CLINICAL CHARACTERIZATION AND MANAGEMENT OF COVID-19 IN AFRICA: A RAPID SCOPING REVIEW

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Abstract

Understanding the manifestations of COVID-19 infection is essential for clinical management and control of disease spread. This systematic scoping review summarizes the clinical characteristics of COVID-19 infection in African countries to assess and provide evidence for better clinical management and control of disease. A systematic search was conducted in the PubMed, Cochrane, Epistemonikos and World Health Organization databases for articles containing clinical characterisation and technological platforms used in management of COVID-19 published through July 2021. A total of 18 studies from 10 countries were included. Demographic characteristics such as age and sex were strongly associated with disease severity. Common comorbidities associated with disease severity were hypertension, diabetes, obesity and cardiovascular diseases. The most common clinical symptoms were cough, fever, fatigue and headache. The estimated median hospital stay was 11 days; common therapeutic interventions included corticosteroids, oxygen supplementation, anticoagulants, azithromycin and hydroxychloroquine, although some of these have not yet been proven to be effective through clinical trials. There is a paucity of evidence on the role of malaria, HIV, TB and other infectious conditions as comorbidities for COVID-19 disease severity in Africa. Clinical trials to validate clinical intervention strategies are also lacking. There were no studies that investigated technological platforms that could be applied in resource-limited settings as tools for systematic, easy case data collection, clinical characterization or triage and management of COVID-19 in the African context. Overall, there is an urgent need for research on clinical case characterisation, documentation and management across disparate demographic and geographic settings in Africa. Systematic studies of technological platforms that may aid documentation, clinical characterisation, rapid triaging and evidence-based management of COVID-19 and control of disease spread are also urgently needed.

Keywords

Clinical characteristics, SARS coronavirus (SARS-CoV-2), novel coronavirus diseases (COVID-19), management, platform/tools for COVID-19 management, scope review

Background

Coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has been in human circulation since at least November 2019 [1]. Although data gaps exist and the situation is highly dynamic, evidence suggests that Africa has been spared the brunt of COVID-19 relative to elsewhere in the world, with fewer cases reported and potentially lower mortality [2]. However, the combination of the emergence of SARS-CoV-2 variants of concern (VOC), coupled with very slow vaccine rollout and relatively poor healthcare infrastructure across African countries, as well as the socioeconomic challenges caused by the pandemic, are likely to shift the burden disproportionately towards Africa and other low- and middle- income settings [3].

There are already a number of pharmaceutical therapeutic and preventive innovations for COVID-19, i.e., vaccines and drugs. Vaccines to prevent severe disease are perhaps the best hope for ending the pandemic, but limited access caused by prohibitive costs, geopolitical considerations, the logistical limitations of healthcare and vaccine hesitancy have hampered their widespread rollout in Africa [4]. Only a handful of mostly palliative medications exist for serious illness, with no specific anti-viral drugs or well-established biopharmaceutical interventions available, although various clinical trials are underway [5]. Furthermore, it is believed that many cases are undiagnosed and therefore not reported due to various logistical and socioeconomic challenges, including lack of or poorly equipped diagnostic facilities, high testing costs and avoidance of healthcare facilities by patients out of fear of nosocomial infections and complex procedures [6].

The clinical presentation of SARS-CoV-2 and transmission of the virus are complex. For example, it is suspected that infected persons who remain asymptomatic play a significant role in virus spread. Additionally, disease presentation is generally milder in children than in adults [7]. Notably, male sex, advanced age, cardiovascular disease, diabetes, hypertension and cancer have been found to be risk factors for severe disease [8]. Therefore, understanding clinical features according to demographic characteristics such as age, sex, geography and comorbidities is key to COVID-19 disease management. Moreover, the pathogen itself is rapidly evolving with various variants of concern (VOC) now identified, which may alter clinical presentation and epidemiological spread of the virus.

In this context, it is essential to better elucidate the clinical characteristics of patients with COVID-19 for a clear understanding of disease pathogenesis and development of rational clinical management practices. The development of decision support tools for real-time clinical management of COVID-19 is of prime importance to assist in the triage of patients and to allocate resources for patients at risk. To facilitate clinical characterisation and management, technological innovations such as digital data management systems or platforms are key to enhance the process. To-date, several institutions are inventing digital platforms/systems to enhance quick and precise clinical characterisation of cases. For example, the WHO Global Clinical Platform for COVID-19 is a tool to establish the clinical characterisation and management of hospitalised patients with suspected or confirmed COVID-19 [9]. For purposes of this review, we define COVID-19 Clinical Management Systems to be digital

platforms/systems that support clinicians to rapidly and accurately characterise COVID-19 patients and their management in hospitals.

