Polish Annals of Medicine

Journal homepage: https://www.paom.pl

Research paper

Infection control measures at Osh City Perinatal Centre

Aizharkyn Akzholtoeva[1], Mairamkan Zhumanalieva[2], Umid Zakirov[1], Manas Kyzy Uulkan[3], Aigerim Kasymova[2]

[1] *Department of Public Health, Osh State University, Kyrgyz Republic*
[2] *Department of Propaedeutics of Internal Diseases with Family Medicine Course, Osh State University, Kyrgyz Republic*
[3] *Department of Anatomy, Histology and Normal Physiology, Osh State University, Kyrgyz Republic*

Article info

Article history
Received: September 11, 2024
Accepted: October 18, 2024
Available online: April 22, 2025

Keywords
Disease prevention
Hospital hygiene
Monitoring systems
Medical safety
Sanitary standards

Doi
https://doi.org/10.29089/paom/194879

Abstract

Introduction: Investigating the effectiveness of infection control in health care facilities is of paramount importance, given the critical role of health care facilities in preventing the spread of infectious diseases.

Aim: The aim of this article is to comprehensively analyse the infection control system in a specified health facility and identify key deficiencies that contributed to the spread of SARS-CoV-2.

Material and methods: Statistical analysis and epidemiological surveillance methods were used in the study. The analysis revealed significant systemic problems in the existing infection control system at the perinatal centre, covering various aspects, including lack of adequate quarantine measures, insufficient regular testing, incorrect medical records and organizational failures.

Results and discussion: During the study, the following results were obtained: 22.2% of the perinatal centre staff and 15.5% of patients were infected with COVID-19 during the study period. The main factors contributing to the high rate of infection were the lack of systematic testing (only 30% of the staff underwent regular PCR testing), inadequate quarantine measures (40% of cases were not isolated), and deficiencies in medical record keeping and contact tracing (only 20% of contacts of infected persons were recorded).

Conclusions: These factors combined to create a favourable environment for the spread of the virus within the institution.

Corresponding author: Aizharkyn Akzholtoeva; Department of Public Health, Osh State University, 723500, 331 Lenin, Osh, Kyrgyz Republic.
E-mail address: aiz.akzholtoeva@gmail.com

1. INTRODUCTION

Infection control in healthcare facilities represents one of the key challenges for the healthcare system, especially in the current COVID-19 pandemic. The need to study this topic is due to the significant impact of infectious diseases on the health of the population, as well as on the economic and social development of countries.[1,2]

The research is aimed at identifying the weaknesses of existing infection control measures and developing new, more effective methods of preventing and controlling infectious diseases in healthcare facilities. Studies conducted in Kyrgyzstan have shown the importance of this issue. In their study, Omusheva and Turdalieva[3] highlighted significant changes in the microbial environment and increased antibiotic resistance among patients with bacterial pneumonia in the context of the current pandemic. These observations emphasize the significance and complexity of the problem of antibiotic resistance, especially as the medical system faces additional strains due to widespread viral infections such as COVID-19. These changes in the microbiome and increasing incidences of antibiotic resistance require the medical community to take immediate action to adapt existing diagnostic and treatment protocols.

A research paper by Abdurakhmanov et al.[4] documents significant adaptations in the Kyrgyz Republic healthcare system caused by the COVID-19 pandemic. The implementation of advanced epidemiological monitoring methods and the development of comprehensive protective strategies for the health workforce led to a reduction in the incidence of secondary infections among patients infected with SARS-CoV-2 and a decrease in incidents among health workers at the start of 2022. These data suggest an increase in the responsiveness and resilience of the public health system in the context of a pandemic threat. Deryabina et al.[5] emphasize the importance of the national roadmap for strengthening infection control in Kazakhstan and identify gaps in the implementation of key components of infection control at the level of health facilities.

The presented studies examined various aspects of infection control in healthcare facilities in Kazakhstan in the context of the COVID-19 pandemic, including changes in the microbial landscape, antibiotic resistance, challenges in the provision of healthcare services to vulnerable populations, and the development and implementation of infection control measures. However, despite the important conclusions and recommendations made in these works, there remain several unresolved issues and areas that require further research. In particular, there is a lack of a holistic, multidisciplinary approach that brings together evidence from different areas of expertise to create integrated solutions. There has also been insufficient focus on the development and evaluation of individualized strategies for different populations, which is essential to address specific risks and needs. In addition, studies have not considered the long-term effectiveness of the implemented interventions, which is necessary to understand the sustainability and long-term impact of the adopted strategies.

2. AIM

Based on the identified gaps and unresolved issues in existing studies, the aim of this study can be reformulated to explore integrated approaches to infection control in healthcare facilities. The aim of this study is to develop and evaluate the effectiveness of infection control measures in healthcare facilities based on an analysis of the current situation and the experience of the former CIS countries in pandemic conditions. Additional objectives are the need to identify the main risk factors for the spread of HAIs and to assess the impact of implemented infection control measures on improving the safety of patients and healthcare personnel.

