Original Research Article

Risk Factors for Mortality in Hospitalized COVID-19 Patients: A Retrospective Study from the Republic of Guinea

Abstract

Introduction: The Republic of Guinea, like other countries, has recorded cases of Covid-19 in all its health districts. The aim of this study was to identify the factors associated with death in hospitalised patients.

Methods: This was a retrospective, cross-sectional, analytical study conducted from March 2020 to November 2022, based on records of patients admitted to treatment centres for confirmed Covid-19. Data were collected from 28 out of 38 health districts of the country. A multivariate analysis was used to identify factors associated with risk for mortality.

Results: The study involved 37714 confirmed cases of covid-19. The mean age of the study patients was 37±15 and majority were males (67.34%). Sixty-one percent (61%) had had contact with a covid-19 patient prior to their diagnosis. The mean time to admission to the treatment centre was 2.94 ± 0.01 days. Dyspnea was the most common symptom (76.66%). The most common comorbidities were arterial hypertension (29.41%) and diabetes (22.34%). The average hospital stay was 20 ±0.05 days, with a case fatality rate of 1.23%. The main factors associated with death were age greater than 60 years [OR: 6.29 (95% CI: 4.86-8.15), p=0.000]; hospital stay greater than 2 days [OR: 2.67 (95% CI: 1.6-13.20), p=0.021], diabetes [OR: 2.00 (95% CI: 0.79-4.13), p=0.000]; and arterial hypertension [OR: 9.14 (95% CI: 2.48-9.47), p=0.000]

Conclusion: Taking better account of these factors associated with death, coupled with improving management capacity by raising the level of resuscitation facilities, will help to further reduce Covid-19-related mortality in Guinea.

Key words: Covid-19, factors, mortality, Guinea, West Africa.

1. INTRODUCTION

Coronaviruses form a vast family of viruses, which can be pathogenic in animals or humans. In humans, several coronaviruses can cause respiratory infections ranging from the common cold to more serious illnesses, such as severe acute respiratory syndrome and Middle East respiratory syndrome [1]. In December 2019, a case of pneumonia of unknown cause was detected in China. Very quickly, the pathogenic agent involved was isolated: SARS-CoV-2In December 2019, pneumonia of unknown cause was detected in China. The pathogen involved was very quickly isolated: SARS-CoV-2 [2]. It then spread throughout the world. Research carried out in 185 countries revealed that mortality due to COVID-19 was associated with age over 65, co-morbidities and unequal social and income conditions [3]. Other associated factors reported in the United States were socio-economic conditions and the environment/climate [4]. In addition, diabetes and chronic obstructive pulmonary disease were significantly associated with COVID-19 death in Mali in 2023.

Although 81% of cases of COVID-19 are mild, 14% of patients present with the severe form and 5% with the critical form. The mortality rate among critical cases is around 50% [5]. In West Africa in 2021, overall mortality was 5%, including 1% in patients under 40, 5% in patients aged 40 to 59 and 14% in patients aged 60 or over [6]. As in other countries, Guinea has been affected by the Covid-19 pandemic, recording its first case on 12 March 2020, in a patient returning from Europe.

Several response strategies (home confinement for uncomplicated cases, hospitalisation of serious cases, vaccination first of all of at-risk populations and then extended to the general population, compulsory compliance with barrier measures in gathering places) have been implemented by the national health security agency in collaboration with technical and financial partners under the authority of the Ministry of Health. As far as patient care is concerned, treatment centres for diseases with epidemic potential have been built throughout the country and are now operational to receive cases.

The aim of this study was to identify the risk factors associated with mortality among patients hospitalised for Covid-19 in treatment centres in Guinea between 2020 and 2022.

2. MATERIAL and METHODS

2.1. Scope of the study: The Republic of Guinea, located in West Africa, is bordered by 300 km of coastline and stretches 800 km from east to west and 500 km from north to south, with a total surface area of 245,857 km². In terms of health, the country has 33 districts plus the special region of Conakry Capital (05 districts). Following the major Ebola epidemic between 2014 and 2016, the Republic of Guinea strengthened its health system by setting up coordination and surveillance bodies, training human resources and building and equipping diagnostic and case-management centres. A network of more than 38 centres for the treatment of diseases with epidemic potential has been built in all the country's health districts. It was against this backdrop that the great Covid-19 pandemic occurred. Guinea did not escape the explosion and transmission of cases, most of which were community-based.

