



Strategies for Improving the Diagnosis and Prevention of Malaria During the COVID-19 Pandemic in Africa

Olayinka Stephen Ilesanmi¹, Aanuoluwapo Adeyimika Afolabi^{2*}, Ayomide Esther Bello³

¹Department of Internal Medicine, Brody School of Medicine, East Carolina University, Greenville, North Carolina, USA

²Department of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria

³Department of Pharmacy, University of Ibadan, Ibadan, Oyo State, Nigeria

*Corresponding Author: Aanuoluwapo Adeyimika Afolabi, Department of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria. Tel: +234-8146764516, Email: afoannade@gmail.com

Received May 19, 2022; Accepted July 30, 2022; Online Published September 15, 2022

Abstract

The African continent is a known malaria-endemic region. Amid the COVID-19 pandemic, COVID-19/malaria co-infection is of critical importance in Africa due to the similarities in the manifestation of their symptoms. To avert compromising the health status of individuals on the African continent during the COVID-19 pandemic, this commentary sought to examine the link between COVID-19 and malaria, outlining strategies for improving the diagnosis and prevention of COVID-19 and malaria in Africa. A scale-up of malaria-focused care should be considered to ensure adequate reporting of COVID-19 cases in Africa. Likewise, individuals who present for malarial testing should be linked to COVID-19 testing and treatment care in Africa. Also, surveillance activities should be scaled up to ensure accurate COVID-19 case reporting and improved case notification. Regular refresher trainings should be organized for healthcare workers to promote healthcare service delivery.

Keywords: COVID-19, Health System, Health Promotion, Malaria, Surveillance

1. Background

The entire globe has been shaken with the emergence of the novel Coronavirus disease (COVID-19).¹⁻³ Certain pneumonia-like symptoms were reported among traders in a market in Wuhan city in December 2019, and rapid rates of transmission of COVID-19 has occurred since this period.⁴⁻⁶ As a result, healthcare workers have been overwhelmed with increased workload, with health facilities reaching their limits in admitting patients.^{1,7} Thus, the COVID-19 pandemic has put to test the strength of health systems globally, with grave concerns existing for countries with pre-existing weak health systems.⁸⁻¹¹ Many countries on the African continent are characterized by weak health systems, evident in poor health infrastructure and medical supplies, inadequate manpower, poor financing, poor service delivery, incomplete health information, and poor political commitment.¹²⁻¹⁴ The endemicity of non-communicable diseases such as malaria in many African countries could mask accurate reporting of COVID-19 cases.¹⁴ To avert compromising the health status of individuals on the African continent during the COVID-19 pandemic, this commentary sought to examine the link between COVID-19 and malaria, outlining strategies for improved diagnosis and prevention of COVID-19 and malaria in Africa.

2. Similarities and Differences Between COVID-19 and Malaria

COVID-19 is a viral infection caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2).¹ The COVID-19 outbreak was declared a pandemic on March 11, 2020, after it had been transmitted across more than 100 000 persons around the globe.¹⁵ Shortly before this period, Africa had recorded her index cases of COVID-19 in Egypt and Nigeria. As of November 18, 2022, 642 117 235 COVID-19 cases and 6 622 212 deaths have been recorded globally. Of the global total, Africa accounts for 12,693,549 cases and 257,984 deaths as of the reference period.¹⁶ Malaria, on the other hand, is a parasitic disease caused by protozoan parasites of genus *Plasmodium* and transmitted by mosquitoes of genus *Anopheles*.¹⁷⁻¹⁹ Globally, the burden of malaria is highest in sub-Saharan Africa where it accounted for 93% of global malarial cases in 2019, and 94% of malarial-related deaths in 2018.²⁰⁻²² In many African countries, COVID-19 tests are conducted on only symptomatic persons among whom one or more of fever, headache, dry cough, fatigue, sore throat, loss of taste or smell, diarrhea, and conjunctivitis is (are) present.²³⁻²⁵ These symptoms that are suggestive of COVID-19 have been frequently reported across literature as malarial symptoms.^{26,27} Due to the similarities in these symptoms and the lack of specific symptoms in

the COVID-19 context, misrepresenting COVID-19 for malaria becomes a possibility. The incubation period of SARS-CoV-2 and malarial plasmodium have been reported to share similarities. The incubation period for COVID-19 is 11.5 days while that of malaria-causing plasmodium is between 7-30 days.^{28,29} Thus, the potential for misrepresenting COVID-19 for malaria in the absence of COVID-19 confirmatory tests become likely, with resulting adverse clinical outcomes.