3. MATERIAL AND METHODS

During the research period from 20 April to 27 May 2023, an epidemiological study was conducted at the Osh City Perinatal Centre to assess the effectiveness of the ongoing anti-epidemic measures in the context of the spread of COVID-19 coronavirus infection. The study involved the collection and analysis of data on the number of cases among medical staff and patients, as well as an assessment of the dynamics of the growth of new cases of infection within this medical facility specializing in the provision of care to pregnant women and maternity women.

As part of a study to analyse the development of healthcare-associated infections (HAIs) during the COVID-19 pandemic in the Osh City Perinatal Centre, a thorough study and assessment of the current situation with HAIs among medical staff and patients was carried out. The use of both quantitative and qualitative methods allowed providing a deep understanding of the dynamics and main factors of infection development, as well as identifying the main directions for improvement of sanitary and hygienic conditions and prevention of HAI.

Quantitative analysis included the collection and processing of statistical data on the number of registered cases of HAIs, as well as assessment of the effectiveness of existing infection prevention and control measures. For this purpose, data from patients' medical records, body temperature and hospitalization logs, and reports on the state of infection safety at the centre were used. These data made it possible to assess the overall infection safety status and identify major trends and problem areas. Qualitative analysis was aimed at an in-depth study of the sanitary and hygienic conditions in the perinatal centre and the identification of factors contributing to the development of HAIs.

As part of a comprehensive analysis conducted to assess the impact of the COVID-19 pandemic on the spread of HAIs with HAI, 238 patients and 72 staff members were surveyed at the Osh City Perinatal Centre. Detailed epidemiological surveillance was initiated in response to the registration of the first 4 alarming cases of new COVID-19 coronavirus infection among patients on May 13, 2020, which raised serious concerns of the health facility management

and authorities and necessitated an in-depth study of the dynamics and risk factors for the rapid spread of HAIs at the height of the pandemic.

The study was conducted in close cooperation with healthcare workers from various specialities, which allowed for obtaining a complete and objective picture of the current situation. The participation of doctors, nurses and nursing staff working in conditions of increased risk of infectious contamination was key to collecting reliable data and developing recommendations that took into account the actual working conditions and needs of medical staff. Analysis of medical records, registers and sanitary-epidemiological reports made it possible to identify gaps in the infection control system and prioritize areas for further efforts. The choice of research methodology was determined by the desire to comprehensively analyse the problem of HAIs in pandemic conditions and to find the most effective solutions to improve infection safety in healthcare facilities. An integrated approach combining quantitative and qualitative methods made it possible not only to identify current problems but also to develop specific recommendations aimed at preventing the development of HAIs and improving the quality of medical care at the perinatal centre.

A key aspect of the study was attention to the details of sanitary and hygienic conditions at the Osh Perinatal Centre. Particular attention was paid to the analysis of the spatial organization of the health facility, including an assessment of the space of the premises and their compliance with the norms designed to ensure adequate infection control. The analysis of cross-process flows allowed for defining potential risks for the spread of infections and developing recommendations for their minimization. An integral part of the study was to examine the availability and use of disinfectants in the perinatal centre. This included an assessment of the range of disinfectants used, their effectiveness and compliance with modern infection control requirements. An analysis of the processes of completing medical records, in particular body temperature and hospitalization registers, revealed the importance of taking these procedures into account in the HAI control system. The study also involved analysing the policies and procedures relating to infection prevention and control in the health facility. This included examining interventions aimed at training and raising awareness among healthcare staff about the importance of adhering to hygiene standards and the use of personal protective equipment.

4. RESULTS

Analysis of the collected data revealed systemic issues in the organization and implementation of infection prevention measures at the Osh City Perinatal Centre during the study period. The results indicate an upward trend in the number of HAIs, particularly among medical staff and patients, which demonstrates the need for improved infection control protocols and preventive strategies.

In the mother-and-child unit, 313 mothers with newborn babies were hospitalized between April 20 and May 13. As of May 14, 88 mothers and 85 newborn babies were under observation in the unit. Of the 29 staff members in the ward, 5 were placed under home quarantine and 4 other health workers were placed in a special isolation ward due to suspected COVID-19 on epidemiological grounds. In the obstetric department of pathology of pregnancy during the same period, 165 pregnant women were hospitalized, 98 of whom were discharged in satisfactory condition, and the remaining 35 patients were transferred to other specialized departments of the perinatal centre. As of May 14, 32 patients were in the department of pathology of pregnant women, 4 of whom had laboratory confirmed cases of COVID-19 by PCR diagnosis on May 13.

In the Department of Pathology of Newborns and Premature Infants, 69 infants were hospitalized during the same period from April 20 to May 13, of whom 47 were discharged home with recovery. At the time of the study, 22 mothers with newborn babies were under medical observation in this unit, and of the 15 staff members in this unit, 6 were quarantined to prevent the possible spread of infection. In the neonatal intensive care unit, 26 infants were in serious condition requiring intensive care during this period, 3 of whom died. 16 infants were transferred from the intensive care unit to the neonatal pathology department, and 3 were discharged under the early newborn discharge programme.

