022. 1328 p.

2. Presidential Task Force of Redefining the Postpartum V. ACOG Committee Opinion No. 736: Optimizing postpartum care. Obstet Gynecol 2018;131(5):e140-e50.

3. Lisonkova S, Potts J, Muraca GM, Razaz N, Sabr Y, Chan WS, et al. Maternal age and severe maternal morbidity: A population-based retrospective cohort study. PLoS Med 2017;14(5):e1002307.

4. Grobman WA, Bailit JL, Rice MM, Wapner RJ, Reddy UM, Varner MW, et al. Frequency of and factors associated with severe maternal morbidity. Obstet Gynecol 2014;123(4):804-10.

5. Martin AS, Monsour M, Kissin DM, Jamieson DJ, Callaghan WM, Boulet SL. Trends in severe maternal morbidity after assisted reproductive technology in the United States, 2008–2012. Obstet Gynecol 2016;127(1):59-66.

6. Lindquist A, Noor N, Sullivan E, Knight M. The impact of socioeconomic position on severe maternal morbidity outcomes among women in Australia: a national case–control study. BJOG 2015;122(12):1601-9.

7. Norhayati MN, Nik Hazlina NH, Aniza AA, Sulaiman Z. Factors associated with severe maternal morbidity in Kelantan, Malaysia: A comparative cross-sectional study. BMC Pregnancy Childbirth 2016;16:1-10.

8. Belfort MA, Clark SL, Saade GR, Kleja K, Dildy III GA, Van Veen TR, et al. Hospital readmission after delivery: evidence for an increased incidence of nonurogenital infection in the immediate postpartum period. Am J Obstet Gynecol 2010;202(1):35. e1-. e7.

9. Umashankar K, Dharmavijaya M, Sudha R, Datti SN, Kavitha G. Effect of a primary postpartum haemorrhage on the “near-miss” morbidity and mortality at a tertiary care hospital in rural Bangalore, India. Journal of clinical and diagnostic research: J Clin Diagn Res 2013;7(6):1114.

10. Lutomski J, Byrne B, Devane D, Greene R. Increasing trends in atonic postpartum haemorrhage in Ireland: an 11-year population-based cohort study. BJOG 2012;119(3):306-14.

11. Tort J, Rozenberg P, Traoré M, Fournier P, Dumont A. Factors associated with postpartum hemorrhage maternal death in referral hospitals in Senegal and Mali: a cross-sectional epidemiological survey. BMC Pregnancy Childbirth 2015;15(1):1-9.

12. Legesse T, Abdulahi M, Dirar A. Trends and causes of maternal mortality in Jimma University specialized hospital, Southwest Ethiopia: a matched case–control study. Int J Womens Health 2017:307-13.

13. Oberg AS, Hernandez-Diaz S, Palmsten K, Almqvist C, Bateman BT. Patterns of recurrence of postpartum hemorrhage in a large population-based cohort. Am J Obstet Gynecol 2014;210(3):229. e1-. e8.

14. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller A-B, Daniels J, et al. Global causes of maternal death: a WHO systematic analysis. Lancet Glob Health 2014;2(6):e323-e33.

15. Boushra M, Rahman O. Postpartum Infection. Treasure Island (FL): StatPearls Publishing; 2020.

16. Waites KB, Xiao L, Paralanov V, Viscardi RM, Glass JI. Molecular methods for the detection of Mycoplasma and ureaplasma infections in humans: a paper from the 2011 William Beaumont Hospital Symposium on molecular pathology. J Mol Diagn 2012;14(5):437-50.

17. Wagner JL, White RS, Tangel V, Gupta S, Pick JS. Socioeconomic, racial, and ethnic disparities in postpartum readmissions in patients with preeclampsia: a multi-state analysis, 2007–2014. J Racial Ethn Health Disparities 2019;6:806-20.

18. Vallely L, Ahmed Y, Murray SF. Postpartum maternal morbidity requiring hospital admission in Lusaka, Zambia–a descriptive study. BMC Pregnancy Childbirth 2005;5:1-8.

