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The significant role of laboratory technician in covid-19, article review

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ABSTRACT

The healthcare system has, over the years, undergone myriad changes aimed at improving its efficiency and quality levels. At the core of the changes are the concerted efforts of practitioners who work in tandem to deliver efficient services. Laboratory technicians are identified as vital cogs in the healthcare system as they work behind the scenes conducting tests that improve the validity of medical diagnoses. The important role of laboratory technicians came into the limelight during the coronavirus pandemic, which wreaked havoc worldwide. The novel nature of the SARS-CoV-2 virus necessitated prompt testing and evaluation of samples to understand its impact on the body, trajectory, and viable intervention mechanisms. This literature review aims to break down the roles of laboratory technicians during the pandemic. A total of 15 sources have been reviewed, which allude that the laboratory technicians were responsible for running tests and reviewing their quality and ingenuity. The insight derived from the tests permitted physicians and doctors to formulate clinical diagnoses that reduced the deleterious effects of the coronavirus. Consequently, the results indicate that the laboratory technicians tested biomarkers that determined the risk of contracting or transmitting the SARS-CoV-2 virus in specific populations. Identifying risk biomarkers facilitated the creation of preventive mechanisms and doling out recommendations, thus minimizing morbidity and mortality rates. Moreover, the practitioners played an advocacy role during the pandemic by calling for new technologies and testing procedures that could cope with the epidemiological response needs. The technologies created a conducive milieu for the collection, storage, and subsequent testing of samples, thus reducing the probability of errors. Conclusively, the literature review indicates that the role played by the practitioners helped identify vaccines that quelled the continuous spread of the virus.

1. INTRODUCTION

The advent and subsequent spread of the SARS-CoV-2 virus in 2019 caused widespread confusion and anxiety worldwide. The declaration of the disease as a fully-fledged pandemic necessitated rapid testing and implementation of preventive/reactive measures. At the core of the testing process were laboratory technicians who helped diagnose the virus through a wide range of tests [8]. The laboratory technicians actively helped collect clinical samples, which were analyzed to determine the deleterious effect of the virus on the patient's body. The subsequent essay presents a review of various works of erudition covering the seminal role of laboratory technicians during the coronavirus pandemic.

2. Literature Review

[11] adumbrate that testing processes, tools, and mechanisms were substantial in the fight against COVID-19. The authors denote that the World Health Organization strongly recommended preventive and reactive measures for the pandemic, which hinged on the transmission levels [11]. [10] build upon this disposition by highlighting that laboratory testing was substantial as it ensured that the infected persons were aware of their status. Individuals who did not know their status ignored preventive and management protocols, ergo predisposing others to the risk of infection [10].

The [13] denotes that the pandemic highlighted the critical nature and role of medical laboratory technicians. The article shows that the medical discipline relies on the people in the laboratory with their high level of expertise in formulating a clinical diagnosis. The laboratory technicians run the tests and review their quality as well as the ingenuity of the test results [13]. Moreover, the UNS School of Medicine (2021) indicates that laboratory technicians facilitate high-quality patient-centric care. The prompt and timely tests encouraged patients to go to the hospitals for routine visits, thus increasing awareness of the spread and prevalence of the pandemic. Nunez-Argote, Baker, and Jones (2021) highlight that laboratory technicians are at the intersection between adequate healthcare personnel shortages and diagnostic testing. The laboratory technicians are key actors in the healthcare team as they offer essential testing of biomarkers. Furthermore, they facilitate efforts to monitor health levels while engaging in disease prevention steps [9].

Since testing is conducted by laboratory technicians, [5] explore the seminal role of the practitioners in initiative preventive and management processes. The authors cite that the laboratory technicians helped conduct lab diagnoses based on nucleic acid amplification technologies. Their expertise and skills permitted physicians to confirm the clinical diagnosis. Furthermore, the laboratory technicians established serological testing frameworks for antibodies, thus determining the body's response to the virus [1]. The tests served a complementary role to the diagnosis with healthcare practitioners identifying convalescent plasma as well as determining the disease epidemiology rates [5], [3], [16].

The [14] offers an in-depth analysis of the role of laboratory technicians by sequencing the steps involved in testing processes. The organization highlights that the laboratory technicians were responsible for the safe collection and shipment of the specimens. If it were not for the technicians, then the specimens would have been stored ineffectively, thus increasing the risk of infections. Furthermore, the technicians used their expertise to collect respiratory material, including upper and lower respiratory specimens, which were stored and shipped at 2-8°C [14]. The establishment of good communication between the physicians/ practitioners

and laboratory technicians encouraged proper processing of the samples and timely reporting. Moreover, The [14] reports that the utilization of various testing techniques by laboratory technicians facilitated the formulation of case management and prevention policies. The laboratory technicians used nucleic acid amplification tests, viral sequencing, and cultures to diagnose patients with the virus, as shown in the appendix. Additionally, they actively engaged in research to improve the detection of the virus through comparative studies of the serological and molecular assays. The laboratory technicians harnessed information on the optimal percentage of reported cases that merit monitoring of mutations. The information hastened the rolling out of information regarding the changing nature of the coronavirus.