Between April 20 and May 13, the emergency department of a perinatal centre experienced a significant increase in the number of emergency admissions, posing serious challenges for the health facility in the context of infection control. During this period, 603 emergency admissions of pregnant women and women in labour were registered, highlighting the high workload and the critical importance of this unit in providing emergency care. Of particular note is the fact that 6 of the newly admitted patients were found to have an elevated body temperature during the initial medical examination. This symptom can be an indicator of several conditions, including respiratory infections. With the ongoing threat of COVID-19, the possibility that these fever elevations are due specifically to SARS-CoV-2 coronavirus infection requires special attention. Such cases emphasize the need for strict adherence to infection control measures and prompt response to potential infection risks within the health facility.

Analysis of statistical and epidemiological data collected between April 20 and May 27 2023 provided an accurate picture of the spread of COVID-19 in a perinatal centre. The study demonstrates the significant impact of the virus on medical staff and patients, highlighting the critical need for infection prevention measures. Among the centre's 72 staff, 16 positive cases of SARS-CoV-2 infection were identified by PCR, representing 22.2% of the total staff. This indicator is significant and indicates a high degree of penetration among healthcare workers. These data point out the need to strengthen preventive measures, including systematic testing, use of personal protective equipment and ad-

herence to infection control protocols. Analysis of patient data showed that of the 238 women treated during this period, 37 (15.5%) tested positive for COVID-19. This rate indicates transmission not only between healthcare workers but also among patients, reinforcing the need for effective measures to prevent nosocomial infection. Key measures include screening of all incoming patients, increased disinfection of facilities and isolation of infected individuals.

Analysis of the dynamics of detection of new cases of SARS-CoV-2 infection among the medical staff of the perinatal centre showed a gradual increase in the number of infected staff during the study period. Thus, at the initial stage of the study, by May 15, only 1 medical worker out of 72 people (1.4%) had a positive result of PCR test for coronavirus. By May 16, this had increased to 6.9% – 5 infected staff out of 72. By May 26, the percentage of COVID-19 infected healthcare workers increased to 9.7% (7 cases out of 72), reaching a peak of 22.2% (16 positive cases out of 72 workers) by May 27 (Figure 1).

A similar upward trend in the number of persons infected with SARS-CoV-2 was also detected in patients of the perinatal centre. Thus, while on May 15 the rate of COVID-19 infection among hospitalized pregnant and post-partum women was 2.1% (5 cases out of 238 patients), by May 16 this rate increased to 2.9%. However, a more significant increase was recorded by May 26, when the percentage of ill patients reached 13.4% (32 cases out of 238). As a result, by May 27, the total number of COVID-19-infected perinatal centre patients increased to 37, or 15.5% of the total number of tested individuals in this category (Figure 2).

It should be noted that the conducted epidemiological study revealed systemic deficiencies in the maintenance of medical records and registration of COVID-19 cases in individual departments of the Osh Perinatal Centre, starting approximately May 20, 2023. In particular, in the neonatal intensive care and pregnancy pathology departments, the regular recording of patients' body temperature in medical records was almost completely discontinued. This made it difficult to detect new cases of SARS-CoV-2 infection within this facility in a timely manner at later stages of the epidemiological study and may have contributed to the further uncontrolled spread of COVID-19 among patients and staff.

The results of an epidemiological study conducted in the Osh City Perinatal Centre during the COVID-19 pandemic indicate significant systemic problems in the implementation of a set of anti-epidemic and infection control measures. These problems contributed to an increased level of nosocomial spread of SARS-CoV-2 infection among patients and medical staff in this health facility. The existence of systemic deficiencies in the organization and the implementation of necessary measures to prevent the spread of infection highlights the critical need to strengthen infection control and epidemiological measures in settings with a high risk of transmission. This includes not only improving existing safety protocols and their enforcement but also developing new strategies and approaches to strengthen epidemiological safety in health facilities, especially in critical facilities such as perinatal centres.

The results of the conducted comprehensive epidemiological study confirmed the extreme necessity of taking and implementing additional preventive and anti-epidemic measures to control the spread of COVID-19 coronavirus infection in the Osh City Perinatal Centre. The conducted comprehensive epidemiological analysis revealed that several critical preventive and anti-epidemic measures to control COVID-19 have not been implemented in the Osh City Perinatal Centre. The following shortcomings in the current infection control system should be taken into account to minimize the risk of infection during future pandemics:

1. Strict adherence to established medical record-keeping protocols by all healthcare workers was not achieved. The importance of daily recording of body temperature in patients for timely detection of possible COVID-19 cases was underestimated.
2. There was no system of regular and comprehensive PCR testing of medical staff for coronavirus, which did not effectively monitor and prevent the spread of infection within the health facility.

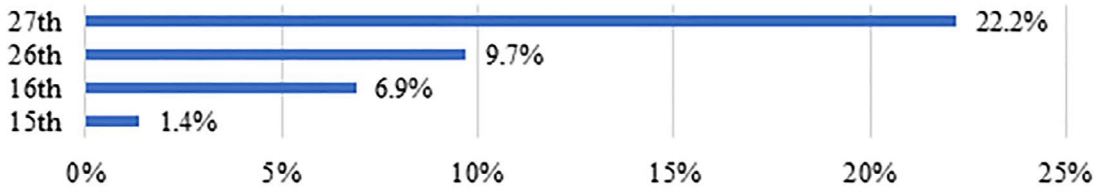

Figure 1. Dynamics of morbidity among personnel. Frequency of HAIs of employees (per 100 population).

