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RISK-ORIENTED APPROACH TO THE PREVENTION OF HEALTHCARE-ASSOCIATED INFECTIONS IN OBSTETRIC CARE ORGANIZATIONS

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Abstract

Background and Objectives. Healthcare-associated infections in obstetric care remain a significant public health issue due to their impact on maternal and neonatal morbidity and mortality. Intrauterine infections and postpartum infectious complications constitute a substantial component of perinatal risk. The objective of the study was to analyze the dynamics of healthcare-associated infections among postpartum women and newborns in the Republic of Kazakhstan and to develop a risk-oriented approach to the prevention of infectious complications in obstetric care.

Materials and Methods. A retrospective epidemiological study covering the period 2020-2024 was conducted. The analysis included official national statistical data on healthcare-associated infections among postpartum women and intrauterine infections among newborns. Additional data were obtained from the obstetric department of a multidisciplinary hospital in Astana, including the number of live births, overall neonatal morbidity, and the structure of registered neonatal pathology. Relative and intensive indicators were calculated. Descriptive statistical methods were applied.

Results. During 2022-2024, postpartum endometritis predominated in the structure of healthcare-associated infections among postpartum women. A decrease in intrauterine infection incidence was observed from 6.5 per 1,000 live births in 2020 to 3.7 per 1,000 in 2024, while the case fatality rate increased from 10.5% to 17.3%. At the institutional level, overall neonatal morbidity increased from 26.7% to 47.6%, accompanied by changes in the structure of neonatal pathology. Based on the conducted analysis, a risk-oriented stratification matrix of determinants of healthcare-associated infections among postpartum women was developed and tested.

Conclusions. The identified structural changes in maternal and neonatal infectious morbidity indicate persistent epidemiological risks. The implementation of a risk-oriented approach may contribute to prioritizing preventive measures and strengthening infection control in obstetric care settings.

Keywords: healthcare-associated infections; intrauterine infections; neonatal morbidity; obstetric care; risk-oriented approach; infection control.

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Резюме

РИСК-ОРИЕНТИРОВАННЫЙ ПОДХОД К ПРОФИЛАКТИКЕ ИНФЕКЦИЙ, СВЯЗАННЫХ С ОКАЗАНИЕМ МЕДИЦИНСКОЙ ПОМОЩИ В ОРГАНИЗАЦИЯХ РОДОВСПОМОЖЕНИЯ

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Введение и цель. Инфекции, связанные с оказанием медицинской помощи, в организациях родовспоможения остаются одной из актуальных проблем современного здравоохранения, оказывая существенное влияние на показатели материнской и неонатальной заболеваемости и смертности. Внутриутробные инфекции и послеродовые инфекционные осложнения формируют значительную долю перинатального риска. Целью исследования явился анализ динамики инфекций, связанных с оказанием медицинской помощи, у родильниц и новорождённых в Республике Казахстан и разработка риск-ориентированного подхода к профилактике инфекционных осложнений в системе родовспоможения.

Материалы и методы. Проведено ретроспективное эпидемиологическое исследование за 2020–2024 гг. В анализ включены официальные национальные статистические данные по инфекциям, связанным с оказанием медицинской помощи, у родильниц и внутриутробным инфекциям у новорождённых. Дополнительно проанализированы показатели акушерского стационара многопрофильной больницы г. Астаны, включая число родившихся живыми, общую заболеваемость новорождённых и структуру зарегистрированной патологии. Рассчитаны относительные и интенсивные показатели. Использованы методы описательной статистики.

Результаты. В 2022–2024 гг. в структуре инфекций, связанных с оказанием медицинской помощи, у родильниц преобладал послеродовой эндометрит. Отмечено снижение частоты внутриутробных инфекций с 6,5‰ в 2020 году до 3,7‰ в 2024 году при одновременном увеличении летальности с 10,5% до 17,3%. На уровне медицинской организации выявлено увеличение общей заболеваемости новорождённых с 26,7% до 47,6% и изменение структуры неонатальной патологии. На основании проведённого анализа разработана и апробирована матрица риск-ориентированной стратификации факторов инфекций, связанных с оказанием медицинской помощи у родильниц.

