

Cesarean Section Audit to Improve the Quality of Care: A One-Year Retrospective Study at the Royal Commission Medical Center in Saudi Arabia

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Abstract

Cesarean section is a surgical intervention performed for several indications, such as repeated cesarean section and delivery abnormalities. There is an increased rate of cesarean section globally, including in Saudi Arabia. However, it is linked with several elevated risks of fetal and maternal complications. A clinical audit is a method for improving the quality of care and reducing mortality and morbidity. Aim: This study was established to determine the actual cesarean section rate in Royal Commission Medical Center, indications, and factors affecting cesarean section. Methods: This was a convenience, quantitative, retrospective study conducted at the Gynecology & Obstetrics Department of Royal Commission Medical Center, Yanbu City, Kingdom of Saudi Arabia, over a one-year period among all pregnant women who underwent cesarean section at Royal Commission Medical Center between 1/9/2023 and

1/9/2024. Results: This study enrolled 871 subjects who underwent cesarean section; 23.2% had no prior parity, and 61% had a prior cesarean section. 51.8% underwent elective cesarean section at Royal Commission Medical Center, and 31.2% had a previous normal delivery. 48.5% were assessed by a consultant, and 32.8% were counseled about vaginal birth after cesarean section. Previous cesarean section was associated with age ($P=0.0001$) and parity ($P=0.0001$). Conclusion: Previous cesarean section was most likely for repeated cesarean section. In addition, elective cesarean section was occurred more frequently and may have sustainably contributed to the increasing cesarean section rate. Furthermore, healthcare organizations should strengthen adherence to evidence-based cesarean section guidelines, establish standardized VBAC counseling pathways. From a nursing perspective, shared decision-making, targeted educational programs to enhance nurses' competencies in antenatal education, and patient counseling.

Keywords: Audit, cesarean section, previous cesarean section, quality of care, delivery types, retrospective study, Royal Commission Center, Saudi Arabia.

Introduction

Cesarean section (CS) is a surgical intervention performed for several maternal and fetal indications, such as repeated CS, delivery abnormalities, and cord and placental abnormalities. Recently, CS has been performed to meet the needs of pregnant women. Hence, CS on maternal demand was added as a common indication for CS. CS is linked with several elevated risks of fetal and maternal complications such as placenta previa, infections, higher rates of abdominal organ injuries, placenta accreta, placenta increta, thromboembolic complications, placenta percreta, and neonatal respiratory issues. Such complications may lead to severe consequences for the mother and her neonate (Al-Kadri et al., 2015).

A global rise in CS has been observed in recent decades, raising concerns about the appropriateness of the operation. Over time, CS rates have continued to increase with significant variation among regions, countries, and hospitals (Hoxha et al., 2017). The rates of CS vary widely across regions, countries, women's preferences, and financial status. Also, CS rates vary by medical practice type (Al-Kadri et al., 2015). Cesarean section is one of the predominant surgical interventions in Saudi Arabia. The concerns regarding the increased rates of CS are related not only to the associated greater morbidity and mortality compared to vaginal labor but also to the impacts on subsequent gestations and labor (Ba'aqueel, 2009).

A clinical audit is a technique for improving the quality of care and reducing perinatal and maternal mortality and morbidity. The audit plays a significant role in analyzing trends and changes in CS, thereby standardizing the process (Elasy et al., 2021). The avoidance of unnecessary CS can be achieved by making CS decisions only when no better alternatives exist (Dekker et al., 2018).

It was recommended that the CS rate for any community should be 5-15%, and that a higher rate is considered unnecessary use of the surgery (Al-Kadri et al., 2015). However, the annual elevation in CS rates has been reported for some developing nations to be 5-11% (Thomas, 2006). Additionally, it was determined that CS will exceed 38 million deliveries by 2030, and the CS rate will rise to 28% (Wahabi et al., 2023). One study from rural regions revealed that

many CSs were performed with no clear indications, and there were severe maternal morbidity and death (Nelissen et al, 2013).

In Saudi Arabia, a 10-year retrospective review (1997 – 2006) reported that 80.2% increase in the CS rate easing from 10.6% in 1997 to 19.1% in 2006. The highest elevation was reported in the Northern region at 265%, whereas the lowest rate was 32.8% in the Royal Commission hospitals (Ba'aqueel, 2009). Another Saudi study enrolled 198 females and reported a considerable increase in the CS rate, which was associated with changes in physicians' practices (Al-Kadriet al.al, 2015).

