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Impact of COVID-19 in the Hospital Activities of a Cardiology Department: Case of the General Hospital Idrissa Pouye in Dakar, Senegal in 2020

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Abstract

Introduction: In Senegal, at the end of 2020, there were a cumulative 18,728 confirmed cases of COVID-19 and 390 deaths. Patients with cardiovascular disease were the most affected by this morbidity and mortality. This is why we were given the objective of analyzing the effect of COVID-19 on the hospital activities of a cardiology service in Senegal. In this case that of the General Idrissa Pouye Hospital (HOGIP), by comparing admissions, deaths, average monthly length of stay and overall annual mortality of the service in 2020 with each of the four previous years. **Methodology:** This was a descriptive study from January 2016 to December 2020 by retrospective data collection. The collection ran from January 5, 2021 to March 30, 2021. Statistical analysis was performed with Rstudio 4.1.0 statistical analysis software. We expressed these variables as their absolute values and then we calculated the difference between the absolute value of 2020 and that of each of the previous years, both on a monthly and annual scale for each of the variables. Finally, we calculated the annual global mortality (each year from 2012 to 2020). **Results:** The total number of admissions in 2020 was significantly lower than in 2016 (−7.59%), 2017 (−8.78%) and 2018 (−2.16%). On the other hand, it was clearly higher than that of 2019 (+12.83%). A record in admissions was found during the month of December 2020 compared to 2016 (+64.70%), 2017 (+95.34%), 2018 (+127.02%) and 2019 (+127.02%). The average monthly

length of stay in 2020 was less than or equal to those of 2016 (−7.62%), 2017 (−8.57%), 2018 (−3.03%) and 2019 (−0.00%). The total number of annual deaths in 2020 was significantly lower than in 2016 (−24.39%), 2017 (−27.06%), 2018 (−39.81%) and 2019 (−23.46%). Over the 5 years of our study, the year 2020 was the least lethal in service with an overall annual mortality of 9.79%.

Conclusion: COVID-19 being a viral transmissible pathology with pulmonary tropism, its mortality is due to both respiratory failure and cardiovascular damage. Its morbidity and mortality are supported by major non-communicable diseases and their risk factors (Heart disease, Asthma, Chronic obstructive pulmonary disease, Diabetes, Smoking, Obesity, etc.). It, therefore, follows that the considerable drop in overall annual mortality in the service in 2020 can only be explained by a massive diversion of patients, to epidemic treatment centers and infectious diseases services, who should have, in normal times, been taken care of in cardiology departments until November 2020. In conclusion, we will say that the authorities should not relegate to the background, at any time, the fight against major non-communicable diseases, especially cardiovascular diseases, even in times of an infectious disease pandemic. They should capacity early cardiology services to maintain the offer of care and follow-up even in infectious and contagious contexts.

Keywords

Hospital, COVID-19, Cardiology, Senegal, Impact

1. Introduction

COVID-19 is the infectious viral disease of the lungs caused by human-to-human transmission of SARS-CoV-2 (predominantly via respiratory droplets) [1] [2]. It is spreading rapidly across the world, so much so that for the sixth time in its history, WHO declared a state of health emergency on January 30th, 2020 [3] [4]. The first case on the African continent had been reported in Egypt on February 14th, 2020 [5] [6]. Senegal registered its first case on March 2nd, 2020 [7] [8] [9]. Faced with this globalization of the disease, the WHO declared a global pandemic on March 11th, 2020 [4].

In Senegal, at the end of 2020, there were a cumulative 18,728 confirmed cases of COVID-19 and 390 deaths [1]. Patients with cardiovascular disease or cardiovascular risk factors were the most affected by this morbidity and mortality [10].

However, no study in Senegal has yet looked into the real effect COVID-19 has had on the hospital activities of a cardiology department. Did cardiology departments record significant peaks in their hospital activities in 2020 compared to previous years?

This present study provides an answer in that it is the cardiology service of the General Hospital Idrissa Pouye, Dakar, Senegal.

2. Objective

The objective was to analyze the effect of COVID-19 on the hospital activities of the cardiology department of the General Hospital Idrissa Pouye (HOGIP) by comparing admissions, deaths, average monthly length of stay and annual overall mortality from service in 2020 to each of the previous 4 years (2016, 2017, 2018, 2019).