Заключение. Выявленные структурные изменения инфекционной заболеваемости у родильниц и новорождённых свидетельствуют о сохраняющихся эпидемиологических рисках. Применение риск-ориентированного подхода может способствовать приоритизации профилактических мероприятий и совершенствованию системы инфекционного контроля в организациях родовспоможения.

Ключевые слова: инфекции, связанные с оказанием медицинской помощи; внутриутробные инфекции; неонатальная заболеваемость; родовспоможение; риск-ориентированный подход; инфекционный контроль.

Для цитирования:

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Түйіндеме

АКУШЕРЛІК ҰЙЫМДАРЫНДА МЕДИЦИНАЛЫҚ КӨМЕК КӨРСЕТУГЕ БАЙЛАНЫСТЫ ИНФЕКЦИЯЛАРДЫҢ АЛДЫН АЛУДЫҢ ТӘУЕКЕЛГЕ БАҒДАРЛАНҒАН ТӘСІЛІ

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Кіріспе және мақсат. Акушерлік көмек көрсету ұйымдарында медициналық көмекке байланысты инфекциялар қазіргі денсаулық сақтау жүйесінің өзекті мәселелерінің бірі болып қала береді және ана мен неонаталдық сырқаттанушылық пен өлім-жітім көрсеткіштеріне елеулі әсер етеді. Жатырішілік инфекциялар мен босанудан кейінгі инфекциялық асқынулар перинаталдық қауіптің едәуір бөлігін құрайды. Зерттеудің мақсаты -Қазақстан Республикасында босанған әйелдер мен жаңа туған нәрестелер арасындағы медициналық көмекке байланысты инфекциялардың динамикасын талдау және акушерлік қызмет жүйесінде инфекциялық асқынулардың алдын алудың тәуекелге негізделген тәсілін әзірлеу.

Материалдар мен тәсілдер. 2020-2024 жылдар аралығында ретроспективті эпидемиологиялық зерттеу жүргізілді. Талдауға босанған әйелдер арасындағы медициналық көмекке байланысты инфекциялар және жаңа туған нәрестелердегі жатырішілік инфекциялар бойынша ресми ұлттық статистикалық деректер енгізілді. Қосымша ретінде Астана қаласындағы көпсалалы ауруханаңың акушерлік стационарының көрсеткіштері талданды, оның ішінде тірі туғандар саны, жаңа туған нәрестелердің жалпы сырқаттанушылығы және тіркелген патология құрылымы қарастырылды. Салыстырмалы және интенсивті көрсеткіштер есептелді. Сипаттамалық статистика әдістері қолданылды.

Нәтижелер. 2022-2024 жылдары босанған әйелдер арасындағы медициналық көмекке байланысты инфекциялар құрылымында босанудан кейінгі эндометрит басым болды. Жатырішілік инфекциялар жиілігінің 2020 жылғы 6,5‰-ден 2024 жылы 3,7‰-ге дейін төмендеуі байқалды, сонымен қатар леталдылық көрсеткіші 10,5%-дан 17,3%-ға дейін артты. Медициналық ұйым деңгейінде жаңа туған нәрестелердің жалпы сырқаттанушылығының 26,7%-дан 47,6%-ға дейін өсуі және неонаталдық патология құрылымының өзгеруі анықталды. Жүргізілген талдау негізінде босанған әйелдердегі медициналық көмекке байланысты инфекциялардың қауіп факторларын тәуекелге негізделген стратификациялау матрицасы әзірленіп, апробация дан өткізілді.

Қорытынды. Босанған әйелдер мен жаңа туған нәрестелердегі инфекциялық сырқаттанушылық құрылымындағы анықталған өзгерістер эпидемиологиялық тәуекелдердің сақталып отырғанын көрсетеді. Тәуекелге негізделген тәсілді қолдану профилактикалық іс-шараларды басымдыққа қоюға және акушерлік ұйымдарда инфекциялық бақылау жүйесін жетілдіруге ықпал етуі мүмкін.