[2] allude that laboratory technicians are vital cogs in the healthcare team, with the pandemic elucidating their importance. The laboratory technicians were required to work around the clock during the pandemic, with their expertise and skills influencing clinical decisions. At least 70% of the clinical decisions made during the pandemic relied on the tests conducted by laboratory technicians [2]. Furthermore, close to 80% of the pandemic management guidelines/ policies were based on lab testing [2].

[12] further highlight that the historical trend of the pandemic placed laboratory technicians at a core position in containing the disease. Apart from conducting testing, the laboratory technicians ensured sudden capacity in processing the large volume of specimens derived from the patients. The technicians requested and advocated for new technologies and testing procedures, which helped cope with the epidemiological response needs. Moreover, they introduced testing frameworks that were implemented at the global, local, regional, state, and national levels. The one-size-fits-all frameworks ensured that the test results were quality and efficient, thus reducing the probability of errors. Also, [6] cite that the laboratory technicians tracked the genetic evolution of the virus, which contributed to the development of vaccines based on mutation levels. The researchers show that the technicians relied on phylogenetic network analysis, which determined the variants and their prevalence in various populations [6]. The phylogenetic analysis helped trace routes of infections, thus identifying undocumented infection sources. The information from the analysis aided in the setting up of quarantine measures preventing the recurrent spread of the disease [15].

[7] focus on the development of COVID-19 vaccines through concerted efforts among laboratory technicians. The paper shows that a global network of laboratories was established to improve and centralize testing processes. The Coalition for Epidemic Preparedness Innovations spearheaded the initiative by providing the requisite resources for comparative analyses [7]. The analyses focused on immunological responses caused by the administration of COVID-19 vaccines. It is imperative to note that the establishment of the centralized lab network with technicians enabled the evaluation of efficacy and immunogenicity endpoints. Consequently, the laboratory technicians supported vaccine developers by providing guidelines on the pathway toward licensure. The vaccines were, however, subject to evaluation by laboratory technicians. [4] reports that all vaccines were tested in the laboratory to determine pharmaceutical quality. The test results would be compared based on the body response as well as the vaccine's ability to minimize the mutation rates of the coronavirus.

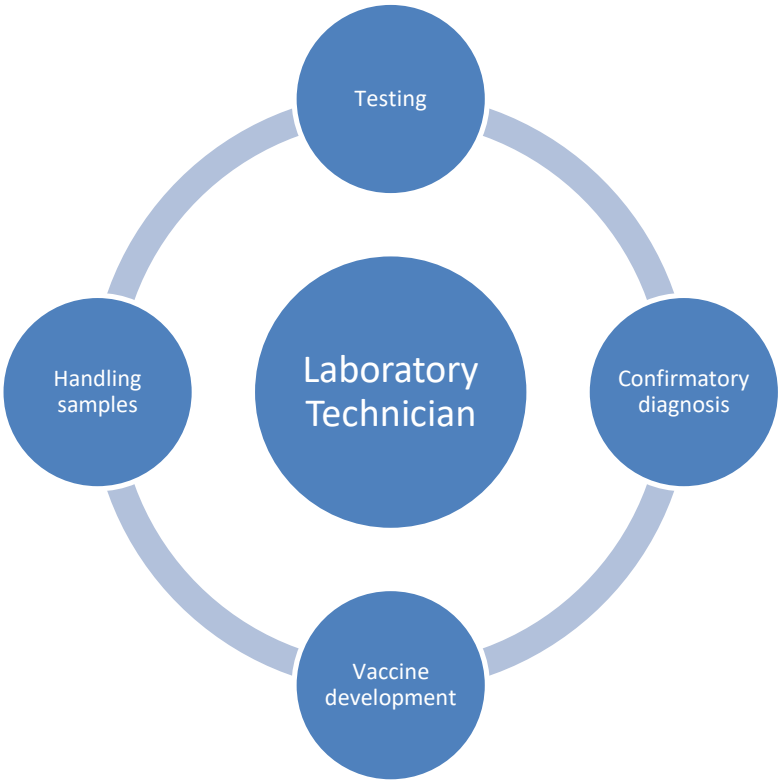


Figure 1: Roles of the Laboratory Technician

3. Conclusion

In due summation, laboratory technicians have played a substantial role in the healthcare industry during the course of the coronavirus pandemic. The preceding literature review shows that the laboratory technicians were involved in testing processes that influenced clinical diagnosis. Furthermore, they advocated for novel technologies that hastened the testing and delivery of quality results. The results were used in developing case management interventions and improving patient-centric care. Consequently, the review indicates that the insight provided by laboratory technicians improved the identification of genomic sequences and virus mutations. The identification facilitated the development of vaccines and evaluation of their side effects on the body.