Evidence has emerged describing comprehensively the clinical features, management and treatment of different patient cohorts of COVID-19 globally [10-15]. However, considering the heterogeneity of demography, geographic location and comorbidities and the evolving nature of the virus, it is likely that more needs to be done to facilitate optimal clinical interventions and epidemic control of the virus. There is still very limited information on the emerging or existing Clinical Management Systems to assist with rapid clinical characterisation and management of COVID-19 and its relevance to policy in Africa.

Objectives of the review

1. To scope and summarise existing literature describing clinical characteristics and management approaches used for COVID-19 patients in Africa;
2. To understand the emerging/existing digital tools/platforms used for systematic clinical characterisation, triaging and management of COVID-19 and their optimisation for and adaptation to Africa, and
3. To understand the gaps that exist to enable more rapid and accurate characterisation and triage for management and control of the spread of the disease.

Methods

The authors performed a rapid scoping review of the peer-reviewed literature and grey literature following PRISMA ScR guidelines for reporting of scoping reviews [16] (**Appendix 2**.)

Inclusion and exclusion criteria:

Types of studies --

We included all study types that described the clinical characterisation and management of COVID-19 patients in Africa. We excluded modelling studies and systematic reviews.

Types of participants --

We included individuals of all ages infected with SARS-CoV-2, including:

- Patients with asymptomatic, mild, moderate, severe and critical disease, including those who died;
- Hospitalized and non-hospitalised COVID-19 patients;
- Patients with persistent infection, and
- Patients with long- and short-term effects of COVID-19 infection.

Context

Studies conducted in African settings.

Types of outcome measures

We included studies that report clinical characteristics and management of COVID-19 patients, including clinical symptoms and signs, staging of disease (asymptomatic, mild, severe, critical) and mortality outcomes. We also included reports describing COVID-19 digital platforms/management systems.

Search methods for identification of studies

We developed a comprehensive search strategy for peer-reviewed studies and grey literature published from December 2019 to July 2021 with no language restriction. The electronic databases included PubMed, Epistemonikos and the Cochrane COVID-19 study register. In addition, we used the World Health Organization COVID-19 Global literature on coronavirus disease to obtain grey literature (https://search.bvsalud.org/global-literature-on-novel-coronavirus-2019-ncov/.) Key search terms included “Coronavirus” OR “2019-nCoV” OR “COVID-19” OR “SARS-CoV-2” AND Clinical characteristics OR Clinical features OR Clinical symptoms OR Findings AND Digital platform OR Digital tools AND Specific terms for African countries as shown in Appendix 1. We also screened the reference lists of all the included studies and related systematic reviews for other potentially eligible primary studies. Search terms in Appendix 1 were used and adapted in relevant databases.

Data collection and analysis

Selection of studies --

Using the Rayyan platform, one author (LA) screened the titles and abstracts. The lead author (TN) was consulted in case of questions. The full text records of the potentially eligible materials were selected for further examination and assessed for inclusion. Discrepancies were resolved through discussion and consensus.

Data extraction and management --

Data extraction forms were created in Excel and extracted by a single author for both primary studies and reports, and coded into structured categories to include the setting of the study (city and country), type of study, participant characteristics (e.g., hospitalized or ambulatory), long- or short-term infection, sample size, sampling methods, demographic characteristics (age, sex, education), type of outcomes measured (clinical symptoms, severity of disease, mortality rate), and treatment/vaccination and platform/system used to characterize cases. We used Endnote as reference manager. The risk of bias in the studies included was not assessed.

Data synthesis --

We analysed and summarised the results of the study in a narrative and thematic format. Key themes included but were not limited to clinical characterisation and management, technological platforms/systems used for clinical characterisation and the gaps documented in the emerging/existing platform.

Results

We identified 2,324 articles after culling 437 duplicates, resulting in a title and abstract review of 1,887 articles. Further, 1,853 without clinical information on COVID-19 patients in Africa were removed. We evaluated 34 full-text articles based on the eligibility criteria. We further excluded 16 studies, 13 of which were due to their focus on laboratory diagnosis, which was beyond our review scope, and three because they are ongoing. Ultimately, 18 articles were included in this review as illustrated in **Figure 1** below.