3. Methodology

3.1. Type of Study

This was a descriptive study from January 2016 to December 2020 by retrospective data collection.

3.2. Data Collection Duration

Data collection ran from January 5th, 2021 to March 30th, 2021.

3.3. Population and Statistical Unit

All patients were admitted to the hospitalization sector of the Cardiology/HOGIP department from January 2016 to December 2020. The survey unit was the month. The statistical units were the patients with the number of admissions, deaths and the average length of monthly stays in the Cardiology/HOGIP department from January 2016 to December 2020.

3.4. Including Criteria

Our criteria for including the months were to have the service activity report for that month, that it be legible and that the head of the service and the supervisor of the service signed it.

Our criteria for not including months were not to have an activity report from the service for the month in question, or to have unreadable reports and/or to have unsigned reports by both the head of service and the service supervisor.

3.5. Data Collection

The data source consisted of the monthly activity reports of the Cardiology department of HOGIP and that of the ICU from January 2012 to December 2020, signed by both the department head and the department supervisor.

Our collection tool support was an electronic form, generated on Google Forms by authors **(Annexe)**. The survey form consisted of four (4) questions. They were all open-ended questions, one of which had a predefined response format and the others had a free-response format.

On each report, we insert the month and year of the report, the number of deceased patients, the number of discharged patients, and the average monthly length of stay.

The data was collected by consulting the monthly activity reports of the Car-

diology department of HOGIP from January 2016 to December 2020, signed by both the department head and the department supervisor. The variables that were collected are:

- Service admissions: Number of patients admitted each month from January 2016 to December 2020 across the entire department: it was obtained by adding the number of deaths to the number of discharges for each month across the entire department.
- Department deaths: Number of patients who died each month from January 2016 to December 2020 across the entire department.
- Average monthly length of stay (AMLS) in the service: Average monthly length of stay for each month from January 2016 to December 2020 across the entire service. AML is expressed in days.

3.6. Statistical Analyzes

Statistical analysis was performed with Rstudio 4.1.0 statistical analysis software.

The month and year variable of the report (the only qualitative variable) served as a chronological benchmark for the other variables which are all quantitative (admissions, deaths, AMLS).

We expressed them with their absolute numbers on a monthly and annual scale.

Then we calculated the difference between the value of 2020 and that of each of the previous years, both on a monthly and annual scale.

When this difference was negative then we concluded that there was a deficit in 2020 compared to the year taken into account. Otherwise, (positive difference) we concluded that there was a gain in 2020 compared to the year taken into account.

Finally, we calculated the annual global mortality rate in the cardiology/HOGIP department (each year from 2012 to 2020). This proportion indicator was expressed as a percentage.

The results were all expressed to the hundredth of a decimal.

4. Results

The percentage of data collection was 100%. We actually had the absolute numbers of departures, deaths and average length of stay for all 60 months from January 2016 to December 2020.

4.1. Admissions

4.1.1. At the Annual Level

The total number of admissions in 2020 was significantly lower than in 2016 (−52 admissions or −7.59%), 2017 (−61 admissions or −8.78%) and 2018 (−14 admissions or −2.16%) (Figure 1, Table 1).

On the other hand, it was clearly higher than that of 2019 (+72 admissions or +12.83%) (Figure 1, Table 1).

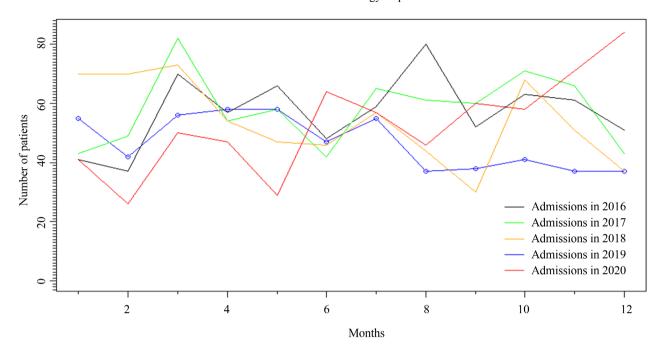Admissions to the HOGIP Cardiology Department 2016 to 2020

Figure 1. Graphic description of the evolution of admissions from January to December 2016 (black), 2017 (green), 2018 (orange), 2019 (blue) and 2020 (red) at the Cardiology department/HOGIP.