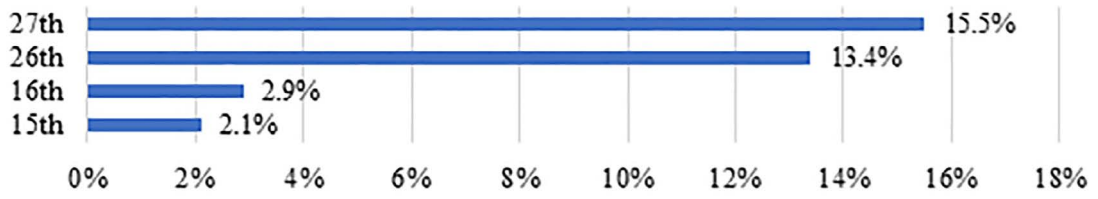

Figure 2. Dynamics of morbidity among patients. Frequency of HAIs of patiente (per 100 population).

3. Mandatory PCR testing was not organized for all newly admitted patients, contributing to the risk of introducing infection from outside.
4. The centre did not have specialized observation wards to isolate patients with confirmed coronavirus infection, which threatened the safety of both patients and staff.
5. Epidemiological work, including tracing and contact recording of identified COVID-19 cases, which is important to prevent nosocomial spread, has not been sufficiently strengthened.
6. Monitoring of the use of personal protective equipment was inadequate, increasing the risk of infection among medical staff.
7. Necessary additional training for medical staff on infection control and COVID-19 prophylaxis was not provided.
8. There was no effective system of administrative control over compliance with anti-epidemic measures, leading to gaps in their implementation.

Taking into account and correcting these errors is extremely relevant for strengthening epidemiological safety and preventing possible future outbreaks of infectious diseases. Only the implementation of this set of urgent preventive and anti-epidemic measures will make it possible to promptly take control of the epidemic situation COVID-19, stop the further spread of SARS-CoV-2 coronavirus infection inside the Osh City Perinatal Centre, ensure the safety of all patients and newborn babies, and reliably protect medical staff from the threat of infection. Only the adoption of tough and decisive measures of this kind can prevent the current situation from escalating into a full-scale epidemic outbreak of COVID-19 in this largest and most critical obstetric facility in the region.

Thus, the results of the study indicate an extremely weak level of preparedness of the management and staff of the Osh City Perinatal Centre to effectively respond to the unprecedented threat of the SARS-CoV-2 pandemic. Insufficient emphasis on the importance of total compliance with quarantine and isolation procedures, the almost complete absence of a system of regular screening of health workers and incoming patients, gross violations in documentation and poor monitoring of indicators of the current condition of women in labour, as well as organizational laxity and failure to track and isolate all possible chains of contacts of infected persons – all these numerous omissions together led to an extremely negative scenario. They made the walls of the perinatal centre one of the powerful hotbeds of further transmission of especially dangerous SARS-CoV-2 virus among the most vulnerable categories of the population. Only urgent and complete elimination of all these deficiencies can prevent the recurrence of similar outbreaks in the institution in the future.

5. DISCUSSION

The results of a detailed epidemiological study of the Osh City Perinatal Centre in the context of the COVID-19 pandemic revealed several extremely alarming trends and systemic deficiencies that require urgent response and drastic measures. One of the most serious problems detected was a rapid increase in the number of people infected with the new coronavirus SARS-CoV-2 both among the patients of the health centre and among health workers themselves. The proportion of COVID-19 cases among the centre's staff showed an impressive stepwise increase from 1.4% in mid-May to a record 22.2% by the end of the month. Such a high rate of infection among nearly 1 in 4 employees makes it extremely difficult to ensure adequate quality of care and poses additional health risks to the rest of the staff and patients. One way to combat this problem is to introduce specialized teams of specialists to monitor hygiene and epidemiological precautions among the staff of the health facility.

Although Thandar et al.,[6] in a study dated 2022, found that the introduction of infection control teams in hospitals, did not result in a statistically significant reduction in nosocomial infections, but significantly improved adherence to hygiene protocols among healthcare staff. This is reflected in the fact that almost all healthcare facilities in Europe have specialized teams and wards for infected patients, significantly reducing the rate of spread of infection through the hospital. These factors have contributed to the spread of infection. Another study by de Claro et al.[7] assessed compliance with COVID-19 infection prevention and control standards in public hospitals and temporary treatment and observation facilities in the Philippines using a 35-item questionnaire. Hospitals were found to show better training and compliance in engineering and administrative controls compared to temporary facilities. However, waste management problems were observed in both types of facilities, with only a small proportion of facilities using colour-coded waste bags, and about a third did not have centralized storage facilities for infectious waste. Particularly notable was the lack of adherence to administrative measures in temporary facilities, including the existence of institutional infection control policies, posting of information materials on hand hygiene, respiratory labelling, physical distancing and use of personal protective equipment. The results emphasize the need for periodic monitoring and supplementation of resources to maintain standards and promptly address compliance gaps. This study reflects the dire epidemiological situation in the world at that time, when priority was given to increasing bed capacity without strict requirements for the hygienic characteristics of buildings housing temporary hospitals. A study conducted at the University Teaching Hospital in Lusaka assessed infection prevention practices among health workers and support staff. It found that although there was a good understanding of the importance of adhering to standard infection prevention and control guidelines, there were significant barriers to full implementation. The main barriers are high staff turnover, infrastructural constraints and high clinical workloads, resulting in poor adherence to infection prevention practices.[8] A similar pattern was observed across hospitals during the pandemic due to the high workload of medical staff.