With the endemicity of malaria in Africa coupled with the similarities between COVID-19 and malaria, abuse of antimalarial medications has been reported across many African communities.²⁹ A new trend has been observed of persisting fevers, headaches, and chronic fatigue up to a week after the completion of antimalarial regimen among many individuals. Usually, malarial symptoms recede within one week of its onset²⁹; however, the persistence of these malarial-like symptoms is highly suggestive of COVID-19.³⁰ In some instances, many individuals neglect these indices and continually maintain contact with others while going about their daily activities. The recurring neglect of the recommendations on the adoption of social distancing and the use of face masks to break the chain of COVID-19 transmission increases the vulnerability of the healthy, immuno-compromised, and the elderly to COVID-19.³¹

The second and third waves of COVID-19 have waned in many African countries³²; however, complete conquest of the COVID-19 pandemic is yet to be achieved. The roll-out of the AstraZeneca COVID-19 vaccine and other brands of the vaccine indicate some progress towards submerging the COVID-19 pandemic.³³ However, more efforts are needed to achieve total COVID-19 vaccination coverage. In the wait for total coverage of the COVID-19 vaccine, strategies for maintaining essential services and improving service delivery in the COVID-19 and malarial contexts are required.¹⁶ This therefore implies that a window of opportunity exists to scale up malarial prevention and treatment service to avoid masking actual COVID-19 cases, while increasing avoidable COVID-19 deaths in African countries.

3. Strategies for Improving Service Delivery for Improved Diagnosis of Malaria and COVID-19

Behavioral change communication (BCC) has been proven as a vital measure for disease prevention at the primary stage.³⁴ BCC involves the adoption of different sources of information channels such as the radio, television, social media, and other frequently used channels of information dissemination.³⁵ Lessons from the health belief model (HBM) are required to be incorporated into the COVID-19 information package. The HBM describes a situation in which an individual is likely to adopt disease-preventive practices due to the knowledge of the disease, its risk factors, and mode of transmission.³⁶ Therefore, COVID-19 BCC would include information on the risk factors for COVID-19 such as overcrowding and poor

hand hygiene. COVID-19 preventive measures such as social distancing, cough and sneezing etiquette, regular hand hygiene, frequent handwashing with soap and clean water, or hand hygiene using alcohol-based hand rub should also be included in the information package. For the information package to benefit the audience for which it was intended, it should be communicated in simple and clear terms. Likewise, public health campaigns should be targeted at persons with underlying health conditions among whom high COVID-19 mortality rates have been recorded. Prevention ethics such as reporting to the nearest COVID-19 accredited testing centers should be taught, and the location of these centers made known to members of the public.

The shortage of COVID-19 testing kits has been earlier reported in many instances in Nigeria and Ghana, and this has reduced the frequency at which COVID-19 tests were conducted.³⁷ To address this challenge, increased availability of testing kits is of dire need in Africa. If these kits are in adequate supply, the turn-around time for COVID-19 test results would be reduced, and the uptake of COVID-19 tests would increase. To prevent missed cases, persons who have symptoms suggestive of malaria can be screened for malaria and linked to COVID-19 testing.³⁸ Thus, persons who were thought to have had only malaria *ab initio* but confirmed positive for COVID-19 would then become adequately informed of the need for self-isolation or quarantine. Also, prompt identification of cases of COVID-19/malarial coinfection who would have ordinarily been treated for malaria only would be identified.