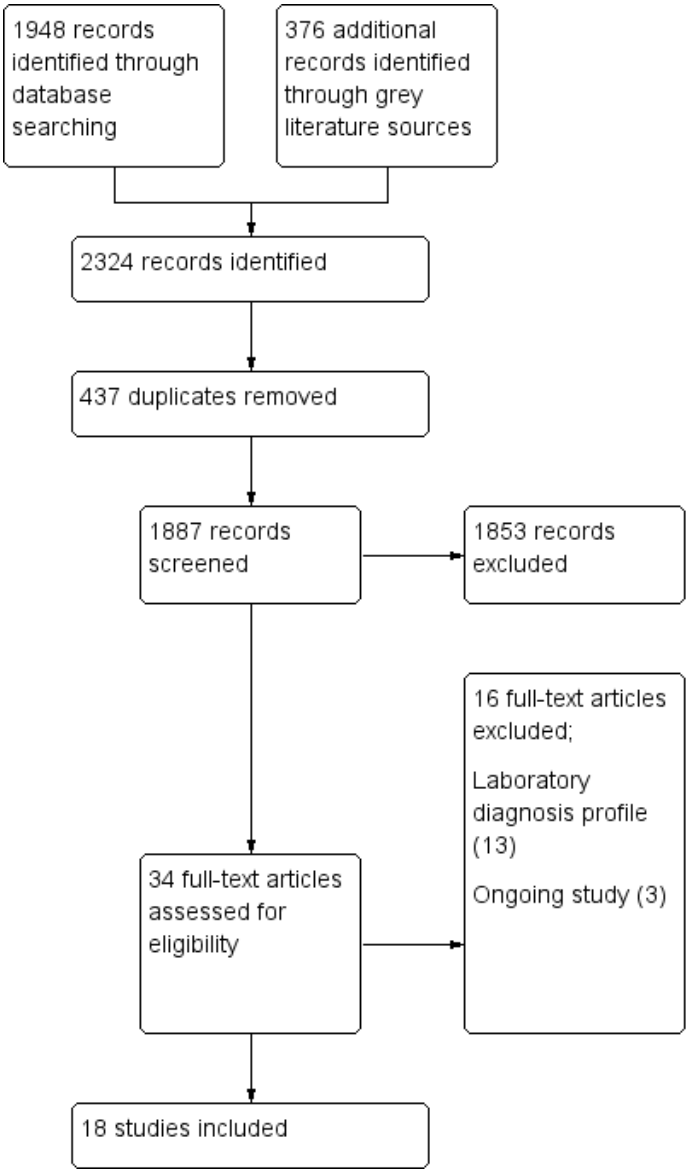

Figure 1: Study flow chart

Description of included studies

Of the 18 studies included, 15 studies focused on adults (males and females) [17,19-23, 25,27-34], two investigated children only [18,26] and one study was based on a cohort of pregnant women only [24].

Nine of the total 18 studies used longitudinal design [17,21-23,26,27,31-33] while eight studies were cross-sectional [19,20,24,25,28-30,34]. One study was classified as a case series report [18].

All the studies were conducted in African countries, with one study from southern Africa (South Africa) [30], 10 from West Africa (Cameroon 2, Sierra Leone 1, Ghana 3, Nigeria 3, Senegal 1) [18-21,23-25,29,33,34], three from North Africa (one each from Egypt, Tunisia, Morocco) [22,26,28], three from East Africa (Ethiopia 2, Uganda 1) [17,27,31] and one from Central Africa (DRC1) [32].

Table 1: Characteristics of included studies

Study ID	Country	Study design	Population Age/gender	Clinical manifestation outcome				Conclusion/ Recommendation/s
				Sample size	Clinical characteristics	Comorbidities	Treatment	
Abraha H et al 2020 [17]	Ethiopia	Longitudinal study	Male:1657 Female: 960 Median age: 29	Total: 2617 Asymptomatic: 114 Symptomatic: 1935	cough, myalgia, headache, fever, dyspnoea, anosmia and/or dysgeusia, sore throat and chest pain	diabetes cardiovascular disease and human immunodeficiency virus infection	None	Key comorbid conditions like diabetes, cardiovascular disease, malignancy and human immunodeficiency virus infection increased the risk of severe COVID-19 and in-hospital mortality
Adetola H et al 2020 [18]	Sierra Leone	Case series report	5 male 4 females Median age: 69 months	Total:9 Asymptomatic: 5 Symptomatic: 4	fever and cough	None	None	COVID-19 in malaria-endemic settings has its implication and caution should be taken on how best to manage children who present with fever during the COVID-19 pandemic
Adjei P et al 2020 [19]	Ghana	Cross-sectional study	Median age: 53	Total: 50 Asymptomatic: 10 Symptomatic: 40	Cough and difficulty in breathing, mortality rate (6/50)	Hypertension and Diabetes Mellitus	None	There is a need to pay critical and prompt attention to the management of patients with COVID-19 pneumonia particularly among people with diabetes to improve outcomes
Afriyie-Mensah J	Ghana	Cross-sectional study	Median age: 62	Total: 22 All symptomatic	Dyspnoea, fever and cough Mortality (5/22)	Hypertension	None	Early use of systemic corticosteroids for severe to