Түйінді сөздер: *медициналық көмекке байланысты инфекциялар; жатырішілік инфекциялар; неонаталдық сырқаттанушылық; акушерлік көмек; тәуекелге негізделген тәсіл; инфекциялық бақылау.*

Дәйексөз үшін:

Алдабекова Г.У., Касымбек С., Данбаева Ж.С., Мусина А.А., Хамидуллина З.Г., Абдрашидова С.Б., Жумабаева Э.М., Кокишева Г.А., Раисова К.А., Камалбекова Г.М. Акушерлік ұйымдарында медициналық көмек көрсетуге байланысты инфекциялардың алдын алудың тәуекелге бағдарланған тәсілі // Ғылым және Денсаулық сақтау. 2026. Vol.28 (1), Б. 74-81. *doi 10.34689/SH.2026.28.1.009*

Introduction

Healthcare-associated infections (HAIs) in obstetric care settings remain one of the significant challenges of modern healthcare, affecting maternal and neonatal morbidity and mortality rates [1,2]. Intrauterine infections (IUIs) and nosocomial infections in newborns occupy a special place in the structure of infectious complications, as they determine perinatal losses and the risk of adverse long-term health outcomes in children [18,26].

According to international studies, sepsis is among the leading causes of maternal mortality, accounting for approximately 11% of its overall structure [9,13]. In Europe and the United States, septic complications continue to represent a substantial proportion of maternal deaths [9,22]. The incidence of nosocomial infections in newborns ranges from 4% to 7%, with the highest risk observed in infants with extremely low birth weight and gestational age below 28 weeks [7,20].

In the Republic of Kazakhstan, 8,978 cases of intrauterine infections in newborns were registered during 2020-2024 [15]. However, the absence of unified diagnostic and registration approaches for IUIs and HAIs complicates the objective assessment of their prevalence [14]. Significant regional variability in reported indicators may reflect differences in epidemiological surveillance systems and the quality of infection reporting.

Modern technologies in pregnancy management and the care of premature newborns, aimed at reducing perinatal mortality, are accompanied by an increase in invasive procedures, potentially raising the risk of HAIs [10,24]. Despite improvements in infection control standards and the implementation of modern diagnostic methods, the prevention of infectious complications in obstetric care remains epidemiologically relevant [2,4].

Given the multifactorial nature of HAIs, a risk-oriented approach to prevention becomes particularly important. This approach is based on systematic identification, assessment, and management of epidemiological risks [18,26]. The concept of risk implies a comprehensive evaluation of the likelihood of infectious complications, taking into account clinical, microbiological, and organizational determinants [4]. Risk-oriented technologies include the standardization of medical procedures, strengthening epidemiological control, and prioritizing interventions targeting modifiable risk factors [3]. It has been demonstrated that improved adherence to hand hygiene practices significantly reduces the incidence of nosocomial infections [12].

Thus, the variability of HAI and IUI indicators, changes in their nosological structure, and the need to prioritize modifiable determinants highlight the necessity of developing a systematic risk-oriented approach to the prevention of infectious complications in obstetric care.

The aim of the study was to analyze the dynamics of healthcare-associated infections among postpartum women and newborns and to develop a risk-oriented model for HAI prevention in obstetric care settings.

Materials and Methods

Study Design and Data Sources

A retrospective epidemiological study with elements of time-trend analysis was conducted covering the period 2020–2024.

The primary data sources included official annual statistical reports of the healthcare system of the Republic of Kazakhstan, containing information on healthcare-associated infections (HAIs) among postpartum women and intrauterine infections (IUIs) among newborns.

Additional data were obtained from the obstetric department of a multidisciplinary hospital in Astana, including annual records on the number of live births, overall neonatal morbidity, and the structure of registered neonatal pathologies.