The commencement of surveillance activities for both COVID-19 and malaria are of key importance. The Integrated Disease Surveillance and Response should be adapted to include reporting on suspected cases of COVID-19 and provide complete data in this regard.³⁹ Contingency plans for data entry should be made to ensure that batching of case reporting is prevented. Also, prompt notification of COVID-19 cases should be ensured to avert situations in which COVID-19 cases live in the oblivion of their status, and possibly transmit COVID-19 on to others due to their ignorance. To enhance disease surveillance and response system, the engagement of community-based health service providers such as community pharmacists, patent drug vendors, and community leaders as focal persons in reporting suspected cases of COVID-19 in their communities should be considered.⁴⁰ The involvement of these community stakeholders would be needed to tackle COVID-19 misinformation at the grassroots, enhance the linkage of suspected cases of COVID-19 to the national health system, and enhance accurate reporting of COVID-19 cases. It is however required that trainings are conducted for these stakeholders to equip them with accurate information in dispelling their responsibilities as COVID-19 focal persons in their communities.

Routine health information, including data on outpatient consultations, malarial cases, and fever, is

crucial to monitoring COVID-19 and malaria in Africa. To enable the success of health information, training of surveillance staff should be prioritized, data quality checks should be ensured, and logistics for transporting data reporting forms to and from health facilities are required. Home management and integrated case management of malaria alongside follow-up by healthcare personnel at the grassroots will be important to improve access to malarial care in underserved communities. For the integrated case management of malaria to be effectively conducted, these healthcare personnel should be equipped with sufficient knowledge of malaria and COVID-19. Improving the supply chain of antimalarials such as artemether in community-based health facilities should be promoted. To prevent stock-out of antimalarials, larger supply of antimalarials should be provided to health facilities, and decentralization of drug supply to primary health care centers should be advocated for. Increased lead time for procurement of medications should also be considered.

4. Conclusion

Globally, the COVID-19 pandemic has compromised health systems, especially in many African countries. The African continent is a known malaria-endemic region. COVID-19/malaria co-infection is of critical importance in Africa due to the similarities in the presentation of both. The low proportion of COVID-19 cases in Africa creates a window of opportunity for improving the delivery of essential malaria-focused care. In ensuring the delivery of essential health services, individuals who present for malarial testing should be linked to COVID-19 testing and treatment care in Africa. Therefore, tailoring malaria interventions in the COVID-19 response to include improved testing, timely treatment of cases, and improved supply chain, and laboratory activities should be ensured. In addition, surveillance activities should be scaled up to improve case notification and ensure accurate COVID-19 case reports. For this cause, the national government, and policymakers should be more responsive towards logistic support for the procurement of malaria and COVID-19 test kits, and COVID-19 case reporting forms. Regular trainings should be organized for healthcare workers to improve service delivery for both COVID-19 and malaria. Adequate engagement of community stakeholders and community-based healthcare providers such as community pharmacists and patent medicine vendors should be promoted so that they could function as COVID-19 focal persons to improve surveillance activities.

Author Contributions

Data Conceptualization: OI. Writing of initial draft: AA and AB. Review for critical intellectual content: OI and AA. Approval of the final version of the manuscript: OI, AA, and AB.

Conflict of Interest Disclosures

None declared.

Ethical Approval

Not applicable.

Funding/Support

The authors received no financial support for the research, authorship, and/or publication of this article.