One Saudi study from Jazan that enrolled 268 women revealed that 72.7% of subjects underwent CS for the first or second time, whereas 27.3% had repeated CS three or more times. The major intraoperative complications experienced by females were intra-peritoneal adhesions (7.5%) and fused abdominal layers (7.1%). Regarding postoperative complications, the most frequent one was the requirement for transfusion (22%). Regarding neonates, a low APGAR score was the most frequent complication (19%), followed by requiring resuscitation (2.6%) (Murtada et al, 2023).

In Saudi Arabia, the consequences of CS were found to be that among the annual mortality of 37 cases, 8% of cases were related to CS (Shah et al, 2009). To improve maternal health, countries should enhance the quality, availability, accessibility, and use of basic and comprehensive emergency obstetric care. Such care involves CS, manual placenta removal, instrumental vaginal labor, blood transfusion, and basic neonatal resuscitation (WHO, 2009). Therefore, the World Health Organization (WHO) advised policymakers to use CS rates to monitor progress in maternal health and access to obstetric care (WHO, 2009; WHO, 2015).

Quality today is an integral part of our lives, and it is difficult to define, as it is a subjective concept with ambiguous features. Additionally, its definition varies with context, situation, and the perspective taken (Mosadeghrad, 2013). In turn, it was found that the definition of healthcare quality varies depending on whether it is viewed by policymakers, professionals, managers, clients, or payers. Quality improvement involves six dimensions: time, safety, efficiency, effectiveness, equity, and patient-centeredness (Arasli et al., 2008).

A consistent finding across health service research studies is the substantial gap between evidence-based standards of care and the care actually delivered to patients (Al Zahrani & Sikder, 2022). Numerous studies have reported that substantial variation in the care delivered to patients among regions, physicians and specialists as well. Variations in clinical practice may occur within the same healthcare setting due to differences in clinical experience and formal education (Çiçek et al., 2016; Savani et al., 2014). A lot of strategies have been implemented to improve healthcare quality, including continue education, professional training, technology and resources education, effective management, and shared decision-making. Clinical audit is one such method and is considered the most well-known means of improving healthcare quality (Ashley et al., 2014; Rodríguez et al., 2015).

Clinical audit has gained prominence, with growing emphasis on enhancing quality of care and reducing patient morbidity and mortality. It is an effective tool for achieving this objective (Al Zahrani & Sikder, 2022). Clinical audit has been defined as an improvement process for quality that seeks to improve patient care and outcomes through a systematic review of care against explicit standards and criteria, as well as the review of changes (Rodríguez et al., 2015).

The audit plays a crucial role in analyzing changes in CS trends to achieve a more standardized operation. Medically supported CS can effectively prevent maternal and perinatal morbidity and mortality (Elasly et al., 2021). A clinical audit has been initiated in Saudi Arabia; however, no reports have been published on its implementation in CS (Al Zahrani & Sikder, 2022). There is a gap in the literature that sufficiently investigates the rate of previous CS and the most common type of CS, identifies counseling regarding Vaginal Birth After Cesarean Section (VBAC), and determines the factors affecting previous CS.

Significance of the Study

Cesarean section (CS) is a surgical operation performed for several maternal and fetal indications. There is a global increase in CS rates, and Saudi Arabia has also witnessed this rise. CS is associated with various complications despite its general safety. Avoiding unnecessary CS can be achieved through precise decision-making. Clinical audits can improve the quality of care by reducing mortality and morbidity. The audit plays a significant role in CS trend analysis, thereby standardizing the process. However, no previous study has focused on CS audits to improve the quality of care. The purpose of this study was to determine the rate of previous cesarean section and the most common type of cesarean section, and to identify counseling regarding

Methods

Study Design

This study utilized a quantitative retrospective clinical audit design to evaluate cesarean section practices and the quality of care provided to women undergoing cesarean delivery. A retrospective clinical audit involves the systematic review of previously documented patient records and clinical practices against predetermined evidence-based standards. This approach enables researchers to identify gaps between actual clinical practice and recommended standards, assess compliance with established guidelines, and determine areas requiring quality improvement. The primary purpose of clinical audit is to enhance patient care and clinical outcomes by reviewing current practices against explicit evidence-based criteria and implementing corrective actions where necessary (Essali, 2017).