The analysis included aggregated annual indicators reflecting the number of registered HAIs among postpartum women, the structure of HAI nosological forms (postpartum endometritis, sepsis, peritonitis, purulent-septic complications), the number of intrauterine infections among newborns, the proportion of laboratory-confirmed IUI cases, neonatal deaths associated with IUIs, the total number of live births, the number of newborns with registered pathology, and the structure of neonatal morbidity (prematurity, congenital anomalies, intrauterine growth restriction, hypoxia/asphyxia, congenital pneumonia). The study included all officially registered cases during the study period without sampling.

Since the extracted data were reported in absolute numbers, relative and intensive indicators were calculated using the annual number of live births as the denominator.

The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and was approved by the Ethics Committee of Astana Medical University (Protocol No. 10, dated November 26, 2024). As the study was based exclusively on anonymized aggregated statistical data, individual informed consent was not required.

Study Formulas

The incidence rate of intrauterine infections (IUIs) was calculated per 1,000 live births. To determine this indicator, the annual number of registered IUI cases was divided by the total number of live births in the same year and then multiplied by 1,000.

The case fatality rate for IUIs was calculated by dividing the number of neonatal deaths attributed to intrauterine infections by the total number of registered IUI cases for the corresponding year, followed by multiplying the result by 100 to obtain a percentage value.

Overall neonatal morbidity was calculated as the proportion of newborns with registered pathology among the total number of live births. This was determined by dividing the number of newborns diagnosed with pathological conditions by the total number of live births in the same year and multiplying the result by 100.

The structure of neonatal morbidity was assessed by calculating the proportion of each nosological category within the total number of registered pathological cases. This was performed by dividing the number of cases for each specific diagnosis by the total number of newborns with registered pathology and multiplying the result by 100.

To evaluate temporal trends, absolute changes were calculated by subtracting the baseline value from the subsequent annual value. Relative changes were calculated by dividing the absolute change by the baseline value and multiplying the result by 100. Annual growth rates were determined to assess the direction and magnitude of changes over the study period.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics (version 26.0)

Descriptive statistical methods were applied, including calculation of relative and intensive indicators, proportions, and analysis of time-series dynamics.

Based on the epidemiological findings, determinants of HAIs among postpartum women were systematized and grouped according to clinical and organizational characteristics. A risk-oriented stratification matrix was subsequently developed by categorizing factors according to their clinical relevance and degree of manageability.

Results

The analysis of the structure of healthcare-associated infections (HAIs) among postpartum women in the Republic of Kazakhstan for 2022–2024 made it possible to assess the dynamics of the main nosological forms and identify changes in their proportional distribution (Figure 1).

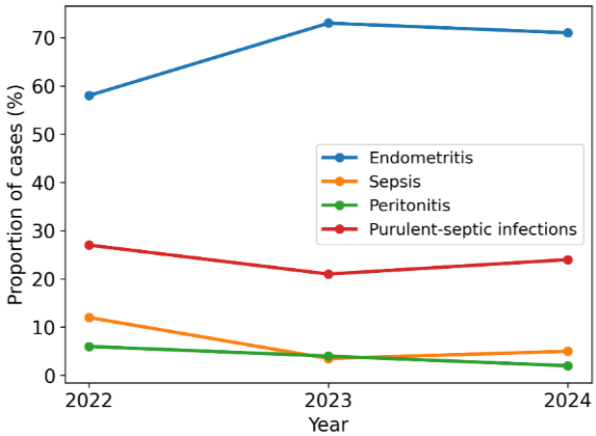

Figure 1. Trends in healthcare-associated infections among postpartum women in Kazakhstan, 2022-2024

Throughout the analyzed period, postpartum endometritis predominated in the structure of HAIs. In 2022, its proportion was 58%. In 2023, it increased to 72-73%, and in 2024, it slightly decreased to 70–71%. Compared to 2022, an overall increase in the share of endometritis was observed, while it consistently maintained its leading position among postpartum infectious complications.