Table 1. Description of month-month differentials (in absolute frequency) between admissions in 2020 and each of the years from 2016 to 2019 in the Cardiology department/HOGIP.

Admissions in service	Admissions by 12 months of the year												Annual Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
In 2020 (n_0)	41	26	50	47	29	64	57	46	60	58	71	84	633
In 2016 (n_1)	41	37	70	57	66	48	59	80	52	63	61	51	685
Δ ($n_0 - n_1$)	0	−11	−20	−10	−37	+16	−2	−34	+8	−5	+10	+33	−52
In 2020 (n_0)	41	26	50	47	29	64	57	46	60	58	71	84	633
In 2017 (n_2)	43	49	82	54	58	42	65	61	60	71	66	43	694
Δ ($n_0 - n_2$)	−2	−23	−32	−7	−29	+22	−8	−15	0	−13	+5	+41	−61
In 2020 (n_0)	41	26	50	47	29	64	57	46	60	58	71	84	633
In 2018 (n_3)	70	70	73	54	47	46	57	44	30	68	51	37	647
Δ ($n_0 - n_3$)	−29	−44	−23	−7	−18	+18	0	+2	+30	−10	+20	+47	−14
In 2020 (n_0)	41	26	50	47	29	64	57	46	60	58	71	84	633
In 2019 (n_4)	55	42	56	58	58	47	55	37	38	41	37	37	561
Δ ($n_0 - n_4$)	−14	−16	−6	−11	−29	+17	+2	+9	+22	+17	+34	+47	+72

4.1.2. On a Monthly Scale

Over the first 5 months of the year, admissions to the service in 2020 were significantly lower than those of 2016, 2017, 2018 and 2019 with deficits ranging from −2 admissions (−4.65%) to −44 admissions (−62.85%) (**Figure 1**, **Table 1**).

It was during the months of June then September and finally November, December that admissions to the service in 2020 were higher than the admissions recorded in 2016, 2017, 2018 and 2019 with gains ranging from +5 admissions (+7.57%) to +47 admissions (+127.02%) (**Figure 1**, **Table 1**).

It is especially the month of December 2020 which recorded a record in admissions compared to those of December of 2016 (+33 admissions *i.e.* +64.70%), 2017 (+41 admissions *i.e.* +95.34%), 2018 (+47 admissions or +127.02%) and 2019 (+47 admissions or +127.02%) (**Figure 1**, **Table 1**).

4.2. Average Monthly Length of Stay

4.2.1. At the Annual Level

Average monthly length of stay (AMLS) in 2020 was lower than or equal to those of 2016 (−0.66 days or −7.62%), 2017 (−0.75 days or −8.57%), 2018 (−0.25 days or −3.03%) and 2019 (−0.00 days or −0.00%) (**Figure 2**, **Table 2**).

4.2.2. On a Monthly Scale

During the months of February then April, May and finally November, December the AMLS in service in 2020 were significantly lower than those of 2016, 2017, 2018 and 2019 with deficits ranging from −1 days (−11.11%) to −5 days (−38.46%) (**Figure 2**, **Table 2**).

It was during the month of September that the AMLS in service in 2020 were greater than or equal to the AMLS in 2016 (+2 days or +28.57%), 2017 (+2 days or +28.57%), 2018 (+2 days or +28.57%) and 2019 (+0 days or +00.00%) (**Figure 2**, **Table 2**).

The average monthly length of stay in the HOGIP Cardiology Department 2016 to 2020
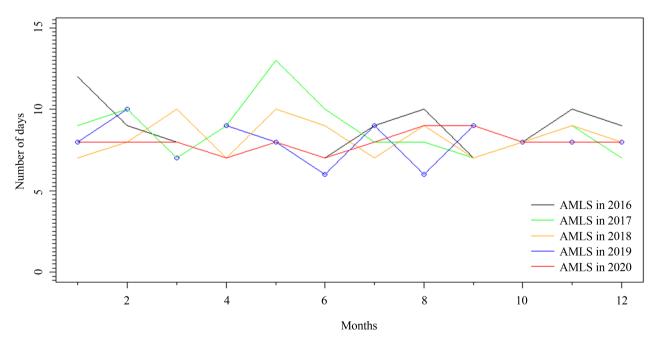

Figure 2. Graphic description of the change in the average monthly length of stay from January to December 2016 (black), 2017 (green), 2018 (orange), 2019 (blue) and 2020 (red) at the Cardiology department/HOGIP.