et al 2021 [20]								critically ill patients in the ICU may improve outcomes
Alasia Datonye et al 2021 [21]	Nigeria	Longitudinal study	474 males 172 females Mean age: 39	Total: 646 Asymptomatic: 585 Symptomatic: 61	Fever, dry Cough, anosmia, headache and dyspnoea. Mortality: 13	Hypertension and diabetic	-	The clinical and epidemiologic characteristics of this study show significant similarities with existing trends from previously reported studies
Albadawy R et al 2021 [22]	Egypt	Longitudinal study	Male: 92 Female: 65 Mean age:	Total: 148 Asymptomatic: 74 Symptomatic: 74	Fever, headache, cough, sore throat, fatigue, and shortness of breath	Diabetic, Asthma and hypertension		Multiple comorbidities in COVID-19 patients are linked to severe clinical symptoms, disease complications, and critical disease progression.
Ashinyo M et al 2021 [23]	Ghana	Longitudinal study	Mean age: 38 Male: 174 Female: 133	Total: 307 Symptomatic: 44 Asymptomatic: 263	cough, fever, headache, and sore throat	hypertension, asthma and diabetes	azithromycin + chloroquine (AZ+CQ) was 10.4 days, hydroxylchloroquine (HCQ) only, 11.0 days.	The use of AZ+CQ or HCQ only as a therapy for managing COVID-19 patients shortened the duration of hospitalization
Diouf A et al 2020 [24]	Senegal	Cross-sectional study	Mean age: 28 years	Total: 9 All symptomatic	Cough, rhinorrhea, poor appetite	None	Hydroxychloroquine and azithromycin. recovery time was 13.6 days	Pregnant women appear to have the same contamination predispositions and clinical features of SARS-COV-2 infection as the general population
Erinoso O et al 2020 [25]	Nigeria	Cross-sectional study	Males: 380 Females: 252	Total: 632 Asymptomatic: 398	cough and fever	Hypertension and diabetes	None Hospital stay: Median 10 days	Age and comorbidities should be used for COVID-19 triaging for efficient resource allocation.

			Mean age: 40	Symptomatic: 234				
Fakiri E et al 2020 [26]	Morocco	Longitudinal study	Female: 40 Male:34 Mean age: 7	Total: 74 Asymptomatic: 54 Symptomatic: 20	Fever and cough	None	Azythromycin+ Hydrochloroquine + vitamin c Hospitalization stay: Mean 13 days	COVID-19 was mostly mild in the paediatric population in Morocco
Gateneh A et al 2021 [27]	Ethiopia	Longitudinal study	Male: 278 Female: 93 Median age: 31	Total: 371 Asymptomatic:316 Symptomatic: 56	Cough, fever and headache	Diabetics, chronic respiratory diseases, Hypertension and HIV	None	Older age and people with underlying comorbidities are at high risk of having the severe disease and poor outcomes
Harizi C et al 2021 [28]	Tunisia	Cross-sectional studies	Male: 504 Female: 526 Mean age: 43	Total: 1030 Asymptomatic: 499 Symptomatic: 602	Cough, fatigue, fever and headache Mortality: 43	Not reported	Chloroquine	A particular attention must to be paid to elderly and symptomatic patients with closer monitoring.
Ibrahim O et al 2020 [29]	Nigeria	Cross-sectional studies	Male: 39 Female: 6 Mean age: 43	Total: 45 Asymptomatic: 21 Symptomatic: 24	fever, cough, or dyspnea Mortality: 7	Hypertension, diabetes mellitus, Obesity, tuberculosis	None Hospital stay: 10 days	Diagnostic measures like hypoxemia and elevated creatinine predictors of mortality in patients with COVID
Kaswa R et al 2021 [30]	South Africa	Cross-sectional study	Male: 628 Female:1186 Mean age: 43	Total: 1814 Asymptomatic: 214 Symptomatic: 1600	Not reported	Diabetes and hypertension Mortality: 73	None	Advance age and underlying comorbidities (diabetes, hypertension and HIV) were associated with high mortality in hospitalised COVID-19 patients.