2.2. Type and duration of study: This was a retrospective, cross-sectional, analytical study conducted from January 4 to July 18, 2024 in 28 treatment centres in the country, using data from confirmed cases of covid-19 hospitalised from March 12, 2020 to November 14, 2022.

2.3. Selection criteria :

2.3.1. Inclusion criteria: All hospitalised patients with a confirmed diagnosis of Covid-19 by RT-PCR or rapid diagnostic test between March 2020 and November 2022.

2.3.2. Exclusion criteria: Patients with incomplete data or whose records lack information critical to the analysis.

2.3.3. Diagnosis of SARSCoV-2 infection was based on RT-PCR [7] and rapid diagnostic tests. Patients were treated symptomatically for simple forms, and severe cases were admitted to intensive care [8]. Severity was defined according to the WHO clinical classification [9].

2.4. Sampling :

Sampling was non-probability and exhaustive for all Covid-19 patients hospitalised in the 28 health districts. However, the 10 other health districts were not included because of poor data management in some places and a lack of data in others.

2.5. Study variables :

The study variables were quantitative (age, length of hospitalisation, time to hospitalisation) and qualitative (occupation, sex, place of residence, mode of exposure, clinical signs, clinical classification, treatment received, site of treatment, outcome, comorbidities and factors associated with death).

The length of hospitalisation corresponded to the time elapsed in the health facility until the patient's death or discharge. Time to hospitalisation corresponded to the time between the appearance of the first symptoms and the patient's hospitalisation after confirmation.

As for comorbidities, some were self-reported by the patients themselves and others were diagnosed during complementary check-ups.

2.6. Statistical analysis tools :

The analysis was carried out using Epi-info version 7 and Stata version 11 software. The descriptive part consisted of a detailed description of the study variables.

Factors associated with death were identified using a stepwise retrograde multivariate analysis, which involved cross-tabulating death with independent variables (age, length of hospitalisation, time to hospitalisation, occupation, sex, place of residence, exposure mode, clinical signs, clinical classification, treatment received, treatment site, outcome, comorbidities).

All variables associated with the 5% threshold were retained as factors associated with death.

3. RESULTS

The study involved 37,714 confirmed cases of covid-19. The mean age of the study patients was 37±15 and majority were males (67.34%). The majority lived in Conakry (83.70%) and were professional drivers (33%) (Table 1).

Clinically, the main symptoms were dyspnoea (76.66%), cough (75.06%), anosmia (49.19%), agueusia (43.85%), fever (17.37%), headache (7.11%) and physical asthenia (5.47%). According to the clinical classification on admission, 69.55% of covid-19 confirmed cases were asymptomatic, 13.08% were mild cases, 11.90% were minor cases, 4.48% were severe cases and 0.99% were critical cases. The average time to admission to the treatment centre was 2.94 ± 0.01 days. Sixty-one percent (61%) had had contact with a covid-19 patient prior to their diagnosis. The most common comorbidities were arterial hypertension (29.41%) and diabetes (22.34%). The mean length of hospitalisation was 20 ±0.05 days, with a case fatality rate of 1.23% (Table 2).

Comparison of the surviving and deceased groups shows differences in terms of age, sex and co-morbidity (table 3). The main factors associated with death were age greater than 60 years [OR: 6.29 (95% CI: 4.86-8.15), p=0.000]; hospital stay greater than 2 days [OR: 2.67 (95% CI: 1.6-13.20),

p=0.021], diabetes [OR: 2.00 (95% CI: 0.79-4.13), p=0.000]; and arterial hypertension [OR: 9.14 (95% CI: 2.48-9.47), p=0.000] (Table 4).

Table 1: Distribution of the 37714 confirmed cases followed up at Covid-19 treatment sites in Guinea according to their socio-demographic characteristics, from 13 March 2020 to 14 November 2022.