The proportion of sepsis was 12% in 2022. It decreased to 3-4% in 2023 and increased to 5% in 2024, remaining below the baseline level. Peritonitis demonstrated a consistent decline over the study period, decreasing from

6% in 2022 to 4% in 2023 and further to 2% in 2024. Purulent-septic infections, including postoperative and postpartum forms, exhibited variable dynamics. Their proportion decreased from 27% in 2022 to 21% in 2023, followed by an increase to 24% in 2024.

Overall, the nosological structure of HAIs among postpartum women in 2022-2024 was marked by the persistent predominance of endometritis, a decline in severe purulent-inflammatory complications such as peritonitis, and variable patterns in septic forms.

These structural shifts warranted further assessment of neonatal morbidity, particularly intrauterine infections, which serve as a key indicator of infectious risk in obstetric care. The dynamics of IUIs among newborns in the Republic of Kazakhstan for 2020 - 2024 are presented in Table 1.

Table 1.

Indicators of intrauterine infections (IUIs) among newborns in the Republic of Kazakhstan, 2020-2024.

Year	Registered IUI cases, n	Rate per 1,000 live births (‰)	Laboratory-confirmed, %	Neonatal deaths due to IUIs, n	Case fatality rate, %*
2020	2585	6.5	25	271	10.5
2021	1675	3.8	39	226	13.5
2022	1881	4.7	26	297	15.8
2023	1413	3.6	29	203	14.4
2024	1424	3.7	34	246	17.3
* Case fatality rate was calculated as the proportion of neonatal deaths among registered IUI cases.					

The analysis of intrauterine infection (IUI) indicators among newborns in the Republic of Kazakhstan for 2020 - 2024 demonstrates a decrease in the incidence rate compared with 2020. In 2020, the rate was 6.5 per 1,000 live births (2,585 cases), whereas by 2024 it declined to 3.7 per 1,000 (1,424 cases). The lowest value was recorded in 2023 (3.6 per 1,000), with fluctuations within the range of 3.6–4.7 per 1,000 during the study period.

The proportion of laboratory-confirmed cases ranged from 25% to 39%. The highest level of laboratory verification was observed in 2021 (39%), followed by a decrease in 2022 and a subsequent increase to 34% in 2024.

The number of neonatal deaths associated with IUIs varied from 203 to 297 cases annually. The case fatality rate showed an upward trend, increasing from 10.5% in 2020 to 17.3% in 2024. The highest fatality rate was recorded in 2024.

Thus, despite the decline in the registered incidence of IUIs, variability in laboratory confirmation and an increase in case fatality persist, indicating the need for further improvement of epidemiological surveillance.

After analyzing national indicators of intrauterine infections, an assessment of overall neonatal morbidity was conducted at the level of an individual medical institution, allowing for a more precise characterization of the epidemiological burden within the obstetric care system.

The dynamics of overall neonatal morbidity in the obstetric hospital of Astana for 2020-2024 are presented in Figure 2.

The analysis demonstrates an increase in the proportion of newborns with registered pathology among live births from 26.7% in 2020 to 45.0% in 2021. In 2022, the indicator decreased to 43.6%, then increased to 48.6% in 2023 and reached 47.6% in 2024.

Overall, during the study period, an increase in overall neonatal morbidity was observed compared with the baseline year 2020, followed by stabilization within the range of 43-49%. These findings indicate an increased clinical burden on the neonatal care component of obstetric services.

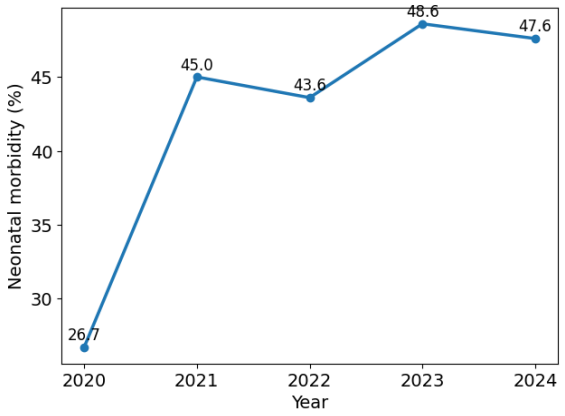

Figure 2. Trends in overall neonatal morbidity in the obstetric hospital of Astana, 2020-2024.

