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DIAGNOSTIC PROBLEMS OF VIRAL INFECTIONS AND COVID-19 IN INDIA AND KYRGYZSTAN

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ДИАГНОСТИЧЕСКИЕ ПРОБЛЕМЫ ВИРУСНЫХ ИНФЕКЦИЙ И COVID-19 В ИНДИИ И КЫРГЫЗСТАНЕ

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Abstract. Significant overlap in the symptoms of viral infections creates challenges for differential diagnosis, which is crucial for clinical case management and pandemic control. Data on the epidemiological characteristics of acute respiratory viral infections and COVID-19, the diagnostic capabilities of both syndromes, and the healthcare system's capacity to treat these diseases in India and Kyrgyzstan were collected and compared. Two key findings include significant overlap in symptoms (fever and cough), anosmia, and ageusia, which are more specific to COVID-19 but insensitive for diagnosing other diseases. The data also show that both countries experienced significant shortages in PCR testing capacity during the peak COVID-19 outbreaks, forcing them to adopt clinical diagnostics. India pursued a strategy of rapidly increasing the number of available tests using rapid antigen tests, while Kyrgyzstan faced significant challenges related to supply chain management. Access to diagnostic services varied sharply between urban and rural areas in both India and Kyrgyzstan. Such purely clinical differentiation is unreliable in resource-limited settings. Decentralized testing networks must be strengthened with affordable rapid tests, the implementation of context-specific clinical algorithms, and investment in training frontline healthcare workers. Indeed, a syndromic approach to epidemiological surveillance of multiple pathogens offers a path to future preparedness.

Аннотация Значительное совпадение синдромов между вирусными инфекциями создает проблемы для дифференциальной диагностики, что имеет решающее значение в клиническом ведении случаев и контроле пандемий. Собраны и сопоставлены данные об эпидемиологических характеристиках ОРВИ и COVID-19, диагностике обоих этих синдромов и возможностях системы здравоохранения по лечению этих заболеваний в Индии и Кыргызстане. Два основных вывода включают значительное совпадение симптомов

(лихорадка и кашель), аносмию и агеузию, которые более специфичны для COVID-19, но не чувствительны для диагностики других заболеваний. Данные также показывают, что в обеих странах во время пиковых вспышек COVID-19 наблюдался значительный дефицит возможностей ПЦР-тестирования, что вынудило обе страны принять клиническую диагностику. Индия применяла стратегию быстрого увеличения количества доступных тестов с помощью экспресс-тестов на антигены, в то время как Кыргызстан столкнулся с большими проблемами, связанными с управлением цепочками поставок. Доступ к диагностическим услугам резко различался между городскими и сельскими регионами как в Индии, так и в Кыргызстане. Такая чисто клиническая дифференциация ненадежна в условиях ограниченных ресурсов. Необходимо укреплять децентрализованные сети тестирования с помощью доступных экспресс-тестов, внедрения контекстно-специфических клинических алгоритмов и инвестиций в обучение медицинских работников на передовой. Действительно, синдромный подход к эпидемиологическому надзору за множественными патогенами предлагает путь для будущей готовности.

Keywords: COVID-19, Kyrgyzstan, India.

Ключевые слова: COVID-19, Кыргызстан, Индия.

Acute Respiratory Viral Infections (ARVI), including influenza, respiratory syncytial virus (RSV), and adenovirus infections, represent a perennial global burden of disease [1, 2].

The emergence of SARS-CoV-2 and the ensuing COVID-19 pandemic introduced a novel pathogen with a clinical presentation often indistinguishable from common ARVIs [3, 4, 12].

This convergence of syndromic illness creates a significant challenge in regard to diagnostic capability. The ability to accurately and promptly determine which infectious disease is present will primarily influence the initiation of targeted treatment, the application of recommended infection control measures, and will help shape public health responses. By 2024, COVID-19 has accounted for >7 million reported fatalities (WHO) while the seasonal influenza virus is estimated to contribute to approximately 290,000–650,000 respiratory deaths worldwide annually [1, 5].

In many instances, resource-limited countries experience challenges related to laboratory infrastructure, availability of reagents and supplies, the ability to find funding to cover costs, and locating trained resources [5].