Socio-demographic characteristics	Number	Proportion (%)
Sexe	**n=37714**	**%**
Male	25392	67,33
Female	12322	32,67
Age in years, mean ± std (37±15)	**n=37714**	**%**
Under 60	34058	90,31
Over 60	3656	9,69
Profession	**n=37714**	**%**
Health agent	1253	3,00
Driver	12734	33,00
Shopkeeper/Merchant	11257	30,00
Pupil/student	1008	3,00
Administrator	7942	21,00
Miner	1355	4,00
Teacher	800	2,00
Military	600	2,00
*Other	765	2,00
Residence	**n=37714**	**%**
Conakry (capital)	31566	83,70
Outside Conakry	6148	16,30

*Ministers (7), no profession (349), seamstresses/tailors (409)

Table 2: Breakdown of the 37714 confirmed cases followed up at Covid-19 treatment sites in Guinea according to their clinical and therapeutic aspects, from 13 March 2020 to 14 November 2022.

Clinical and therapeutic aspects	Number	Proportion (%)
Exposure mode	**n=37714**	**%**
Contact with a Covid-19 patient	23024	61,00
No link Epidemiological	13538	36,00
Travel to an epidemic country	1152	3,00
Time taken before hospitalisation, mean ± std (2,94 ± 0,01)	**n=37714**	**%**
Less than 2 days	12821	34,00
More than 2 days	24893	66,00
Comorbidity	**n=37714**	**%**
Diabetes	8424	22,34
Hypertension	11091	29,41
HIV	7818	20,73

Vaccination status	**n=37714**	**%**
Vaccinated	8062	21,38
Astrazeneca	1000	2,65
Pfizer	50	0,13
Spûtnik	500	1,33
Sinopharm	4512	11,96
Sinivac	2000	5,30
Non-vaccinated	**29652**	**78,62**
Symptoms	**n=37714**	**%**
Agueusia	16538	43,85
Anosmia	18519	49,19
Fever	6550	17,37
Headache	2681	7,11
Cough	28307	75,06
Respiratory difficulties	28911	76,66
Asthenia	2062	5,47
Clinical classification	**n=37714**	**%**
Asymptomatic cases	26230	69,55
Mild case	4934	13,08
Minor case	4488	11,90
Severe case	1690	4,48
Critical case	372	0,99
Treatment received	**n=37714**	**%**
Hydroxy-chloroquine	23502	62,32
Dexamethasone	454	1,20
Oxygen therapy	454	1,20
Énoxaparine sodique	454	1,20
Antibiotics	12850	34,07
Azithromycin	12396	32,87
Ceftriaxone	454	1,20
Length of hospitalisation, mean ± std (20±0,05)	**n=37714**	**%**
Less than 10 days	6858	18,18
More than 10 days	30856	81,82
Patient outcome	**n=37714**	**%**
Cured	37250	98,77
Deceased	464	1,23

Table 3: Comparison between survivors and non-survivors at Covid-19 treatment sites in Guinea from 13 March 2020 to 14 November 2022 (N=37714).

Socio-demographic characteristics	**No survivors n=484**	**Survivors n=37230**	**P value**
Sex			**0,000**
Male	456(84%)	24936(67%)	
Female	28(16%)	12294(33%)	
Age			**0,000**
Under 60	163(44%)	33895(91%)	
Over 60	321(56%)	3335(9%)	
Comorbidity			

Diabetes			**0,000**
Yes	447(92%)	7977(21,4%)	
No	37(8%)	29253(78,6%)	
Hypertension			**0,000**
Yes	436(90%)	26575(71,3%)	
No	48(10%)	10655(28,7%)	
HIV			
Yes	425(88%)	7393(20%)	**0,000**
No	59(12%)	29837(80%)	

Table 4: Main factors associated with death in confirmed cases followed up at Covid-19 treatment sites in Guinea, from 13 March 2020 to 14 November 2022.

Factors linked to death	**Deceased**		
	P-value	**ORaj**	**IC 95%**
Age			
Under 60 years old	-	1	-
Over 60 years old	0,000	6,29	[4,86-8,15]
Time taken before hospitalisation			
Under 2 days	-	1	-
Over 2 days	0,029	2,67	[1,6-13,20]
Comorbidity			
Diabetes			
No	-	1	-
Yes	0,000	2,00	[0,79-4,13]
HTA			
No	-	1	-
Yes	0,000	9,14	[2,48-9,47]
HIV			
No	-	1	
Yes	0,000	2,67	[1,65-4,31]
Status			
Vaccinated	-	1	
Not vaccinated	0,000	5,30	[2,12-13,20]
Clinical classification			
Asymptomatic cases	-	1	-
Severe cases	0,000	26,45	[16-44]
Critical cases	0,000	117,6	[73,4-188,37]

ORaj: Adjusted Odds Ratio IC 95%: 95% Confidence Interval

4. DISCUSSION

Studies on understanding the factors associated with mortality are important because they provide a basis for decision-making in healthcare institutions [10].