4. References

[1] Airforce Medical Service. (2021, April 22). Laboratory professionals play an important role in the fight against COVID-19. Retrieved from airforcemedicine.af.mil: https://www.airforcemedicine.af.mil/News/Display/Article/2581978/laboratory-professionals-play-important-role-in-fight-against-covid-19/

[2] Basnet, B. B., Satyal, D., Pandit, R., Maharjan, A., Karki, R., Mishra, S. K., . . . Basnet, T. B. (2022). Medical laboratory staff satisfaction and their perspective on the role of health institutions in combating the COVID-19 pandemic. Journal of International Medical Research, 1-12. https://journals.sagepub.com/doi/pdf/10.1177/03000605221105356.

[3] Chen, N., Zhou, M., Dong, X., Qu, J., Gong, F., Han, Y., . . . Zhang, L. (2020). Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. The Lancet, 507-513. https://www.sciencedirect.com/science/article/pii/S0140673620302117.

[4] European Medicines Agency. (2022). COVID-19 vaccines: development, evaluation, approval, and monitoring. Retrieved from.ema.europa.EU/: https://www.ema.europa.eu/en/human-regulatory/overview/public-health-threats/coronavirus-disease-covid-19/treatments-vaccines/vaccines-covid-19/covid-19-vaccines-development-evaluation-approval-monitoring

[5] Fang, B., & Meng, Q. (2020). The laboratory's role in combating COVID-19. Crit Rev Clin Lab Sci, 400-414. https://pubmed.ncbi.nlm.nih.gov/32662342/.

[6] Forster, P., Forster, L., Renfrew, C., & Forster, M. (2020). Phylogenetic network analysis of SARS-CoV-2 genomes. PNAS, 9241-9243. https://www.pnas.org/doi/10.1073/pnas.2004999117.

[7] Kumar, A., Bernasconi, V., Manak, M., Aranha, A. P., & Kristiansen, P. A. (2021). The CEPI centralized laboratory network: supporting COVID-19 vaccine development. The Lancet, 2148-2149. https://doi.org/10.1016/S0140-6736(21)00982-X.

[8] Nimer, R., Swedan, S., Kofahi, H., & Khabour, O. (2021). Increased Adherence to Infection Control Practices Among Medical Laboratory Technicians During the COVID-19 Pandemic: A Self-Reported Survey Study. Annals of Global Health, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8231461/#:~:text=The%20adherence%20of%20medical%20laboratory,during%20the%20COVID%2D19%20pandemic.

[9] Nuñez-Argote, L., Baker, D. P., & Jones, A. P. (2021). Initial Clinical Laboratory Response to COVID-19: A Survey of Medical Laboratories Professionals. Lab Med, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8135790/.

[10] Roser, M., Ritchie, H., & Ortiz-Espinosa, E. (2020). Coronavirus Disease (COVID-19) – Statistics. https://www.sipotra.it/wp-content/uploads/2020/03/Coronavirus-Disease-COVID-19-%E2%80%93-Statistics-and-Research.pdf.

[11] Seidu, A.-A., Hagan, J. E., Ameyaw, E. K., Ahinkorah, B. O., & Schack, T. (2020). The role of testing in the fight against COVID-19: Current happenings in Africa and the way forward. International Journal of Infectious Diseases, 237-240. https://www.ijidonline.com/article/S1201-9712(20)30525-7/pdf.

[12] Uchejeso, O. M., Rinpan, J. I., Chongs, M. E., & Ekpere-Ezeugwu, M. O. (2021). Fighting COVID-19: The Medical Laboratory Involvement. https://www.intechopen.com/chapters/77900.