This presentation identifies two unique, but representative case studies of the above challenge: India, with its large population and complex healthcare systems, and Kyrgyzstan, a landlocked country in Central Asia that is currently developing a formalised healthcare delivery system [10, 11].

The primary goal of this study is to bring together existing information regarding these challenges to develop pragmatic diagnosis and management recommendations. The specific objective is to complete a comparison between the ARVI and COVID-19 diagnostic challenges and responses between India and Kyrgyzstan with evidence-based recommendations for health systems with similar resource limitations. To gather peer-reviewed literature relevant to this project, the following online databases and free-of-charge sources were searched: PubMed, Scopus, and Google Scholar; World Health Organization (WHO), Ministries of Health in India and Kyrgyzstan; National Disease Surveillance Centres; and various other grey literature sources [6, 7].

The following criteria were used to select studies for inclusion in this review: 1) articles or reports published between 2020 and April 2024, related to the clinical presentation of ARVI and COVID-19; 2) performance of diagnostic tests and access to testing in low-resource settings; 3)

National COVID-19 Testing Guidelines and Public Health Response Strategies of India and Kyrgyzstan; 4) availability of epidemiological data for ARVI and COVID-19 in India and Kyrgyzstan.

All studies focused exclusively on vaccine development or therapeutics without information pertaining to diagnosis, editorials that did not include primary research data, or articles available only in languages other than English or Russian were excluded from the review [8].

A standardized template was used to extract data related to the epidemiology of COVID-19 and ARVI, the various types of diagnostic modalities and sensitivity/specificity of testing methodologies utilized, health system capacity indicators, and the policy responses of health systems in India versus Kyrgyzstan. The analysis was conducted using a health systems framework to allow for comparisons to be made between the two countries.

This project did not require ethical approval given that the research methods involved a review of previously published literature as well as publicly available resources and materials. Time frame: Literature and data from the period between January 2020 and March 2024 have been collated to represent the pandemic and post-pandemic phases [9].

Both ARVI and COVID-19 have common symptoms such as fever, cough, and fatigue, which occur in approximately 68-85%, 60-80%, and 35-70% of people respectively [12].

Anosmia/ageusia has a stronger correlation to COVID-19; however, you may see these symptoms in other ARVIs. There is a greater extent of lower respiratory tract involvement and associated pro-inflammatory complications such as thromboembolism for COVID-19, as compared to ARVIs.

Epidemiology of COVID-19 and ARVIs in the Study Locations. In India, as a result of the delta variant wave in 2020-21, COVID-19 test positivity had exceeded 20% and many systems were inundated with patients. Kyrgyzstan experienced some of the highest per capita mortality rates in the region in July 2020 and early 2021 as a result of multiple waves of severe COVID-19.

Diagnosics and Limitations:

- Gold Standard (RT-PCR) – Sensitivity = 70-98%. Both were severely affected by the lack of reagents, swabs, and a functioning PCR machine during the peak of the waves. During this time, India increased its testing capability to ~2,500 testing labs but had much lower per capita testing access in rural regions. Kyrgyzstan had a limited number of reference labs with the majority located in Bishkek and many times had delays exceeding 72 hours for return of results.

- Rapid Antigen Tests (RATs) – Sensitivity ranged between ~50% and ~90% but have good specificity. India has used RATs to screen for COVID-19 in large amounts. Kyrgyzstan had slow deployment of RATs due to procurement issues and limited funding.

- Clinical Diagnosis – Became the primary method of diagnosis for many peripheral health centers, using adapted versions of the WHO COVID-19 Case Definition.

Comparative Country Analysis Perspective: India used its large private sector and domestic manufacturing base to increase its testing capacity; however, India has very large urban-rural disparities and interstate disparities. The “Indian Council of Medical Research – Advisory” for who and when to test developed over time and, at times, caused confusion among healthcare providers. Kyrgyzstan was very dependent on international aid and multilateral organizations (e.g. WHO and World Bank) for test kits and equipment (Table).

According to this research, in resource-limited countries such as India and Kyrgyzstan, diagnostic capacity is often dictated more by health system capacity than clinical judgement. The rapid mobilization of resources in India demonstrated the potential of a mixed public/private model leveraging domestic production. However, significant equity issues persisted. Conversely, Kyrgyzstan’s experience highlights the fragility of centralized, aid-dependent health systems during a global emergency.