The situation with the spread of infection among women who were inpatients at the perinatal centre also raises serious

concerns. Despite the lower percentage of cases compared to staff (15.5% by the end of May), the very trend of a steady increase in the number of new cases from 2.1% in the middle of the month to a peak of 13.4% by May 26, requires the closest attention and response. Of particular note are the real, confirmed cases described in the study of rapid spread of infection within the maternity ward among groups of closely contacted labouring women after the first infected patient had been admitted. These cases illustrate very clearly the complexity and danger of dealing with highly contagious respiratory viral infections such as COVID-19 in a medical hospital setting.[9] Even routine ward sharing and domestic situations, previously considered routine, now pose an increased health risk to any uninfected person in contact with an asymptomatic or symptomatic patient.[10] This emphasizes the vital need for strict quarantine of all identified infected persons, without exception. In addition, staff turnover during the pandemic was a significant contributor, thus a study conducted in an inpatient unit of Hospital X in Bogor district, Indonesia, assessed the relationship between nurses' performance and respondents' characteristics with the implementation of infection prevention and control measures. The results showed a significant relationship between the quality of nurses' performance and the effectiveness of infection prevention measures, emphasizing the importance of nurses' professional development to improve infection prevention and control in the hospital environment. Which may be due to the fact that more experienced nurses could not cope with the high workload due to age, therefore the proportion of inexperienced staff increased significantly during the data period.[11,12] This indicates that the high workload of nursing staff also influenced the spread of infection throughout the facility.

It should be noted with particular concern that the survey revealed gross violations in terms of maintaining vital medical records at the perinatal centre itself. Specifically, the discontinuation of recording critical indicators, such as body temperature, in the intensive care and pathology departments of pregnant women is unacceptable and fundamentally contradicts the generally accepted norms and protocols of medical care. Such negligence and indiscipline directly contributed to the accelerated spread of infection within the hospital, due to the inability to timely identify new cases of COVID-19 infection among patients and isolate them from other women in labour. This fact indicates an extremely weak level of control on the part of the centre's management over the observance of discipline and order in an emergency epidemiological situation. To prevent this situation, modern control methods such as SMART could have been used, correlating with high staff awareness and the absence of gross violations of the epidemiological regime.[13,14]

Particularly alarming is the almost complete absence of a system of regular COVID-19 testing of the perinatal centre staff. According to the results of the study, such testing was conducted only once and selectively for some employees in mid-to late May. At the same time, no question was raised about the need for daily or at least weekly screening of health workers by PCR, the only reliable way to detect asymptomatic cases of infection. Meanwhile, just such latent, not outwardly manifested forms of COVID-19 in some infected employees played one of the key roles in the lightning spread of the virus within the walls of medical centres. The complete lack of a systematic approach to testing both patients and staff in the context of the pandemic was one of the main reasons for the severe outbreak of the disease among all those present at the perinatal centre in May 2020. Testing during the pandemic significantly reduced the risk of spread of infection among staff, which ultimately reduced the burden on healthcare facilities during this time period.[15] Similarly, in a study by Alah et al.,[16] a national web-based survey was conducted among healthcare workers in different health sectors in Qatar to assess their knowledge of infection prevention and control measures and their opinion on the effectiveness of these measures in protecting against COVID-19. Of the 1,757 respondents, the majority felt that stricter preventive measures should be applied when dealing with confirmed COVID-19 cases compared to suspected cases. Male healthcare workers and physicians were more likely to consider these measures effective, while female healthcare workers, nurses, and pharmacists tended to have a more critical view of their effectiveness. Also, a high proportion of healthcare workers highly rated the effectiveness of hand hygiene compared to the use of personal protective equipment.

As part of a study by Nhung et al.,[17] the authors evaluated the effectiveness of an infection control and prevention programme to reduce the spread of multi-drug resistant organisms in the neonatology department of Hung Vuong Hospital. The study ran from April to September 2020 and included three phases: an initial assessment of hand hygiene compliance and cleaning of frequently touched surfaces, implementation of several interventions such as the development of specialized cleaning protocols for the ward, training of healthcare staff in infection control and prevention, and implementation of a screening and isolation programme for hospitalized babies. Feedback methods between the infection control team and the neonatology department were also improved. A post-intervention reassessment was conducted and showed significant improvement in hand hygiene compliance and surface cleaning. Specifically, hand hygiene compliance increased from 33.2% to 85.5%, and the frequency of cleaning frequently touched surfaces increased from 82.4% to 93.5%. In addition, the technique of cleaning these surfaces improved, from 38.5% correct use to 87.9%. An important indicator of the effectiveness of the interventions was the reduction in the proportion of positive cultures of multidrug-resistant organisms from 80.8% to 64.7%. This confirms that improved adherence to hand hygiene and surface cleaning can significantly reduce the risk of transmission in the neonatology ward setting. When analysing the results of this study, the negative impact of poor hygiene practices on the spread of coronavirus infection was also observed, which confirms the data obtained in the work described. Sebaey et al.[18] noted that short courses in

epidemiology, especially in facilities with a high proportion of young staff, would be sufficient to address staff ignorance.