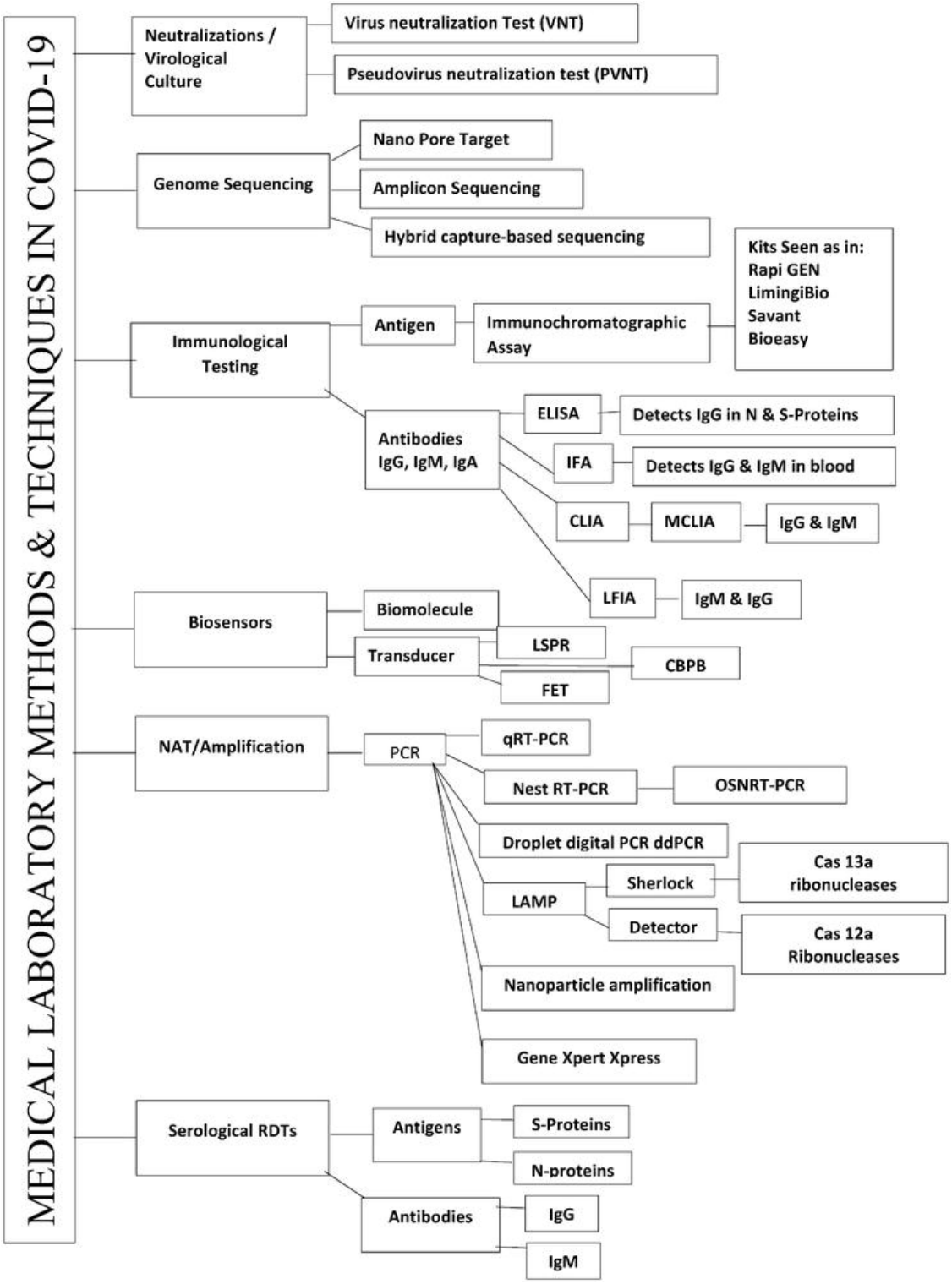
[13] UNC School of Medicine. (2021, February 8). COVID-19 Pandemic Highlights Critical Need for Medical Laboratory Professionals. Retrieved from med.unc.edu/: https://www.med.unc.edu/healthsciences/clinical/2021/02/covid-19-pandemic-highlights-critical-need-for-medical-laboratory-professionals/

[14] World Health Organization. (2020). Laboratory testing for coronavirus disease (COVID-19) in suspected human cases.

[15] Wu, F., Zhao, S., Yu, B., Chen, Y.-M., Wang, W., Song, Z.-G., . . . Zhan, Y.-Z. (2020). A new coronavirus associated with human respiratory disease in China. Nature, 265-269. https://www.nature.com/articles/s41586-020-2008-3?rel=outbound#citeas.

[16] Young, B., Ong, S., & Kalimuddin, S. (2020). Epidemiologic Features and Clinical Course of Patients Infected With SARS-CoV-2 in Singapore. JAMA, 1488-1494. https://jamanetwork.com/journals/jama/article-abstract/2762688.

Appendix



Testing techniques
Source: [12]