The study was conducted in the Gynecology and Obstetrics Department at the Royal Commission Medical Center in Yanbu City, Kingdom of Saudi Arabia. The department provides outpatient, inpatient, maternity, and surgical obstetric services. It receives approximately 70 patients per day through its outpatient clinics, of whom approximately 85% are pregnant women. Medical records of women who underwent cesarean sections during the one-year period from September 2023 to September 2024 were retrospectively reviewed.

Study Sample

The population was from Saudi Arabia. All pregnant women who underwent CS at RCMC in one year, between September 2023 and September 2024, were included. The sample was drawn from the population in Saudi Arabia and was a convenience sample. The sample is a part of a population. Convenient sampling is a non-probability, non-random sampling method in which subjects are selected from the target population based on several criteria, including availability

at a given time, ease of access, geographical proximity, or willingness to participate in the study. Convenience samples are occasionally considered accidental samples, as the features may be selected in the sample simply because they happen to be situated administratively, spatially, or near where the research is conducted, and data collection is performed (Etikan et al, 2016; Golzar et al, 2022). After applying the convenience sampling approach, the study sample included 871 subjects.

Ethical Consideration

Approval from the Royal Commission Medical Center Committee was obtained before the initiation of the study. The approval number was (331390 on the first of September, 2023). No specific intervention was performed; however, the data were collected anonymously and handled with strict confidentiality. The security of the subjects' identities was guaranteed, and no personal data was collected.

Data Collection

The extracted data included maternal booking status, ethnicity, age, parity, gestational age, pregnancy outcome, fetal presentation, history of previous cesarean section, type of cesarean section (elective or emergency), consultant involvement in clinical assessment, provision of counseling regarding vaginal birth after cesarean (VBAC), history of previous vaginal delivery, previous instrumental vaginal delivery, previous abortion, intraoperative complications, and the cesarean section rates among primiparous and multiparous women.

Data Analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 26 for Windows (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to present the frequencies and percentages of categorical variables. Multiple Linear Regression was used in our analysis; it is a statistical technique used to determine relationships between variables and to predict outcomes based on those relationships. This technique estimates the relationship between causally related variables. It generates two versions of the prediction equation: one in unstandardized (raw score) form and the other in standardized form (Uyanik & Guler, 2013). A P-value ≤ 0.05 was considered significant.

Results

1. Sample Characteristics

The study sample consists of women who gave birth by cesarean section (871), and the data are from September 2023 to September 2024. The questionnaire consists of the following questions (Booked, age, Ethnicity, Parity Gestational age, Pregnancy outcome, Babys Position, Previous Caesarean Section, Type of caesarean section, Is the assessment performed by consultant, did counseling performed about VBAC, Previous normal delivery, Previous instrumental delivery, Previous abortion, Intraoperative complication, Rate in Primi VS Rate in Multi, Is Gravidity affect the rate of emergency CS, Outcome of Emergency CS VS Elective CS). The researchers relied on the famous statistical analysis program to analyze the questionnaire (SPSS V26)

2. Descriptive analysis Cesarean Section audit to improve quality of care in RCMC

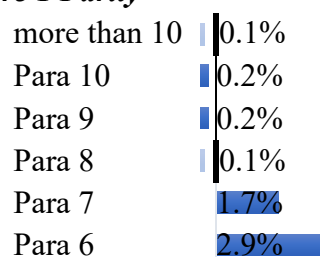
The results in Table 1 indicate that 76.2% are booked and 23.8% are not. 1.3% age <20, 10.9% age 20-3, 38.5% age 30-40, and 49.4%. Age >40. 88.7% Ethnicity Saudi. 64.9% Gestational age (40-37) ranked first, %90.5. Pregnancy outcome (Single) ranked first, while Pregnancy outcome (Multiple) ranked 81.7%. Baby's position: (Cephalic), 10.4%; baby's position (Breach), 3.9%; baby's position (Transverse).