In addition to omissions in record keeping and staff screening, the study also revealed several organizational and methodological lapses in the work of the healthcare facility under COVID-19. Firstly, it concerns poor organization of quarantine measures and isolation of potentially infected patients, and the presence of large-scale contacts of infected persons with other patients due to their joint stay in the same wards. The lack of data on proper tracing, recording and further epidemiological investigation of all possible chains of contacts within the hospital of infected patients or nursing staff is also highly questionable. Without a meticulously constructed system of tracing the movements and social relationships of each infected person, any attempt to prevent further transmission of the virus and to localize existing foci of COVID-19 spread was doomed to failure from the outset.[19,20] Alhumaid et al.[21] found that knowledge of infection prevention measures among healthcare workers was adequate, but gaps existed, for example in the knowledge of vaccination, requiring further training and professional development. This highlights the importance of not only basic knowledge but also specialized training programmes to enhance understanding of specific aspects of infection control. Against this background, Kumar et al.[22] showed that a self-instructional module increases nurses' knowledge of infection control strategies by 45%, highlighting the importance of training programmes. This approach not only improves theoretical knowledge but also promotes more informed application of infection prevention in practice. In this regard, Isma[23] discussed the impact of infection control measures on staff awareness, which resulted in a 30% reduction in infection risks, confirming the importance of awareness and training. Awareness and proper understanding of risks are key factors in preventing the spread of infections and improving overall patient safety outcomes.[24] In addition to these findings, Couto et al.[25] developed the EpiRate index to assess the effectiveness of infection control programmes, facilitating better monitoring and improvement of infection prevention measures. The tool not only assesses the current status of infection control measures but also identifies areas for further improvement and the development of targeted education and prevention programmes.

A study conducted at Karolinska University in Sweden found that workers in contact with COVID-19 patients have a higher risk of SARS-CoV-2 infection. Specifically, the odds' ratio for infection was 1.95 for employees working with COVID-19 patients, except for workers in infectious disease and intensive care units, where the risk was slightly higher at 0.86. The highest risk of infection was found in nursing assistants, with a likelihood ratio of 1.62.[26] These data emphasize the need for careful evaluation of protective measures for staff in different medical departments. In a study conducted in community hospitals in Kerala, India, it was found that violation of infection control measures significantly increased the risk of airborne infections among healthcare workers. The study found that the infection rate among healthcare workers was 7.3%, which includes infections such as influenza and tuberculosis. These findings highlight the critical importance of strict adherence to infection control protocols in healthcare settings to reduce the risk of infection.[27,28] A study in the UK also identified a significant risk of infection for healthcare workers, especially those working in wards with large numbers of COVID-19 patients. Nurses and support staff were found to have a higher risk of infection compared to doctors. In addition, the risk was higher in black workers compared to their white colleagues, indicating possible racial and ethnic differences in infection risk.[29,30] These findings emphasize the need to develop and implement specific protective measures for different categories of healthcare workers.

In a study conducted at Ain Shams University Paediatric Hospital in Egypt, it was found that only 48.2% of health workers had undergone pre-employment medical examinations. Most of them did not receive appropriate management after needle prick incidents. This highlights the deficiencies in the medical surveillance and infection prevention system among health workers, which requires improvement of existing procedures and protocols to ensure staff safety.[31,32] In six district hospitals in Yaoundé, Cameroon, it was found that 53.7% of health workers did not receive any post-work care after exposure to blood or other body fluids. The main reasons for low reporting were underestimation of vulnerability (51%) and lack of knowledge of existing post-exposure prophylaxis procedures (42%). These data indicate the need for increased awareness and improved post-exposure case management procedures among healthcare workers to reduce the risk of infection.[33] These studies demonstrate a significant risk of infection among healthcare workers, especially in settings with poor adherence to infection control measures and a lack of appropriate training and resources.

The findings from the study at Osh City Perinatal Centre emphasise the imperative for a reassessment and enhancement of infection control strategies in healthcare settings, particularly during pandemic conditions. The systemic failures identified – ranging from insufficient staff training and testing protocols to inadequate patient isolation and poor record-keeping – highlight the necessity for a more integrated approach to managing healthcare-associated infections. Effective control measures must include comprehensive staff education, continuous monitoring of infection prevention practices, and timely intervention to mitigate the spread of infectious diseases. These lessons are particularly relevant for high-risk healthcare environments like perinatal centres, where vulnerable populations are especially affected.

5. CONCLUSIONS

1. A multitude of systemic deficiencies in the organisation and implementation of anti-epidemic measures were identified, which contributed to the spread of SARS-CoV-2 infection among both the patient population and medical staff at the Osh City Perinatal Centre.