Kirenga B et al 2021 [31]	Uganda	Longitudinal study	Male: 38 Female:18 Median age: 34	Total: 56 Symptomatic: 24 Asymptomatic: 32	Fever, cough, rhinorrhea, headache, muscle ache and fatigue	Hypertension, diabetes mellitus and Obesity	Hydroxychloroquine (HCQ)	Outcomes did not differ by HCQ treatment status
Matangila J et al 2020 [32]	DRC Congo	Longitudinal study	Male: 82 Female: 78 Median age: 54	Total: 160 Asymptomatic: 92 Symptomatic: 68	Fever, cough, fatigue , shortness of breath and myalgia	Hypertension, diabetes mellitus and Obesity	Hydroxychloroquine or chloroquine phosphate	Epidemiological and clinical feature of COVID-19 patients' in Kinshasa are broadly similar to previous reports from other settings.
Mbarga N et al 2021 [33]	Cameroon	Longitudinal study	Male: 162 Female: 89 Mean age: 40	Total: 259 Asymptomatic = 68 Symptomatic =191	Dysgusia and hyposmia/anosmia	Hypertension, diabetes and cardiovascular disease	Chloroquine/Hydroxychloroquine	Age (40–70), male gender, HIV infection, lung disease, dyspnoea and fatigue are associated with severe COVID-19
Mekolo D et al 2021 [34]	Cameroon	Cross sectional study	Male: 192 Female: 90 Mean age: 52	Total: 282 Asymptomatic: 139 Asymptomatic: 143	dyspnea, cough, asthenia, and fever	Not reported	Chloroquine/Hydroxychloroquine	Understanding clinical characteristics on COVID-19 is key in reducing the impact of the COVID-19 pandemic particularly in countries with limited resources

Effect of sex on COVID-19

The studies assessed included more males than females, with men having most of the severe cases as tabulated in Table 1 above.

Effect of age on COVID-19

Included studies had various categories of age where the majority of patients were ≥50 years with severe COVID-19 disease. COVID-19 patients age >50 were at risk of severe disease compared to those below 50 years. In the two studies that investigated children, most of the children were asymptomatic with less than 25% having even mild symptoms, and no child presented with severe symptoms [18,26]. Children included in the two studies ranged from two months to 17 years old [18,26].

Effect of comorbidity on disease severity

Eighteen studies reported at least one comorbidity, including hypertension, diabetes, cerebrovascular disease, cardiovascular diseases, respiratory disease, malignancy, chronic kidney disease and chronic liver disease in COVID-19 patients, as shown in Table 1 [17-34]. Overall, diabetes was the most common comorbidity associated with COVID-19 and the risk of severity increased exponentially with the presence of more than one comorbid disease, e.g., diabetes, hypertension and HIV. However, there were no studies that reported the impact on disease severity of major infectious comorbidities found in Africa, such as malaria, HIV or TB.

Clinical symptoms or manifestations of COVID-19

In the 18 studies included, collectively more than 65% of patients were symptomatic (Figure 1). Research by Kirenga et al (2021) has defined symptoms during COVID-19 as the presence of fever (self-reported), temperature of ≥37.5°C, cough, shortness of breath and/or fatigue [31]. The most common symptoms from the reviewed studies included fever, cough, fatigue, anorexia, myalgia, dyspnoea, chest tightness, headache and sore throat. Symptoms were consistently observed in both severe and non-severe COVID-19 cases: the most common clinical symptoms were fever, cough and headache. It is worth noting that there were no studies that reported on persistent SARS-CoV-2 infection or long-term COVID-19 in Africa. Moreover, there were no studies that described symptoms according to the genetic variant of the infecting virus.