Table 2. Description of the month-month differentials (in absolute frequency) between the average monthly length of stay in 2020 and each of the years from 2016 to 2019 in the Cardiology department/HOGIP.

AMLS in days in service	Average monthly length of stay (AMLS) by 12 months of the year												Annual Total
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	
In 2020 (n_0)	8	8	8	7	8	7	8	9	9	8	8	8	8.00
In 2016 (n_1)	12	9	8	7	8	7	9	10	7	8	10	9	8.66
Δ ($n_0 - n_1$)	−4	−1	0	0	0	0	−1	−1	+2	0	−2	−1	−0.66
In 2020 (n_0)	8	8	8	7	8	7	8	9	9	8	8	8	8.00
In 2017 (n_2)	9	10	7	9	13	10	8	8	7	8	9	7	8.75
Δ ($n_0 - n_2$)	−1	−2	+1	−2	−5	−3	0	+1	+2	0	−1	−2	−0.75
In 2020 (n_0)	8	8	8	7	8	7	8	9	9	8	8	8	8.00
In 2018 (n_3)	7	8	10	7	10	9	7	9	7	8	9	8	8.25
Δ ($n_0 - n_3$)	+1	0	−2	0	−2	−2	+1	0	+2	0	−1	0	−0.25
In 2020 (n_0)	8	8	8	7	8	7	8	9	9	8	8	8	8.00
In 2019 (n_4)	8	10	7	9	8	6	9	6	9	8	8	8	8.00
Δ ($n_0 - n_4$)	0	−2	+1	−2	0	+1	−1	+3	0	0	0	0	0.00

4.3. Deaths

4.3.1. At the Annual Level

The total number of annual deaths in 2020 was significantly lower than in 2016 (−20 deaths or −24.39%), 2017 (−23 deaths or −27.06%), 2018 (−41 deaths or −39.81%) and 2019 (−19 deaths, *i.e.* −23.46%) (Figure 3, Table 3).

4.3.2. On a Monthly Scale

During the months of March, April and May then July, August and finally October, deaths in service in 2020 were significantly lower than those of 2016, 2017, 2018 and 2019 with deficits ranging from −1 (−16.66%) to − 11 (−91.66) deaths (Figure 3, Table 3).

It was during the month of December that the deaths in service in 2020 were higher than the deaths recorded in 2016 (+5 deaths or +71.42%), 2017 (+8 deaths or +200%), 2018 (+5 deaths or +71.42%) and 2019 (+7 deaths *i.e.* +140.00%) (Figure 3, Table 3).

4.4. Annual Global Mortality from 2016 to 2020

2020 was the least lethal year in the service with 9.79% (Table 4).

5. Discussion

Admissions and COVID-19:

The total number of admissions in 2020 was significantly lower than in 2016 (−52 admissions or −7.59%), 2017 (−61 admissions or −8.78%) and 2018 (−14 admissions or −2.16%) (Figure 1, Table 1). On the other hand, it was clearly higher than that of 2019 (+72 admissions or +12.83%) (Figure 1, Table 1).

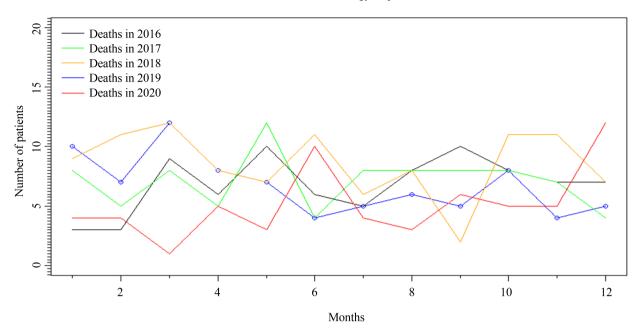Deaths at the HOGIP Cardiology Department 2016 to 2020

Figure 3. Graphic description of the evolution of deaths from January to December 2016 (black), 2017 (green), 2018 (orange), 2019 (blue) and 2020 (red) at the Cardiology department/HOGIP.

Table 3. Description of month-month differentials (in absolute frequency) between deaths in 2020 and each of the years from 2016 to 2019 in the Cardiology department/HOGIP.