19. Hill K, Thomas K, AbouZahr C, Walker N, Say L, Inoue M, et al. Estimates of maternal mortality worldwide between 1990 and 2005: an assessment of available data. Lancet 2007;370(9595):1311-9.

20. Lydon-Rochelle M, Holt VL, Martin DP, Easterling TR. Association between method of delivery and maternal rehospitalization. JAMA 2000;283(18):2411-6.

21. Clapp MA, Little SE, Zheng J, Robinson JN. A multi-state analysis of postpartum readmissions in the United States. Am J Obstet Gynecol 2016;215(1):113. e1-. e10.

22. Nam JY, Park EC. The relationship between severe maternal morbidity and a risk of postpartum readmission among Korean women: a nationwide population-based cohort study. BMC Pregnancy Childbirth. 2020;20:1-8.

23. Matas JL, Mitchell LE, Sharma SV, Louis JM, Salemi JL. Severe maternal morbidity at delivery and postpartum readmission in the United States. Paediatr Perinat Epidemiol 2021;35(6):627-34.

24. Fein A, Wen T, Wright JD, Goffman D, D’Alton ME, Attenello FJ, et al. Postpartum hemorrhage and risk for postpartum readmission. J Matern Fetal Neonatal Med 2021;34(2):187-94.

25. Sun F, Han B, Wu F, Shen Q, Shen M, Chen Y. Development and validation of models to predict cesarean delivery among low-risk nulliparous women at term: a retrospective study in China. Europre PMC 2020. https://doi.org/10.21203/rs.3.rs-44296/v2

26. Clapp M, Robinson J, Little S. The relationship between the rising cesarean delivery and postpartum readmission rates. Journal of Perinatology. 2017;37(4):355-9.

27. Hamilton S, Lawson S, Olson S, Voegtline K. Postpartum readmission in Maryland by race and ethnicity [ID: 1358223]. Obstet Gynecol 2023;141(5):50S-1S. doi: 10.1016/j.xagr.2023.100278

28. Liu S, Heaman M, Joseph KS, Liston RM, Huang L, Sauve R, et al. Risk of maternal postpartum readmission associated with mode of delivery. Obstet Gynecol 2005;105(4):836-42.

29. Axelsson D, Brynhildsen J, Blomberg M. Postpartum infection in relation to maternal characteristics, obstetric interventions and complications. J Perinat Med 2018;46(3):271-8.

30. Aviram A, Raban O, Melamed N, Hadar E, Wiznitzer A, Yogev Y. The association between young maternal age and pregnancy outcome. J Matern Fetal Neonatal Med 2013;26(15):1554-8.

31. Watts DH, Krohn MA, Hillier SL, Eschenbach DA. Bacterial vaginosis as a risk factor for post-cesarean endometritis. Obstet Gynecol 1990;75(1):52-8.

32. Shmueli A, Salman L, Hiersch L, Ashwal E, Hadar E, Wiznitzer A, et al. Obstetrical and neonatal outcomes of pregnancies complicated by endometriosis. J Matern Fetal Neonatal Med 2019;32(5):845-50.

33. Wen T, Overton EE, Sheen JJ, Attenello FJ, Mack WJ, D'Alton ME, et al. Risk for postpartum readmissions and associated complications based on maternal age. J Matern Fetal Neonatal Med 2021;34(9):1375-81.

34. Atterbury JL, Groome LJ, Baker SL, Ross EL, Hoff C. Hospital readmission for postpartum endometritis. J Matern Fetal Med 1998;7(5):250-4.

35. Giraldo-Isaza MA, Jaspan D, Cohen AW. Postpartum endometritis caused by herpes and cytomegaloviruses. Obstet Gynecol 2011;117(2 Pt 2):466-7.

36. Leunen K, Amant F, Debiec-Rychter M, Croes R, Hagemeijer A, Schoenmakers EF, et al. Endometrial stromal sarcoma presenting as postpartum haemorrhage: report of a case with a sole t(10;17)(q22;p13) translocation. Gynecol Oncol 2003;91(1):265-71.