The increase in the proportion of newborns with registered pathology required an analysis of its nosological structure, which serves as the basis for subsequent risk factor stratification. The corresponding data are presented in Table 2.

The analysis of the indicators presented in Table 2 demonstrates a marked increase in the proportion of newborns with registered pathology among live births during 2020–2024. While in 2020 this indicator was 26.7%, it increased to 45.0% in 2021. In subsequent years, the proportion fluctuated within the range of 43.6-48.6%, remaining substantially higher than the baseline level of 2020. The highest value was recorded in 2023 (48.6%), followed by relative stabilization in 2024 (47.6%).

The proportion of preterm newborns varied from 4.0% to 6.6% of total live births. The highest rate was observed in 2023 (6.6%), coinciding with the peak of overall neonatal morbidity.

Within the structure of registered pathology, Intrauterine growth restriction consistently accounted for a substantial proportion, ranging from 17.2% to 33.4%. After a decrease in 2023 (17.2%), the indicator increased again to 26.5% in 2024. The proportion of hypoxic conditions increased compared with 2020 and remained at the level of 23-25% during 2022-2024.

Table 2.

Neonatal morbidity indicators in the obstetric hospital of Astana, 2020–2024. Percentages of preterm newborns were calculated from the total number of live births in the corresponding year; percentages for individual conditions were calculated from the total number of newborns with registered pathology.

Indicator	2020	2021	2022	2023	2024
Live births, n	8656	5345	7257	7365	7552
Newborns with registered pathology, n (%)	2310 (26.7)	2406 (45.0)	3161 (43.6)	3578 (48.6)	3595 (47.6)
Preterm newborns, n (%)	344 (4.0)	297 (5.6)	375 (5.2)	488 (6.6)	366 (4.9)
Congenital anomalies, %	26.2	36.7	29.1	26.8	39.1
Intrauterine growth restriction, %	33.4	32.3	32.5	17.2	26.5
Hypoxia / asphyxia, %	11.1	19.9	25.3	23.8	23.2
Congenital pneumonia, %	18.0	17.9	16.7	14.7	13.3

The frequency of congenital pneumonia showed a gradual decline from 18.0% in 2020 to 13.3% in 2024. The share of congenital anomalies demonstrated variability, reaching its maximum value in 2024 (39.1%).

Overall, the increase in neonatal morbidity was accompanied by changes in the structure of pathology, reflecting heterogeneity in perinatal risk and indicating the need to consider both obstetric and somatic factors when developing preventive measures.

For the purpose of systematizing the identified determinants and defining priorities for epidemiological control, a risk-oriented stratification matrix of healthcare-associated infections among postpartum women was developed. The matrix is presented in Table 3.

Table 3.

Risk-oriented stratification matrix of healthcare-associated infections among postpartum women.

Group of determinants	Main risk factors	Degree of manageability	Control mechanisms
Obstetric	Emergency cesarean delivery; prolonged rupture of membranes; chorioamnionitis; frequent vaginal examinations	Partially modifiable	Standardization of indications; limitation of invasive procedures; antibiotic prophylaxis
Somatic	Anemia; obesity; diabetes mellitus; immunodeficiency	Partially modifiable	Prenatal screening; correction of underlying conditions
Microbiological	Colonization with Streptococcus agalactiae; bacterial vaginosis	Modifiable	Screening; birth canal sanitation
Organizational and healthcare system	Non-compliance with hand hygiene; improper surgical technique; absence of antibiotic prophylaxis	Modifiable	Standard operating procedures; internal audit; infection prevention and control (IPC) measures
Behavioral	Smoking; non-adherence to breastfeeding recommendations	Modifiable	Education and counseling
Risk stratification criteria	High risk - presence of ≥3 factors, including ≥1 manageable organizational and healthcare system factor; moderate risk- 1-2 factors without severe obstetric complications; low risk - absence of significant factor combinations	-	Individualization of preventive measures

Table 3 presents the risk-oriented stratification matrix of healthcare-associated infections among postpartum women. The matrix groups identified determinants into obstetric, somatic, microbiological, organizational and healthcare system, and behavioral categories.