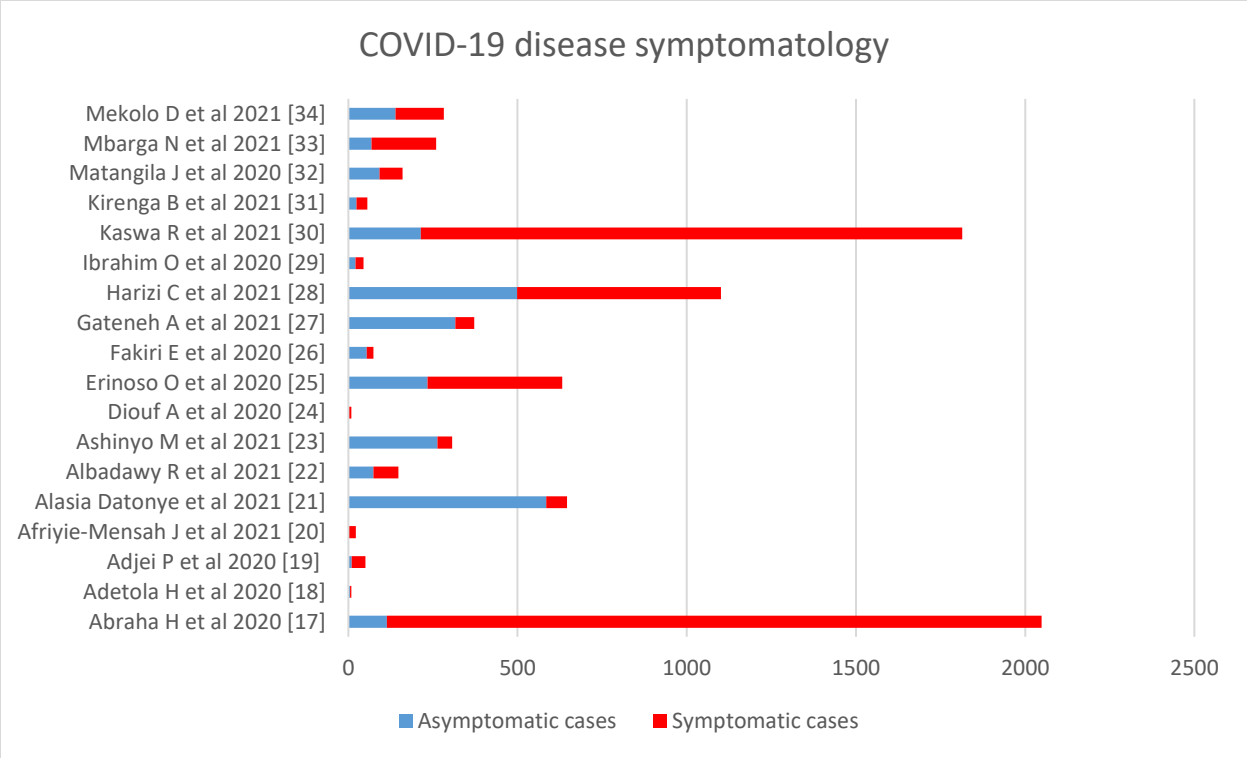

Figure 2: Number of COVID-19 cases classified as either symptomatic or asymptomatic disease.

Treatment of COVID-19

Most of the studies reported that treatment protocols were continuously revised as the pandemic evolved. For example, the most common treatment regimens that were reported included azithromycin and/or hydroxyl chloroquine [23,24,26,31-34]. In addition, it was also reported that anticoagulants, vitamin C and Zinc were used as standard of care for COVID-19 patients. One study [33] reported that depending on severity and comorbidities, some patients received anticoagulants, corticosteroids or intravenous antibiotics. However, no studies reported on the impact of treatment interventions on disease course.

Platforms for documentation, reporting, triaging and management of COVID-19

From all the 18 studies, it was evident that there were several diagnostic models that have been developed for the detection of COVID-19 in suspected cases as well as for the prognosis of COVID-19. Some of the most frequent predictors of COVID-19 diagnosis in suspected cases are clinical characteristics such as age, sex, symptoms including cough, radiological features and laboratory results (electrolytes, white blood cell counts, liver enzymes, etc.) [35]. None of the discussed or investigated technological platforms for documentation, reporting, triaging and management of COVID-19 patients in our setting is reported.

Discussion

Following the study review and a tele-convening of experts and stakeholders conducted in the area of clinical characterisation and management, it is clear that consensus has emerged on some factors that exacerbate the severity of COVID-19 disease [17-34]. Demographic characteristics like age have been found to be strongly associated with disease severity in Africa. This is consistent with the literature [36] that shows that adults over age 50 have more severe outcomes [36]. In addition, children aged under five years have less severe clinical presentation [18,26].

Males appear to be more prone to severe COVID-19 than females, with resultant higher mortality rates [36]. This could be due to biological differences between males and females whereby women have been reported to have more robust innate immune responses than males. Alternatively or in addition, differences in health seeking behaviours may play a role since it is well established that females tend to be more conscientious about their health and seek healthcare more than males. However, there is no clear evidence for either hypothesis and further research is required.

This review focused on studies conducted in Africa, and reveals that in terms of geographical context, there is no major difference in how COVID-19 presents clinically compared to the rest of the world. However, there are no studies that have investigated subtle differences in clinical characteristics based on geographical space. It should be noted that some other infectious conditions that could potentially impact COVID-19 presentation are more prevalent in Africa, including malaria, HIV and tuberculosis. This was confirmed in a study by Boulle et al (2021) in South Africa that investigated HIV and TB as a risk factor for COVID-19 mortality. The study found both HIV and active tuberculosis to be independently associated with increased COVID-19 mortality [37]. However, more research needs to address the potential impact of these conditions on the course of COVID-19.