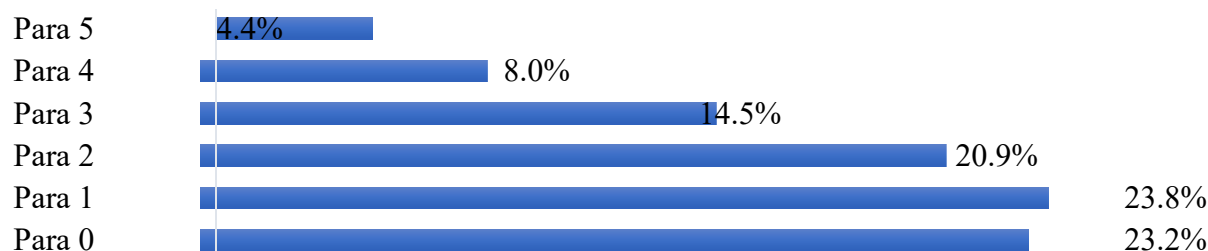
Table 1 Descriptive Analysis Cesarean Section Audit to Improve Quality of Care in RCMC

		N	%
Booked	Yes	664	76.2
	No	207	23.8
Age	<20	11	1.3
	20-30	95	10.9
	30-40	335	38.5
	>40	430	49.4
Ethnicity	Saudi	773	88.7
	Non-Saudi	98	11.3
Gestational age	>40	70	8.0
	40-37	565	64.9
	36-34	184	21.1
	<34	52	6.0
Pregnancy outcome	Single	788	90.5
	Multiple	78	9.0
	Didn't respond	5	0.6
Babys Position	Breach	91	10.4
	Breach, Transverse	2	0.2
	Cephalic	712	81.7
	Cephalic, Breach	30	3.4
	Cephalic, Transverse	2	0.2
	Transverse	34	3.9

The results shown in Figure 2 indicate that 61% had a Previous Cesarean Section (yes), while 39% had a Previous Cesarean Section (No).

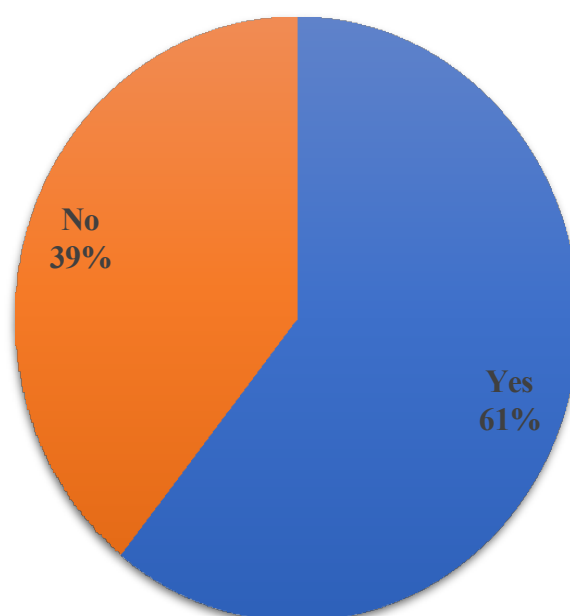
Figure 1 Parity





The results shown in Figure 2 indicate that 61% had a previous cesarean section (yes), while 39% had a Previous Cesarean Section (No).

Figure 2 Cesarean Section Number



The results shown in Table 2 indicate that there is a percentage of 60.3% for Type of cesarean section (Elective), while a percentage of 42.3% for Type of cesarean (Didn't respond).

Table 2 Percentage of Cesarean Section

Type of caesarean section	N	%
Elective	451	51.8
Emergency	368	42.3
Didn't respond	52	6.0
Total	871	100.0

The results shown in Table 3 indicate that 48.5% of the assessment was conducted by a consultant (yes), while 14.5% was not (no).

Table 3 Consultant Assessment

Is the assessment performed by consultant	N	%
Yes	422	48.5
No	126	14.5

Didn't respond	323	37.1
Total	871	100.0

The results in Table 4 indicate that 32.8% received counseling on VBAC (yes), while 59.6% did not (no).

Table 4 Vaginal Birth After Caesarean Section (VBAC) Counselling

Did counseling do about VBAC	N	%
Yes	286	32.8
No	519	59.6
Didn't respond	66	7.6
Total	871	100.0

The results shown in Table 5 indicate that 31.2% had previous normal delivery (no), while 63.7% had previous normal delivery (no).

Table 5 Types of Delivery

Previous normal delivery	N	%
Yes	272	31.2
No	555	63.7
Didn't respond	44	5.1
Total	871	100.0

The results shown in Table 6 indicate that there is a percentage of 2.9%. Previous instrumental delivery (yes), while 90.6% Previous instrumental delivery (no).