References

- World Health Organization. Pneumonia of Unknown Cause – China. <https://www.who.int/csr/don/05-january-2020-pneumonia-of-unknown-cause-china/en/>. Accessed March 15, 2021.
- Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. *Acta Biomed.* 2020;91(1):157-160. doi:10.23750/abm.v91i1.9397.
- McAnulty JM, Ward K. Suppressing the epidemic in New South Wales. *N Engl J Med.* 2020;382(21):e74. doi:10.1056/NEJMc2011592.
- She J, Jiang J, Ye L, Hu L, Bai C, Song Y. 2019 novel coronavirus of pneumonia in Wuhan, China: emerging attack and management strategies. *Clin Transl Med.* 2020;9(1):19. doi:10.1186/s40169-020-00271-z.
- Munster VJ, Koopmans M, van Doremalen N, van Riel D, de Wit E. A novel coronavirus emerging in China - key questions for impact assessment. *N Engl J Med.* 2020;382(8):692-694. doi:10.1056/NEJMp2000929.
- Li Q, Guan X, Wu P, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med.* 2020;382(13):1199-1207. doi:10.1056/NEJMoa2001316.
- Ilesanmi O, Afolabi A. Time to move from vertical to horizontal approach in our COVID-19 response in Nigeria. *SciMed J.* 2020;22(Special Issue «COVID-19»):28-29. doi:10.28991/SciMedJ-2020-02-SI-3.
- Ilesanmi O, Afolabi A. COVID-19 waves in Africa: effects of outbreak response and interventions. *Global Biosecurity.* 2021;3(1). doi:10.31646/gbio.104 .
- Ilesanmi OS, Afolabi AA, Awoniyi O. Inequalities in Accessing Healthcare in the United States of America: A Major Contributor to the Increasing COVID-19 Morbidity and Mortality. *Int J Travel Med Glob Health.* 2021;9(4):176-182. doi: 10.34172/ijtmgh.2021.29.
- Ilesanmi OS, Afolabi AA, Akande A, Raji T, Mohammed A. Infection prevention and control during COVID-19 pandemic: realities from health care workers in a north central state in Nigeria. *Epidemiol Infect.* 2021;149:e15. doi:10.1017/s0950268821000017 .
- Ayat Z, Sami AH. Infection prevention and control practices among primary healthcare nurses regarding COVID-19 in Saudi Arabia: a cross-sectional study. *Ann Med Surg (Lond).* 2022;77:103298. doi:10.1016/j.amsu.2022.103298.
- Baswa A, Russo PL, Doyle JS, Ayton D, Stewardson AJ. Experience and perspectives of infection prevention staff of the COVID-19 response in Australian hospitals. *Antimicrob Resist Infect Control.* 2022;11(1):77. doi:10.1186/s13756-022-01116-9.
- World Economic Forum. Global action on malaria is stalling. In some countries it could be a greater threat than COVID. <https://www.weforum.org/agenda/2020/12/who-world-malaria-africa-covid-threat/>. Accessed March 22, 2021.
- Afolabi AA, Ilesanmi OS. Addressing COVID-19 vaccine hesitancy: Lessons from the role of community participation in previous vaccination programs. *Health Promotion Perspectives.* 2021;11(4):434-437. doi: 10.34172/hpp.2021.54.
- World Health Organization. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. <https://www.who.int/director-general/speeches/detail/who>