In contrast, there is clear evidence of the prevalence of disease severity among COVID-19 patients with some non-infectious comorbidities compared to patients with no comorbidities. These comorbidities include diabetes, hypertension, cardiovascular diseases and others. The detrimental impact of non-infectious comorbidities appears to be true in Africa as elsewhere in the world.

There are several ongoing trials of the therapeutics used in management of COVID-19. Some of the drugs include azithromycin, hydroxychloroquine, doxycycline, ivermectin, steroids and antiviral agents such as remdesivir. Some of the treatments reported in the reviewed studies include azithromycin and hydroxychloroquine, where it was reported that hospital stays averaged 11 days. However, there is paucity of controlled clinical trial data to validate the benefits of these interventions against placebo interventions. On the other hand, symptomatic treatment (such as with oxygenation supplementation and anticoagulants) is widespread and there is some anecdotal evidence of its effectiveness.

To-date there no evidence in Africa of a platform that will help the healthcare provider to clinically characterise and manage COVID-19 patients accurately using a standardised

approach. In the global context, the Clinical Platform for COVID-19 was developed by the WHO to collect information on the disease [9]. Using this platform, one can enter the characteristics of patients for rapid triaging to minimize the patient severity. There is a need for further research in this area to identify and optimise platforms designed for and applicable to Africa. **Table 2** summarizes the major gaps identified in this area of research.

Table 2: Major gaps and areas for further research in the clinical characterisation and management of COVID-19

Key area in the clinical characteristics and management of COVID-19	What is known in the study area	Gaps and area for further research
Effect of gender on the disease severity	More males are infected than females in Africa	Research is need to elaborate what could lead to the difference. For example, is the difference due to the biological differences or immunological difference like sex hormones and innate immune responses (Type 1 interferons)
Effect of genetic and geographic variant on COVID-19 symptoms and disease severity	Globally it is clear that there are other factors that play a role in severity of disease over and beyond the commodities, age and sex	More studies on how clinical characteristics differ in terms of geographical space is critical. In addition, it's not clear if COVID-19 symptoms are variant driven or geographic driven. This has not been well characterized in Africa
Effect of comorbidity on the disease severity	Diabetics and hypertensive have increased the mortality of COVID-19	Further research on what role and impact malaria, HIV, TB and other NCD's plays in driving symptomatology in Africa is crucial.
Long COVID/ Post-acute COVID sequalae	The studies were able to classify cases as asymptomatic, mild, moderate and severe based on respiratory symptoms and clinical observations	In the Africa context, further study is needed to understand the definition of long COVID in terms of symptoms, period and characterization.
Effect of age on COVID-19	There is evidence to show more severe clinical presentation in advanced ages. In addition, it's evident that children are experiencing less severe clinical symptoms.	With the new COVID-19 variant, mid-level age are strongly affected hence further research is critical to show the disease severity among all age group distinctively.
Clinical Platform for COVID-19	The Global Clinical Platform for COVID-19 was developed by the	Studies are needed to investigate the current usability and adaptability of the WHO platform in African context. In

	WHO to collect information on COVID-19.	addition, technological platforms in African context that will assist to documentation, reporting, triaging and management of COVID-19 patients in a rapid manner.
Treatment of COVID-19	There are a number of treatment protocols that are continuously revised as the pandemic evolved. In addition, there is no evidence supporting the use of stated treatments, neither has it been recommended for use.	Further study on impact of the treatment interventions on disease course in Africa is needed

Limitations

This is a rapid scope review that included three databases and one grey resource. Half of the studies were longitudinal studies; however, we neither assessed the risk of bias nor the quality of evidence in order to achieve rapid review using the most readily accessible literature.

Conclusion

As elsewhere globally, Africa has the capacity to classify cases as asymptomatic, mild, moderate or severe based on respiratory symptoms and clinical observations. Generally, in Africa and globally, more males than females are severely impacted by the disease. There are lingering questions about whether symptoms are driven by virus variant or geographic location, with very few or no studies investigating these aspects. Comparative studies on subtleties of clinical presentation across different geographic locations are non-existent. There is a need for research to investigate the linkage between virus genetic variants and clinical characteristics. In contrast, there is robust evidence that non-communicable comorbidities play a big role in the progression of COVID-19 disease, with more research needed on the impact of infectious comorbidities endemic to Africa, necessary to generate evidence to inform policy on interventions. Moreover, there is paucity of data on suitable digital platforms and systems that can facilitate standardised and rapid identification, triaging and management of clinical cases to save lives and reduce or control transmission.