Deaths in service	Deaths by 12 months of the year												Annual Total
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	
In 2020 (n_0)	4	4	1	5	3	10	4	3	6	5	5	12	62
In 2016 (n_1)	3	3	9	6	10	6	5	8	10	8	7	7	82
$\Delta\ (n_0 - n_1)$	+1	+1	−8	−1	−7	+4	−1	−5	−4	−3	−2	+5	−20
In 2020 (n_0)	4	4	1	5	3	10	4	3	6	5	5	12	62
In 2017 (n_2)	8	5	8	5	12	4	8	8	8	8	7	4	85
$\Delta\ (n_0 - n_2)$	−4	−1	−7	0	−9	+6	−4	−5	−2	−3	−2	+8	−23
In 2020 (n_0)	4	4	1	5	3	10	4	3	6	5	5	12	62
In 2018 (n_3)	9	11	12	8	7	11	6	8	2	11	11	7	103
$\Delta\ (n_0 - n_3)$	−5	−7	−11	−3	−4	−1	−2	−5	+4	−6	−6	+5	−41
In 2020 (n_0)	4	4	1	5	3	10	4	3	6	5	5	12	62
In 2019 (n_4)	10	7	12	8	7	4	5	6	5	8	4	5	81
$\Delta\ (n_0 - n_4)$	−6	−3	−11	−3	−4	+6	−1	−3	+1	−3	+1	+7	−19

Looking at the monthly scale, we see 2 clear trends:

Over the first 5 months of the year, service admissions in 2020 were significantly lower than in 2016, 2017, 2018 and 2019 with deficits ranging from −4.65% to −62.85% admissions (**Figure 1**, **Table 1**).

During the months of June then September and finally November, December admissions to the service in 2020 were higher than the admissions recorded in 2016, 2017, 2018 and 2019 (Figure 1, Table 1) with gains ranging from +7.57% to +127.02% admissions. We noticed a record in admissions during the month of December 2020 compared to 2016 (+64.70% admissions), 2017 (+95.34% admissions), 2018 (+127.02% admissions) and 2019 (+127.02% admissions) (Figure 1, Table 1).

This general finding of a decrease in admissions to the service during the year 2020 compared to the previous 3 years out of the 4 could be explained by the COVID-19 pandemic and has been found in several countries [10] [11] [12] [13] [14].

The two trends observed in admissions to our service can be explained by the following quantifiable and objective elements:

The significant drop over the first 5 months of 2020 is firstly explained by the fact that from March 2nd, 2020 (date of appearance of the 1st case of COVID-19 in Senegal) [8] [15] to early June 2020, the evolutionary curve of the pandemic in our country has been rapidly increasing [16] [17] with Dakar as the epicenter [16] [17] [18]. Added to this is the state of emergency with a curfew that runs from March 23 [15] [19] to June 30th, 2020 [15] [20] [21], without forgetting that the mode of transmission between March and August 2020 was dominated by transmission by case contact [22] [23], with its consequences of preventive strategies [24] such as the policy of "Tokk len sen Keur" ("Stay at home") [25] [26] and physical distancing [24]. In addition to this, the medical profession reorganized its operations [15] from the start of the epidemic to comply with preventive measures with reduction in the number of staff present daily and a review of the supply of care. In Libya, a study among cardiologists revealed that only 22.9% of them had nothing to change their work habits, otherwise 42.4% had reduced their work to the strict case of emergency management and 34.7% had simply stopped working and only performed urgent one-off interventions [27]. All of this certainly contributed to dissuading or preventing our patients from using our services in the first 5 months of the year.

The increase in admissions to the service in June could be explained by the combined effect of the lifting of the state of emergency and the curfew on June 30th, 2020 [20] and the plateau evolution of the epidemic between the end of May and the end of July [28] which gave an impression of mastery of the epidemiological situation.

The increase in admissions to the service in September could be explained by the decreasing evolution of the epidemic between the end of July and the beginning of November 2020 [23] [29] which certainly gave the impression of an epidemic that extinguishes allowing life to resume its normal course.

However, the increase in admissions to our department in November and December 2020 despite a rapidly increasing evolutionary resumption of the pandemic (2nd wave) [1] suggests that the idea of "living with the virus" has gained the upper hand in mentalities.