Table 6 Percentage of Instrumental Delivery

Previous instrumental delivery	N	%
Yes	25	2.9
No	789	90.6
Didn't respond	57	6.5
Total	871	100.0

The results shown in Table 7 indicate that there is a percentage of 31.7%. Previous abortion (yes), and 65.7% Previous abortion (no).

Table 7 History of Gynecological Surgery

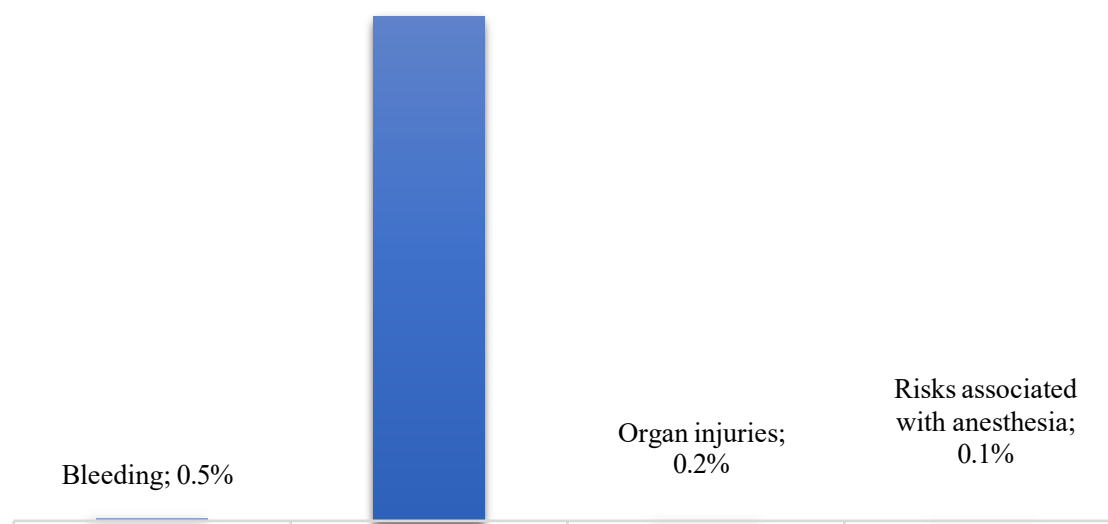
Previous abortion	N	%
Yes	276	31.7
No	572	65.7
Didn't respond	23	2.6
Total	871	100.0

The results shown in Figure 3 indicate a percentage of 97.6%. Intraoperative complication (No complications), 0.5%; Intraoperative complication (Bleeding), 0.2%; Intraoperative

complication (organ injuries), 0.1%; intraoperative complication (risks associated with anesthesia), no complications; 97.6%

Bleeding: no complications, organ injuries , risks associated with anesthesia.

Figure 3 Bleeding, Organ injuries, Risks associated with Anesthesia



3. Hypotheses

Table 8 showed there is a statistically significant effect of (age, Ethnicity, Parity, Gestational age) on previous cesarean section at a significance level of 0.05. There is a significant effect of the variables (age, Parity) on Previous Cesarean Section at a significance level of 0.05, while there is no significant effect of the variables (Ethnicity, Gestational age) on Previous Cesarean Section at a significance level of 0.05. The coefficient of determination was 17.9%. This ratio is interpreted as meaning that the independent variables explain the variance in the dependent variable.

Table 8 Hypothesis

Variables	B	Sig	Result
Constant	2.000	0.000	-----
age	-0.106	0.000	There is an effect
Ethnicity	-0.004	0.930	There is not an effect
Parity	-0.108	0.000	There is an effect
Gestational age	0.033	0.136	There is not an effect
F = 46.670	F = 46.670	0.000	
R Square	0.179 (17.9%)	0.179 (17.9%)	0.179 (17.9%)