- director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020. Accessed March 2, 2021.
16. Worldometer. COVID-19 Coronavirus Pandemic. <https://www.worldometers.info/coronavirus/>. Accessed November 18, 2022.
 17. World Health Organization. Malaria. <https://www.who.int/news-room/fact-sheets/detail/malaria>. Accessed February 20, 2021.
 18. Giribaldi G, D'Alessandro S, Prato M, Basilico N. Etiopathogenesis and pathophysiology of malaria. In: Prato M, ed. *Human and Mosquito Lysozymes*. Cham: Springer; 2015. doi:10.1007/978-3-319-09432-8_1.
 19. Talapko J, Škrlec I, Alebić T, Jukić M, Včev A. Malaria: the past and the present. *Microorganisms*. 2019;7(6):179. doi:10.3390/microorganisms7060179.
 20. World Health Organization. Malaria. <https://www.who.int/news-room/fact-sheets/detail/malaria>. Accessed November 18, 2022.
 21. Al-Awadhi M, Ahmad S, Iqbal J. Current status and the epidemiology of malaria in the Middle East Region and beyond. *Microorganisms*. 2021;9(2):338. doi:10.3390/microorganisms9020338.
 22. Adeyemo AO, Aborode AT, Bello MA, et al. Malaria vaccine: the lasting solution to malaria burden in Africa. *Ann Med Surg (Lond)*. 2022;79:104031. doi:10.1016/j.amsu.2022.104031.
 23. Adepoju P. Africa's struggle with inadequate COVID-19 testing. *Lancet Microbe*. 2020;1(1):e12. doi:10.1016/s2666-5247(20)30014-8.
 24. Ma Q, Liu J, Liu Q, et al. Global percentage of asymptomatic SARS-CoV-2 infections among the tested population and individuals with confirmed COVID-19 diagnosis: a systematic review and meta-analysis. *JAMA Netw Open*. 2021;4(12):e2137257. doi:10.1001/jamanetworkopen.2021.37257.
 25. Ilesanmi OS, Afolabi AA. Verifying the real estimates of COVID-19 deaths in Africa. *Germes*. 2020;10(4):392-395. doi:10.18683/germes.2020.1233.
 26. otepu M. Prevalence and characteristics of malaria among COVID-19 individuals: a systematic review, meta-analysis, and analysis of case reports. *PLoS Negl Trop Dis*. 2021;15(10):e0009766. doi:10.1371/journal.pntd.0009766.
 27. Hussein MIH, Albashir AAD, Elawad O, Homeida A. Malaria and COVID-19: unmasking their ties. *Malar J*. 2020;19(1):457. doi:10.1186/s12936-020-03541-w.
 28. Lauer SA, Grantz KH, Bi Q, et al. The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application. *Ann Intern Med*. 2020;172(9):577-582. doi:10.7326/m20-0504.
 29. Centers for Disease Control and Prevention. Malaria. www.cdc.gov/malaria/about/disease.html#:~:text=The%20incubation%20period%20in%20most,malariae. Accessed November 18, 2022.
 30. Chanda-Kapata P, Kapata N, Zumla A. COVID-19 and malaria: a symptom screening challenge for malaria endemic countries. *Int J Infect Dis*. 2020;94:151-153. doi:10.1016/j.ijid.2020.04.007.
 31. Feng S, Shen C, Xia N, Song W, Fan M, Cowling BJ. Rational use of face masks in the COVID-19 pandemic. *Lancet Respir Med*. 2020;8(5):434-436. doi:10.1016/s2213-2600(20)30134-x.
 32. Ilesanmi OS, Chirico F, Afolabi AA, Nucera G. Coping with the third wave of the COVID-19 pandemic in Africa: implications for an improved outbreak response. *Future Virol*. 2022;17(4):205-209. doi:10.2217/fvl-2021-0184.
 33. ACNA. South Africa to roll out AstraZeneca COVID-19 vaccine in steps to assess efficacy. <https://www.channelnewsasia.com/news/world/south-africa-to-roll-out-astrazeneca-covid-19-vaccine-in-steps-14141584>. Accessed March 25, 2021.
 34. Ngigi S, Busolo DN. Behaviour change communication in health promotion: appropriate practices and promising approaches. *Int J Innov Res Dev*. 2018;7(9):84-93. doi:10.24940/ijird/2018/v7/i9/SEP18027.
 35. Asfaw S, Morankar S, Abera M, et al. Talking health: trusted health messengers and effective ways of delivering health messages for rural mothers in Southwest Ethiopia. *Arch Public Health*. 2019;77:8. doi:10.1186/s13690-019-0334-4.
 36. Jones CL, Jensen JD, Scherr CL, Brown NR, Christy K, Weaver J. The Health Belief Model as an explanatory framework in communication research: exploring parallel, serial, and moderated mediation. *Health Commun*. 2015;30(6):566-576. doi:10.1080/10410236.2013.873363.
 37. Yahoo News. 10 countries account for 80% of Africa COVID-19 testing: Africa CDC. <https://news.yahoo.com/10-countries-account-80-africa-121515151.html>. Accessed March 22, 2021.
 38. Ilesanmi OS, Afolabi AA, Iyiola OP. Effect of the COVID-19 pandemic on malaria intervention coverage in Nigeria: analysis of the Premise Malaria COVID-19 Health Services Disruption Survey 2020. *Population Medicine*. 2021;3:24. doi:10.18332/popmed/141979.
 39. Umeozuru CM, Usman AB, Olorukooba AA, et al. Performance of COVID-19 case-based surveillance system in FCT, Nigeria, March 2020–January 2021. *PLoS One*. 2022;17(4):e0264839. doi:10.1371/journal.pone.0264839.
 40. Ilesanmi OS, Afolabi A, Fakayode O, Arigidi S, Olanrewaju BO. Assessment of training of community pharmacists towards the prevention of COVID-19 in a north central state of Nigeria. *J Pharm Care*. 2020;8(4):164-169. doi:10.18502/jpc.v8i4.5237.