The health care systems in both countries relied heavily upon clinical diagnoses, leading to both over-diagnosis and under-diagnosis with significant implications for patient management and transmission dynamics.

This comparison provides a common, important lesson about pandemic preparedness – the need for decentralised diagnostic capabilities. The primary limitation of the study is that the official health data for both countries may be unrepresentative due to being incomplete, particularly during the peak of the outbreak.

The clinical and public health importance of rapid testing underscores the need for healthcare professionals to use all available testing options [8].

The next logical step is to provide primary healthcare centres with multiplex rapid antigen tests (RAT). Public health recommendations include: (1) Investing in Integrated Surveillance Systems; (2) Creating Contextual Algorithms for healthcare providers; (3) Establishing Regional Stock Pilots for greater resilience. Future studies should evaluate the cost-effectiveness of multiplex RATs and examine the role of AI-driven clinical decision support systems in low-resource settings.

Table

COMPARATIVE SNAPSHOT OF DIAGNOSTIC CHALLENGES, 2020-2022

Feature	India	Kyrgyzstan
Peak PCR Testing Capacity (per day)	~2 million	~5000
Primary Diagnostic Triage during Shortages	ICMR Criteria + RAT	Clinical syndromic diagnosis (SARI/ARI)
Key Urban Rural Access Barrier	Distance to labs, cost in private sector	Transportation logistics, centralized labs
Major Supply Constraint	Fluctuating reagent supply chains	Donor dependency for kits and equipment
Use of Clinical Algorithms	Modified WHO case definition	National protocol for SARI management

Conclusion

The pandemic has highlighted shortages of existing resources; both India and Kyrgyzstan have struggled to differentiate ARVI from COVID-19 diagnostics. Each country developed a system that fails to sufficiently close the gap between equity and access. Therefore, future strategies must focus on developing a comprehensive, inexpensive, and decentralised respiratory virus surveillance and diagnostic methodology. This paper offers a comparative view that demonstrates how diagnostic equity provides a basis for an effective and equitable response model to multiple respiratory pandemics.

References:

1. World Health Organization (2024). COVID-19 Weekly Epidemiological Update. Geneva.
2. Indian Council of Medical Research (2023). Advisory on Strategy for COVID-19 Testing in India. New Delhi.
3. Sh, N. Z., Kuchuk, T. E., Kasymbekova, K. T., & Abdirazakov, N. A. (2022). Seroepidemiological study of the SARS-CoV-2 virus among the population of the Kyrgyz Republic during the first wave of the COVID-19 pandemic. *J Health care in Kyrgyzstan*, 3, 148-56. <https://dx.doi.org/10.51350/zdravkg20229321148>
4. Petersen, E., Koopmans, M., Go, U., Hamer, D. H., Petrosillo, N., Castelli, F., ... & Simonsen, L. (2020). Comparing SARS-CoV-2 with SARS-CoV and influenza pandemics. *The Lancet infectious diseases*, 20(9), e238-e244. [https://doi.org/10.1016/s1473-3099\(20\)30484-9](https://doi.org/10.1016/s1473-3099(20)30484-9)

5. Vandenberg, O., Martiny, D., Rochas, O., van Belkum, A., & Kozlakidis, Z. (2021). Considerations for diagnostic COVID-19 tests. *Nature Reviews Microbiology*, 19(3), 171-183. <https://doi.org/10.1038/s41579-020-00461-z>
6. Aden, D., Zaheer, S., & Raj, S. (2022). Challenges faced in the cancer diagnosis and management—COVID-19 pandemic and beyond — Lessons for future. *Heliyon*, 8(12). <https://doi.org/10.1016/j.heliyon.2022.e12091>
7. Dzushupov, K., Lucero-Prisno III, D. E., Vishnyakov, D., Lin, X., & Ahmadi, A. (2021). COVID-19 in Kyrgyzstan: Navigating a way out. *Journal of Global Health*, 11, 03020. <https://doi.org/10.7189/jogh.11.03020>
8. Dinnes, J., Sharma, P., Berhane, S., van Wyk, S. S., Nyaaba, N., Domen, J., ... & Cochrane COVID-19 Diagnostic Test Accuracy Group. (2022). Rapid, point-of-care antigen tests for diagnosis of SARS-CoV-2 infection. *Cochrane database of systematic reviews*, (7). <https://doi.org/10.1002/14651858.CD013705.pub3>
9. Mathrani, A., Umer, R., Sarvesh, T., & Adhikari, J. (2023). Rural–urban, gender, and digital divides during the COVID-19 lockdown: a multi-layered study. *Societies*, 13(5), 122. <https://doi.org/10.3390/soc13050122>
10. Ахунов, А. М. (2020). Пандемия COVID-19 как вызов для постсоветских стран Центральной Азии. *Международная аналитика*, 11(1), 114-128. (in Russian). <https://doi.org/10.46272/2587-8476-2020-11-1-114-128>
11. World Bank (2021). Strengthening Public Health Preparedness and Response in Kyrgyz Republic. Washington.
12. Koltai, J., Raifman, J., Bor, J., McKee, M., & Stuckler, D. (2022). COVID-19 vaccination and mental health: a difference-in-difference analysis of the understanding America study. *American journal of preventive medicine*, 62(5), 679-687. <https://doi.org/10.1016/j.amepre.2021.11.006>