Discussion

A clinical audit is an improvement process for quality that seeks to improve patient care and outcomes (Rodríguez et al., 2015). The audit plays a crucial role in analyzing changes in CS

trends to achieve a more standardized operation. Medically justified CS can effectively prevent maternal and perinatal morbidity and mortality (Elasly et al., 2021). This study was conducted to determine the rate of prior CS, the most common type of CS, the factors affecting prior CS, and counseling regarding VBAC. In the current study, more than one-half of the subjects (64.9%) had a gestational age of 37-40 weeks, and the large majority (90.5%) had a singleton. The major position of the baby was cephalic (81.7%). The largest proportions of women reported parity 1 (23.8%) and parity 0 (23.2%). In a previous Saudi study, the largest proportion of subjects (45.3%) had a gestational age of 37-40 weeks, and, similar to our findings, the largest proportion was singleton (94%). Nulliparous women accounted for only 13.13% of the total sample (AlBasri et al., 2023). The rate of CS in Saudi Arabia was estimated to be 25-27% (Wahabi et al, 2016; Alsulami et al, 2020). The previous history of CS was reported in one study as the major indication of CS (63.65%) (AlBasri et al., 2023). The present study revealed that more than one-half of cases (61%) had a previous CS, whereas 31.2% reported a previous normal delivery; instrumental delivery was uncommon (2.9%). There was a high rate of elective CS, with 51.8% undergoing it.

A previous Saudi study that enrolled 398 women revealed that the emergent CS rate was 49%, whereas the elective CS rate was 51% (Al-Kadri et al., 2015), findings similar to ours. Studies from Riyadh reported total rates of 13.6% for emergent CS and 7.8% for elective CS, with rates ranging from 4.5% to 12.5% (Wahabi et al., 2016; Wahabi et al., 2021). However, such rates were lower than ours for elective operations. In contrast to our findings, a previous study from Qassim reported a higher rate of emergent CS than elective CS (AlSheeha, 2018). Another Saudi study reported that emergent CS was more common (67%) than elective CS (33%) (Al Rowaily et al., 2014).

Researchers found in one Saudi study that previous CS was the major indication for elective CS (54/3%) (Al Rowaily et al, 2014). VBAC is one of the strategies advanced to reduce the high frequency of CS, as prior CS is the strongest predictor of CS recurrence. A previous study found that 93% of women had a successful VBAC, indicating that VBAC may reduce the CS rate and is an effective option (Habib et al., 2020). However, our findings revealed that only 32.6% reported counseling about VBAC, and less than fifty percent reported assessment by consultants. In contrast to our findings, one study enrolled 281 subjects and found that most women were assessed by consultants (69.4%) (Aljohani et al., 2021).

The assessment of factors affecting previous CS in the current research revealed that both age and parity were significant predictors. Consistent with our findings, a study conducted at King Fahd Medical City found that maternal age and parity were the most strongly associated variables with CS (Kamil et al., 2011). In contrast to our findings, one Saudi study revealed that age and parity weren't associated with CS (AlSheeha, 2018). Furthermore, a previous Saudi study demonstrated that age wasn't associated with emergent CS, whereas parity increased the odds of emergent CS (Wahabi et al, 2023).

Among our subjects, only 31.7% experienced previous abortion. Regarding complications, the large majority (97.6%) had none, whereas 0.5% experienced bleeding, and 0.2% and 0.1% experienced organ injuries and anesthesia-related risks, respectively. Similarly, at King Abdulaziz Medical City in Jeddah, 93.2% of subjects had no complications, but among those who experienced complications, bleeding was the most common (Aljohani et al., 2021). In

previous research, blood transfusion was the most predominant adverse outcome (3.72%) (Al Rowaily et al, 2014). Regarding the improvement of quality of care through audit, one study found that CS audit was a useful tool and, if well implemented, could improve decision-making, enhance the rational use of resources, and harmonize practice among care providers (Al-Kadri et al., 2015).

Conclusion

This study indicated that a previous cesarean section was the leading determinant for repeat cesarean delivery, illustrated its substantial contribution to the overall cesarean section rate. Elective cesarean sections were performed more frequently than emergency procedures, indicating that elective surgery may be a key driver of the increasing cesarean section rate. Maternal age and parity were also significantly associated with a history of previous cesarean section. Although vaginal birth after cesarean (VBAC) is an evidence-based strategy for reducing unnecessary repeat cesarean deliveries and improving the quality of maternity care, counseling regarding VBAC was insufficient. In addition, consultant involvement in the assessment of women undergoing cesarean section was limited. These findings emphasize the importance of implementing regular cesarean section audits to identify gaps in clinical practice, enhance adherence to evidence-based guidelines, promote appropriate VBAC counseling, and ultimately improve the quality of obstetric care while reducing unnecessary cesarean section rates.