Chronic disease increases the risk of adverse outcomes in COVID-19, whether admission to intensive care or death [11]. In our series, diabetes and hypertension were associated with death. Early reports suggested that hypertension may represent a risk factor for susceptibility to SARS-CoV-2 infection, a more severe course and increased death. However, the independent role of hypertension remains

debated, as hypertension is often associated with advanced age and other cardiovascular risk factors in the general population, which may also contribute to SARS-CoV-2 and COVID-19 infection. [12]. Diabetes is responsible for an altered immune response, particularly cellular immunity. This exposes diabetics to more serious attacks by pathogenic germs [13]. Diabetes was also found in Indian [14] and Chinese [15] series. HIV-positive subjects were more likely to develop a severe form of COVID-19 and had an increased risk of death [16]. Thus, patients with diabetes and COVID-19 often require invasive ventilation and an intensive care unit (ICU) because of their likelihood of developing acute respiratory distress syndrome (ARDS) [17].

Older age appears to be significantly associated with mortality from SARS [18]. In Wuhan, China, the occurrence of death in Covid-19 positive patients was associated with an age ≥ 65 years [15]. Ageing generates numerous physiological changes [19]. A younger age threshold for the risk of death has also been reported [20-22]. In Guinea, Kpamy [23] reported that the risk was 24.93 times greater in patients over 60 than in those under 60. Older age has also been found in other studies [24].

In our series, failure to vaccinate patients was also identified as a factor associated with death. In Lombardy, mortality in intensive care units and hospitals was not associated with vaccination status [25]. In the USA, severe forms of the disease were found in patients despite vaccination [26]. In the Republic of Guinea, vaccination against Covid-19 officially began in March 2021. Several types of vaccine with different antigens and modes of administration have been used throughout the country.

According to the clinical classification on admission, 69.55% of cases confirmed by Covid-19 were asymptomatic. The predominance of asymptomatic forms of covid-19 in this study may be explained by exposure of younger people. This is also the finding of other authors [19,27] who have stated that the youth of the African population goes hand in hand with asymptomatic forms of covid-19 disease. At the start of the COVID-19 pandemic in Guinea, the national response plan provided for the isolation of all confirmed cases of COVID-19 (symptomatic or not) in treatment centres in order to break the chain of contamination. This strategy subsequently evolved as knowledge of the disease improved.

Long delays before admission to hospital were also associated with death in our series. This may be explained, among other things, by the therapeutic itinerary of patients, most of whom first tried self-medication or consultation with traditional therapists before being admitted to conventional hospitals. Most of these patients were admitted in an advanced state of the disease or with complications, and were admitted to intensive care or intensive care units. Efforts have been made by the health authorities to improve the technical facilities, but these are not available in all health districts.

The study method was rigorous (triangulation of the information received to ensure the quality of the data and to guarantee the validity of the results, among other things) and provided high-quality data and relevant results. However, one of the limitations of this study lies in the possibility of under-reporting of deaths occurring in the community. In addition, the exclusion of the 10 districts could lead to selection bias if these districts had different mortality rates.

CONCLUSION

This study identified advanced age, co-morbidities such as diabetes and hypertension, and delay before hospitalisation as major risk factors for death among Covid-19 patients in Guinea. Non-vaccination was also associated with higher mortality, highlighting the importance of increasing vaccination coverage. These results highlight the need to strengthen resuscitation infrastructures, improve rapid access to care, and develop targeted prevention strategies, including vaccination campaigns and co-morbidity management, in order to effectively reduce Covid-19-related mortality.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

ETHICAL APPROVAL

The prior agreement of the administrative and health authorities was obtained before the survey began.

Patient anonymity and confidentiality were respected.

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