2. By May 2020, 22.2% of staff and 15.5% of patients had been confirmed as having SARS-CoV-2 infection, which served to highlight the ineffectiveness of previous infection control measures and the necessity for their adjustment.
3. The insufficient training of medical personnel and the absence of explicit directives regarding the utilisation of personal protective equipment served to exacerbate the situation, thereby increasing the risk of infection among health workers and patients.
4. The study underscores the necessity for reforming anti-epidemic strategies in healthcare facilities, encompassing enhanced protocols for diagnosis, isolation, treatment, and infection risk prevention, as well as augmented epidemiological surveillance and training for healthcare professionals.

Conflict of interest
None declared.

Funding
None declared.

References
1 Akzholtoeva AA, Dzhumalieva GA, Lubimova AV, Zhanadilova GZ, Davranbek KM. Assessment of the state of infection control in medical and preventive organisations in Osh region. *Innov Med Sci Educ.* 2022;1(9). https://doi.org/10.56199/dpcsms.iauj7163.

2 Sorombaeva N, Temirov N, Asyranova U, et al. Prevalence of healthcare-associated infections among newborns in maternity hospitals of the Kyrgyz Republic. *Bull Sci Pract.* 2022;8(9). https://doi.org/10.33619/2414-2948/82/39.

3 Omusheva SE, Turdalieva BT. Peculiarities of COVID-19 pneumonia in children with bronchial asthma in the Kyrgyz Republic. *Bull Kazan State Med Acad.* 2023;4(4): 134–141. https://doi.org/10.54890/1694-6405_2023_4_134.

4 Abdurakhmanov I, Umurzakov Sh, Zhamilova G, Satarova A, Aidarov Z. COVID-19 and comorbid pathology (Literature review). *Sci Herit.* 2021;68:57–64. https://doi.org/10.24412/9215-0365-2021-68-2-56-64.

5 Deryabina A, Aiypkhanova A, Juvashev A, et al. Core components of infection prevention and control programmes at the facility level in Kazakhstan: Key challenges and opportunities. *Antimicrob Resist Infect Control.* 2023;12:59. https://doi.org/10.1186/s13756-023-01264-6.

6 Thandar MM, Rahman MO, Haruyama R, et al. Effectiveness of infection control teams in reducing healthcare-associated infections: A systematic review and meta-analysis. *Int J Environ Res Public Health.* 2022;19(24):17075. https://doi.org/10.3390/ijerph192417075.

7 De Claro V, Bautista N, Torralba MR, et al. Infection prevention and control in public hospitals and temporary treatment facilities for COVID-19 in the Philippines: Baseline survey results. *COVID.* 2023;3(3):336–347. https://doi.org/10.3390/covid3030025.

8 Zimba MM, Dorothy CO, Mulubwa C, Ngoma-Hazemba A. Infection prevention and control practices; An exploratory qualitative study of healthcare workers' and support staff's experiences at Lusaka University Hospital, Zambia. 2022. https://doi.org/10.1101/2022.03.23.22269760.

9 Vilches TN, De Almeida GB, Fortaleza CMCB, Ferreira CP. Improving control strategies for infections caused by resistant pathogens in hospital networks. *J Biol Syst.* 2023;31(3):737–753. https://doi.org/10.1142/s0218339023500262.

10 Nazarchuk O, Dmyrtriiev D, Babina Y, Faustova M, Burkot V. Research of the activity of local anesthetics and antiseptics regarding clinical isolates of Acinetobacter baumannii as pathogens of postoperative infectious complications. *Acta Biomed.* 2022;93(1):e2022003.

11 Zhafarina Z, Hutahaean S. The relationship between nurse performance and the implementation of infection prevention and control measures in Hospital X Bogor, Indonesia. *Int J Multidiscip Res Anal.* 2023;6(7). https://doi.org/10.47191/ijmra/v6-i7-37.

12 Tutchenko M, Rudyk D, Besedinskyi M, Chub S. Spontaneous bacterial peritonitis. *East Ukr Med J.* 2024;12(2): 221–228. https://doi.org/10.21272/eumj.2024;12(2):221-228.

13 Zhang J, Deng X, Ni P, Wang D. Evaluation of the effectiveness of hospital infection prevention and control based on the SMART principle. *J Cent South Univ Med Sci.* 2023;48(7):1059–1065. https://doi.org/10.11817/j.issn.1672-7347.2023.220328.

14 Mohamed YS, Spaska A, Andrade G, et al. Hand hygiene knowledge, attitude, and practice before, during and post COVID-19: a cross-sectional study among university students in the United Arab Emirates. *Infect Prev Pract.* 2024;6(2):100361. https://doi.org/10.1016/j.infpip.2024.100361.

15 Kardaś-Słoma L, Fournier S, Dupont JC, et al. Cost-effectiveness of strategies to control the spread of Carbapenemase-producing Enterobacterales in hospitals: A modelling study. *Antimicrob Resist Infect Control.* 2022;11:117. https://doi.org/10.1186/s13756-022-01149-0.

16 Alah MA, Abdeen S, Selim N, et al. Knowledge and perceived effectiveness of infection prevention and control measures among healthcare workers during the COVID-19 pandemic. *J Nurs Care Qual.* 2021;37(2):E23–E30. https://doi.org/10.1097/NCQ.0000000000000615.