This study has numerous limitations. As a single-center retrospective study, the results may not be generalizable to other healthcare settings, and the analysis was limited to the completeness and accuracy of documented medical records. Future studies must include multi-center with prospective designs are recommended to validate these findings and evaluate the long-term effectiveness of audit-based quality improvement initiatives. In clinical practice, healthcare organizations should strengthen adherence to evidence-based cesarean section guidelines, improve documentation, and establish standardized VBAC counseling pathways. From a nursing perspective, targeted educational programs should enhance nurses' competencies in antenatal education, patient counseling, and shared decision-making, while nurses should play a greater role in promoting informed birth choices and supporting strategies that safely reduce unnecessary cesarean deliveries.

This study revealed a high rate of prior CS, which was the primary reason for repeated CS. Additionally, elective CS was more common than emergent CS; therefore, elective CS may be a major contributor to the increase in the CS rate. Furthermore, age and parity were associated with previous CS. VBAC is an effective strategy to reduce CS rates and improve the quality of care. However, counseling patients about VBAC was inadequate. Furthermore, consultants weren't the major personnel responsible for women's assessment. Therefore, a CS audit may improve the quality of care by reducing CS rates.

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Declaration of Conflicting

The authors declare no conflicts of interest regarding the publication of this article.

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References

- Al Rowaily, M. A., Alsalem, F. A., & Abolfotouh, M. A.** (2014). Cesarean section in a high-parity community in Saudi Arabia: Clinical indications and obstetric outcomes. *BMC Pregnancy and Childbirth*, 14, 92.
- Al Zahrani, A., & Sikder, M. N.** (2022). Maturity of clinical audit concept in Saudi Arabian health care practice: A review. *Saudi Journal of Medical and Pharmaceutical Sciences*, 8, 455–462.
- AlBasri, S., AlHibshi, D., Althakafi, K., & Alolyan, S.** (2023). Assessing cesarean section rates and indications in Saudi Arabia: A Robson classification analysis for maternity care improvement. *Medical Journal of Obstetrics and Gynecology*, 11(3), 1178.
- Al-Kadri, H. M., Al-Anazi, S. A., & Tamim, H. M.** (2015). Increased cesarean section rate in Central Saudi Arabia: A change in practice or different maternal characteristics. *International Journal of Women's Health*, 7, 685–692.
- AlSheeha, M. A.** (2018). Epidemiology of cesarean delivery in Qassim, Saudi Arabia. *Open Access Macedonian Journal of Medical Sciences*, 6(5), 891–895.
- Alsulami, S. M., Ashmawi, M. T., Jarwan, R. O., Malli, I. A., Albar, S. K., & Al-Jifree, H. M.** (2020). The rates of cesarean section deliveries according to the Robson Classification System during the year 2018 among patients in King Abdul-Aziz Medical City, Jeddah, Saudi Arabia. *Cureus*, 12(11), e11556.
- Aljohani, A. A., Al-Jifree, H. M., Jamjoom, R. H., Albalawi, R. S., & Alosaimi, A. M.** (2021). Common complications of cesarean section during the year 2017 in King Abdulaziz Medical City, Jeddah, Saudi Arabia. *Cureus*, 13(1).
- Arasli, H., Ekiz, E. H., & Katircioglu, S. T.** (2008). Gearing service quality into public and private hospitals in small islands: Empirical evidence from Cyprus. *International Journal of Health Care Quality Assurance*, 21(1), 8–23.
- Ashley, M. P., Pemberton, M. N., Saksena, A., Shaw, A., & Dickson, S.** (2014). Improving patient safety in a UK dental hospital: Long-term use of clinical audit. *British Dental Journal*, 217(7), 369–373.
- Ba'aqeel, H. S.** (2009). Cesarean delivery rates in Saudi Arabia: A ten-year review. *Annals of Saudi Medicine*, 29(3), 179–183.
- Çiçek, E., Özsezer-Demiryürek, E., Özerol-Keskin, N. B., & Murat, N.** (2016). Comparison of treatment choices among endodontists, postgraduate students, undergraduate students, and general dentists for endodontically treated teeth. *International Dental Journal*, 66(4), 201–207.
- Dekker, L., Houtzager, T., Kilume, O., Horogo, J., van Roosmalen, J., & Nyamtema, A. S.** (2018). Caesarean section audit to improve quality of care in a rural referral hospital in Tanzania. *BMC Pregnancy and Childbirth*, 18, 164.