Obstetric and somatic determinants are classified as partially modifiable, reflecting their association with both clinical conditions and management strategies. Microbiological and organizational determinants are considered modifiable, as they can be influenced through infection prevention and control measures. Behavioral factors are also categorized as modifiable and may be addressed through education and counseling.

Risk stratification is based on the cumulative presence of determinants. High risk is defined as the presence of three or more factors, including at least one modifiable organizational determinant. Moderate risk corresponds to one or two factors without severe obstetric complications. Low risk is defined as the absence of clinically significant combinations of factors. The matrix provides a structured framework for aligning preventive interventions with the identified level of epidemiological risk.

Discussion

The present study identified structural changes in healthcare-associated infections (HAIs) among postpartum women and newborns in the Republic of Kazakhstan during the study period. The predominance of postpartum endometritis in the structure of maternal HAIs corresponds with published data indicating that cesarean delivery and intrapartum factors remain major determinants of postpartum infectious morbidity [24,25]. The observed reduction in peritonitis and fluctuations in septic forms reflect changes in the distribution of severe infectious complications over time.

At the national level, a decrease in the registered incidence of intrauterine infections (IUIs) was observed, while the case fatality rate demonstrated an upward trend. Similar inconsistencies between incidence and severity indicators have been described in surveillance studies, where differences in diagnostic criteria, reporting systems,

and laboratory confirmation may influence epidemiological estimates [7,11]. The variability in laboratory verification identified in the present study may therefore indicate heterogeneity in diagnostic practices.

At the institutional level, an increase in overall neonatal morbidity was recorded, followed by stabilization at elevated levels. International evidence suggests that improved survival of preterm and high-risk infants may be accompanied by an increased proportion of registered neonatal pathology [5,20]. The fluctuations in intrauterine growth restriction and hypoxic conditions observed in this study are consistent with data highlighting the influence of obstetric complications and maternal comorbidities on neonatal outcomes [10,16].

The findings also confirm the importance of modifiable organizational determinants in infection prevention. Previous studies have demonstrated that adherence to hand hygiene and standardized clinical protocols contributes to a reduction in healthcare-associated infections [6,12,17,21]. The classification of organizational and microbiological determinants as modifiable components in the proposed stratification matrix aligns with contemporary infection prevention and control strategies [19,23].

In contrast to purely descriptive listings of risk factors, the proposed stratification matrix systematizes determinants according to their modifiability and cumulative presence. This structured approach allows differentiation of preventive measures according to the level of epidemiological risk.

The study has limitations. The analysis was based on aggregated statistical data, which limits the possibility of individual-level causal inference. In addition, differences in diagnostic practices and reporting completeness may affect the observed trends. However, the use of official national data provides population-level coverage and enables identification of systemic patterns in maternal and neonatal infectious morbidity.

Overall, the findings support the application of a structured risk-oriented approach to infection prevention in obstetric care, taking into account modifiable clinical and organizational determinants.

Conclusion

Structural changes in healthcare-associated infections among postpartum women and newborns in Kazakhstan were identified, including the predominance of postpartum endometritis and an increase in overall neonatal morbidity at the institutional level.

Despite the decline in registered intrauterine infection rates, the rise in case fatality and variability in laboratory confirmation indicate persistent epidemiological challenges.

The proposed risk-oriented stratification matrix may serve as a structured basis for prioritizing preventive measures and strengthening infection control in obstetric care settings.

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