This review highlights the need for studies on clinical characterisation of COVID-19 cases in Africa to facilitate early identification of infections, enabling implementation of strategies to break transmission, stratify risk, inform disease management principles and facilitate evidence-based policy formulation and rational resource prioritisation.

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Contributions of authors

The rapid review was led by the main author with inputs from the second reviewer as the second author.

Declarations of interest

This is an objective rapid review of evidence and thus no interests to declare.

Sources of Support

The lead authors received weekly comments and reviews from the members of the project team led by AESA with support from ARIN, AFIDEP, Cochrane Network, and wider stakeholders involved in the tele convening. The DELTAS leads provided expert guidance and reviews and quality assurance of the process and output.

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Appendices

Appendix 1: Search terms

Key word	Search strategy
COVID-19	Search: Coronavirus[mh:noexp] OR coronavirus*[tiab] OR corona virus*[tiab] OR COVID-19[mh] OR COVID-19[tiab] OR COVID19[tiab] OR COVID 2019[tiab] OR SARS-Cov-2[mh] OR SARS-CoV-2[tiab] OR SARS-CoV2[tiab] OR SARSCoV2[tiab] OR SARsCov-2[tiab] OR SARS-coronavirus*[tiab] OR severe acute respiratory syndrome coronavirus 2[nm] OR severe acute respiratory syndrome coronavirus 2[tiab] OR 2019-nCov[tiab] OR 2019nCov[tiab] OR nCov2019[tiab] OR nCOV-2019[tiab] OR hCOV*[tiab] OR n-cov[tiab] OR ncov*[tiab]
Clinical characterisation	Search: disease attributes[mh] OR clinical character*[tiab] OR clinical feature*[tiab] OR clinical symptom*[tiab] OR clinical classif*[tiab] OR clinical finding*[tiab]
Platforms & tools	“clinical data collection tools” OR “clinical tools’’ OR “Digital platform” OR “Digital tools”
Africa	Search: (Africa[mh] OR Africa*[tiab] OR Algeria*[tiab] OR Angola*[tiab] OR Benin[tiab] OR Botswana[tiab] OR Motswana[tiab] or Batswana[tiab] OR Burkina Faso[tiab] OR Burkinabé[tiab] OR Burundi[tiab] OR Cameroon*[tiab] OR Canary Islands[tiab] OR Cape Verd*[tiab] OR Central African Republic[tiab] OR Chad[tiab] OR Comoros[tiab] OR Comorian*[tiab] OR Congo*[tiab] OR Democratic Republic of Congo[tiab] OR Djibouti[tiab] OR Egypt*[tiab] OR Equatorial Guinea[tiab] OR Eritrea[tiab] OR Ethiopia*[tiab] OR Gabon*[tiab] OR Gambia[tiab] OR Ghana[tiab] OR Guinea[tiab] OR Guinea Bissau*[tiab] OR Ivory Coast[tiab] OR Cote d’Ivoire[tiab] OR Ivorian[tiab] OR Jamahiriya[tiab] OR Kenya[tiab] OR Lesotho[tiab] OR Mosotho[tiab] or Basotho[tiab] OR Liberia[tiab] OR Libya*[tiab] OR Libia[tiab] OR Madagascar[tiab] OR Malawi[tiab] OR Mali[tiab] OR Mauritania*[tiab] OR Mauritius[tiab] OR Morocc*[tiab] OR Mozambique[tiab] OR Mocambique[tiab] OR Mozambican[tiab] OR Namibia[tiab] OR Niger*[tiab] OR Nigeria*[tiab] OR Principe[tiab] OR Reunion[tiab] OR Rwanda*[tiab] OR Sao Tome[tiab] OR Senegal*[tiab] OR Seychell*[tiab] OR Sierra Leone*[tiab] OR Somali*[tiab] OR South Africa*[tiab] OR St Helena[tiab] OR Sudan*[tiab] OR Swazi[tiab] OR Swaziland[tiab] OR Eswatini[tiab] OR Tanzania*[tiab] OR Togo[tiab] OR Tunisia*[tiab] OR Uganda*[tiab] OR Western Sahara[tiab] OR

	Zaire[tiab] OR Zambia*[tiab] OR Zimbabwe*[tiab]) NOT (guinea pig[tiab] OR guinea pigs[tiab] OR aspergillus niger[tiab])

Appendix 2: Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	3
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	3
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	N/A
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	4
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	4-5
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	5 and appendix 1

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	5
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	5
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	5
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	5
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	6
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	6-14
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	6-114
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	6-14
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	14-17

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Limitations	20	Discuss the limitations of the scoping review process.	17
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	17/18
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	18

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850