- Elasý, A. N., Dhawan, S., & El-Hawy, L. L.** (2021). Lower segment caesarean section audit is a promising tool to improve the quality of standard care at a tertiary hospital in Kuwait: A cross-sectional study. *Open Journal of Obstetrics and Gynecology*, 11(12), 1665–1674.
- Essali, A.** (2017). Psychiatric audit. *The Arab Journal of Psychiatry*, 28(2), 137–140.
- Etikan, I., Musa, S. A., & Alkassim, R. S.** (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1–4.
- Gaddis, S. M.** (2018). *An introduction to audit studies in the social sciences*. Springer.
- Golzar, J., Noor, S., & Tajik, O.** (2022). Convenience sampling. *International Journal of Education & Language Studies*, 1(2), 72–77.
- Habib, F. A., Faidh, R. A., Althagafi, S. M., Aljohani, T. A., & Abuessa, B. A.** (2020). A retrospective study about the outcome of vaginal delivery after cesarean section in Madinah, Saudi Arabia. *International Journal of Medicine in Developing Countries*, 4(2), 291–297.
- Hoxha, I., Syrogiannouli, L., Braha, M., Goodman, D. C., da Costa, B. R., & Jüni, P.** (2017). Caesarean sections and private insurance: Systematic review and meta-analysis. *BMJ Open*, 7(8), e016600.
- Kamil, A., Perveen, K., & Al-Tannir, M. A.** (2011). Factors associated with cesarean deliveries at Women Specialized Hospital Riyadh, King Fahd Medical City, Kingdom of Saudi Arabia. *Journal of the Egyptian Public Health Association*, 86(3–4), 73–76.
- Mosadeghrad, A. M.** (2013). Healthcare service quality: Towards a broad definition. *International Journal of Health Care Quality Assurance*, 26(3), 203–219.
- Murtada, M., Hakami, N., Mahfouz, M., Abdelmola, A., Eltyeb, E., Medani, I., Maghfori, G., Zakri, A., Hakami, A., Altraifi, A., & Khormi, A.** (2023). Multiple cesarean section outcomes and complications: A retrospective study in Jazan, Saudi Arabia. *Healthcare*, 11(20), 2799.
- Nelissen, E. J., Mduma, E., Ersdal, H. L., Evjen-Olsen, B., van Roosmalen, J. J., & Stekelenburg, J.** (2013). Maternal near miss and mortality in a rural referral hospital in northern Tanzania: A cross-sectional study. *BMC Pregnancy and Childbirth*, 13, 141.
- Rodríguez, F. P., Castro-Acosta, A., & Martínez, C. J.** (2015). La auditoría clínica y su circunstancia. *Archivos de Bronconeumología*, 51(10), 479–480.
- Savani, G. M., Sabbah, W., Sedgley, C. M., & Whitten, B.** (2014). Current trends in endodontic treatment by general dental practitioners: Report of a United States national survey. *Journal of Endodontics*, 40(5), 618–624.
- Shah, A., Fawole, B., M’Imunya, J. M., et al.** (2009). Cesarean delivery outcomes from the WHO global survey on maternal and perinatal health in Africa. *International Journal of Gynecology & Obstetrics*, 107, 191–197.
- Thomas, J.** (2006). Rates of cesarean delivery in developing countries suggest unequal access. *International Family Planning Perspectives*, 32, 105.
- Uyanik, G. K., & Güler, N.** (2013). A study on multiple linear regression analysis. *Procedia - Social and Behavioral Sciences*, 106, 234–240.
- Wahabi, H., Fayed, A., Elmorshedy, H., et al.** (2023). Prediction of emergency cesarean section using detectable maternal and fetal characteristics among Saudi women. *International Journal of Women’s Health*, 15, 1283–1293.

Wahabi, H., Fayed, A., Esmail, S., et al. (2016). Riyadh Mother and Baby Multicenter Cohort Study: The cohort profile. PLoS ONE, 11(3), e0150297.

Wahabi, H., Esmail, S., & Fayed, A. (2021). Maternal prepregnancy weight and pregnancy outcomes in Saudi women: Subgroup analysis from Riyadh Mother and Baby Cohort Study (RAHMA). BioMed Research International, 2021, 1–10.

World Health Organization. (2009). Monitoring emergency obstetric care: A handbook. World Health Organization.

World Health Organization Human Reproduction Programme. (2015). WHO statement on caesarean section rates. Reproductive Health Matters, 23(45), 149–150.