Список литературы:

1. World Health Organization. COVID-19 Weekly Epidemiological Update. Geneva: WHO; March 2024.
2. Indian Council of Medical Research. Advisory on Strategy for COVID-19 Testing in India. New Delhi: ICMR; 2023.
3. Sh N. Z., Kuchuk T. E., Kasymbekova K. T., Abdirazakov N. A. Seroepidemiological study of the SARS-CoV-2 virus among the population of the Kyrgyz Republic during the first wave of the COVID-19 pandemic // *J Health care in Kyrgyzstan*. 2022. V. 3. P. 148-56. <https://dx.doi.org/10.51350/zdravkg20229321148>
4. Petersen E., Koopmans M., Go U., Hamer D. H., Petrosillo N., Castelli F., Simonsen L. Comparing SARS-CoV-2 with SARS-CoV and influenza pandemics // *The Lancet infectious diseases*. 2020. V. 20. №9. P. e238-e244. [https://doi.org/10.1016/s1473-3099\(20\)30484-9](https://doi.org/10.1016/s1473-3099(20)30484-9)
5. Vandenberg O., Martiny D., Rochas O., van Belkum A., Kozlakidis Z. Considerations for diagnostic COVID-19 tests // *Nature Reviews Microbiology*. 2021. V. 19. №3. P. 171-183. <https://doi.org/10.1038/s41579-020-00461-z>
6. Aden D., Zaheer S., Raj S. Challenges faced in the cancer diagnosis and management—COVID-19 pandemic and beyond — Lessons for future // *Heliyon*. 2022. V. 8. №12. <https://doi.org/10.1016/j.heliyon.2022.e12091>
7. Dzushupov K., Lucero-Prisno III D. E., Vishnyakov D., Lin X., Ahmadi A. COVID-19 in Kyrgyzstan: Navigating a way out // *Journal of Global Health*. 2021. V. 11. P. 03020. <https://doi.org/10.7189/jogh.11.03020>

8. Dinnes J., Sharma P., Berhane S., van Wyk S. S., Nyaaba N., Domen J. Rapid, point-of-care antigen tests for diagnosis of SARS-CoV-2 infection // Cochrane database of systematic reviews. 2022. №7. <https://doi.org/10.1002/14651858.CD013705.pub3>

9. Mathrani A., Umer R., Sarvesh T., Adhikari J. Rural–urban, gender, and digital divides during the COVID-19 lockdown: a multi-layered study // Societies. 2023. V. 13. №5. P. 122. <https://doi.org/10.3390/soc13050122>

10. Ахунов А. М. Пандемия COVID-19 как вызов для постсоветских стран Центральной Азии // Международная аналитика. 2020. Т. 11. №1. С. 114-128. <https://doi.org/10.46272/2587-8476-2020-11-1-114-128>

11. World Bank. Strengthening Public Health Preparedness and Response in Kyrgyz Republic. Washington, DC: World Bank; 2021.

12. Koltai J., Raifman J., Bor J., McKee M., Stuckler D. COVID-19 vaccination and mental health: a difference-in-difference analysis of the understanding America study // American journal of preventive medicine. 2022. V. 62. №5. P. 679-687. <https://doi.org/10.1016/j.amepre.2021.11.006>

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