17 Nhung N, Hang TTT, Nhung NM, et al.. The effectiveness of the infection control interventions in decreasing multidrug-resistant organism transmission in the Department of Neonatology of Hung Vuong Hospital. *Antimicrob Steward Healthc Epidemiol.* 2023;3(S1):s21–s22. https://doi.org/10.1017/ash.2023.65.

18 Sebaey AFE, Atlam SAEM, Kafas ESAER, Zayed HA. Effect of infection control training course on knowledge and practices of medical interns in a large academic hospital in Egypt: An intervention study. *Environ Sci Pollut Res.* 2021;29:14371–14379. https://doi.org/10.1007/s11356-021-16755-5.

[19] Alanazi A, Alenezi NF, Aldidab HF, Alruwaili HK. Overview of infection control in primary healthcare. *Int J Bio-Med Inform e-Health*. 2022;10(6):71–76. https://doi.org/10.30534/ijbmieh/2022/121062022.

[20] Pérez AD, Freyle Martínez DY, Torres Vasquez AC, Bautista HP. COVID-19 and the College Mindset: A Prospective Journey Through Beliefs and Attitudes about Vaccination. *Gac Med Carac.* 2023;131(4):809–819. https://doi.org/10.47307/GMC.2023.131.4.4.

[21] Alhumaid S, Mutair AA, Alawi ZA, et al. Knowledge of infection prevention and control among healthcare workers and factors influencing compliance: A systematic review. *Antimicrob Resist Infect Control*. 2021;10:86. https://doi.org/10.1186/s13756-021-00957-0.

[22] Kumar GV, Kumar P, Madhu MP, Sandyashree B. A study to evaluate the effectiveness of Self-Instructional Module on knowledge and practice regarding infection control strategies among staff nurses working in labour room at selected hospitals, Chamarajanagar. *Int J Adv Nurs Manag.* 2022;10(3):189–196. https://doi.org/10.52711/2454-2652.2022.00047.

[23] Isma M. Assessment of infection control measures and risk factors at Kampala international university teaching hospital in Bushenyi district: A study on staff awareness and implementation. *INOSR Exp Sci.* 2023;12(2):132–146. https://doi.org/10.59298/inosres/2023/2.10.1000.

[24] Ariza S, Gaviria K, Carriazo C, et al. Post-COVID-19 Functional Status and Physical Health in the Affected Population of the Department of Córdoba, Colombia. *Gac Med Carac.* 2024;132(2):479–494. https://doi.org/10.47307/GMC.2024.132.2.19.

[25] Couto B, Ladeira AP, Carvalho WF, Lima NZ, Starling CE. The EpiRate: A multidimensional index for measuring effectiveness in infection prevention. *Open Forum Infect Dis.* 2023;10(Suppl2). https://doi.org/10.1093/ofid/ofad500.1264.

[26] Elfström KM, Blomqvist J, Nilsson P, et al. Differences in risk for SARS-CoV-2 infection among healthcare workers. *Prev Med Rep.* 2021;24:101518. https://doi.org/10.1016/j.pmedr.2021.101518.

[27] Anjali Krishnan R, Kamarudeen M, Rekha Ravindran M, Shinu KS. Are healthcare workers safe? Facility assessment of airborne infection control measures in public hospitals of Kerala. *Int J Community Med Public Health.* 2020;7(7):2723–2729. https://doi.org/10.18203/2394-6040.ijcmph20203005.

[28] Vyshka G, Seferi A, Myftari K, Halili V. Last call for informed consent: confused proxies in extra-emergency conditions. *Indian J Med Ethics.* 2014;11(4):252–254. https://doi.org/10.20529/ijme.2014.064.

[29] Martin CA, Pan D, Melbourne C, et al. Risk factors associated with SARS-CoV-2 infection in a multiethnic cohort of United Kingdom healthcare workers (UK-REACH): A cross-sectional analysis. *PLoS Med.* 2022;19(5):e1004015. https://doi.org/10.1371/journal.pmed.1004015.

[30] Pētersone M, Ketners K, Krieviņš D, Erins I. Strategic purchasing and health system efficiency: Prospects for health sector reform in Latvia. *WSEAS Trans Bus Econ.* 2020;17:41–50.

[31] Hemida EA, Mo'men MAT, Boulos DNK, Aboalfotouh AM. Assessment of implementation of occupational infection prevention of the employee wellness programme among a group of healthcare workers in Pediatrics Hospital of Ain Shams University, Cairo, Egypt. *QJM Int J Med.* 2020;113(Suppl1). https://doi.org/10.1093/qjmed/hcaa045.001.

[32] Babayeva NN. The modern aspects of the professional hygiene of the mouth cavity: Plaque removing in smokers. *Azerb Med J.* 2010;2:141–142.

[33] Takougang I, Cheuyem FZL, Ndungo JH, Lyonga EE, Mbopi-Keou FX. Infection risk perception, reporting and post-exposure management of occupational injuries among healthcare workers in District Hospitals (Yaounde, Cameroon). 2023. https://doi.org/10.1101/2023.08.29.23294797.