In addition to this analysis based on quantifiable elements, it is also necessary to take into account qualitative elements such as feelings to understand the evolution in two tendencies of the admissions curve in our service. The study by SOUGOU and al in Dakar/Senegal, at the beginning of the epidemic, revealed that the fear of the disease was present among health personnel due to the lack of knowledge of the virus and the COVID-19 disease [30]. In addition, the feeling of vulnerability is linked to an insufficiency in the availability of personal protective equipment, and the perceived risk of being a potential danger for their family and those around them [30]. Another study in France found the same feelings among health professionals [31]. These various fears have certainly been better managed over time and thanks to the response efforts of the Senegalese state to support its medical and paramedics (premiums, protective equipment, health insurance, etc.).

Average monthly length of stay and COVID-19:

Average monthly length of stay in the service in 2020 was lower than or equal to those of 2016 (−0.66 days or −7.62%), 2017 (−0.75 days or −8.57%), 2018 (−0.25 days or −3.03%) and 2019 (−0.00 days or −0.00%) (Figure 2, Table 2).

Looking at the monthly scale, it is during the months of February then April, May and finally November, December that the AMLS in service in 2020 were significantly lower than those of 2016, 2017, 2018 and 2019 with deficits ranging from −1 days (−11.11%) to −5 days (−38.46%) (Figure 2, Table 2).

September was the only month when the AMLS in service in 2020 were greater than or equal to the AMLS in 2016 (+2 days or +28.57%), 2017 (+2 days or +28.57%), 2018 (+2 days or +28.57%) and 2019 (+0 days or +00.00%) (Figure 2, Table 2).

This general finding of a drop in AMLS in the service during the year 2020 compared to each of the previous 4 years could be explained by the feelings of the health personnel. It was dominated by the fear of the disease, the anxiety-producing context [30] [31] [32] and the adaptation of its mode of operation in the face of this unknown pathology which is COVID-19 [27].

Deaths and COVID-19:

The total number of annual deaths in 2020 was significantly lower than in 2016 (−20 deaths or −24.39%), 2017 (−23 deaths or −27.06%), 2018 (−41 deaths or −39.81%) and 2019 (−19 deaths or −23.46%) (Figure 3, Table 3).

On a monthly scale, it is during the months of March, April and May then July, August and finally October, deaths in service in 2020 were significantly lower than those of 2016, 2017, 2018 and 2019 with deficits ranging from −1 (−16.66%) to −11 (−91.66%) deaths (Figure 3, Table 3).

December is the only month in which the deaths in service in 2020 were higher than the deaths recorded in 2016 (+5 deaths or +71.42%), 2017 (+8 deaths or +200%), 2018 (+5 deaths or +71.42%) and 2019 (+7 deaths or +140.00%) (Figure 3, Table 3).

This drop in the number of deaths recorded over the year 2020 could be ex-

plained by the fact that cardiology patients (cardiovascular risk factors, heart disease) died from COVID-19 elsewhere than in a cardiology department during the year 2020 (at home or epidemic treatment center).

We argue this hypothesis with first the fact that the risk of being infected by SARS-COV2 is linked to cardiovascular risk factors such as obesity [10] [33]-[42], hypertension [10] [33]-[42], diabetes [10] [33]-[42], the existence of pre-existing heart disease [10] [37] [38] [39] [41] [42] [43].

Then, the factors found which are associated with the mortality of COVID-19 cases are, among other things, the presence of chronic cardiovascular disease [10] [36] [37] [41]-[46].

Finally, the case management policy COVID-19 consisted of hospitalized people in an epidemic treatment center or at-home care. All this is in an effort to contain the epidemic by isolating the cases.

Thus, it is very likely that cardiological patients "intended" to be cared for or even die in a cardiology department have contracted and died from COVID-19 outside a cardiology department, at home or in an epidemic treatment center.

To support this hypothesis we take the case of December 2020, which saw an increase in admissions and deaths compared to December of the 4 previous years. Over-attendance and over-mortality appeared with the return of patients.

The case of the year 2020 at the service:

Over the 5 years of our study, 2020 was the least lethal in service with an overall annual mortality of 9.79% (Table 4).

From our previous analysis, it follows that this unusual annual global mortality is not due to performance.

Firstly, COVID-19 and its management policy have certainly resulted in excess mortality in cardiology patients, but this excess mortality has taken place outside the cardiology departments (Epidemic treatment center, department of infectious diseases, home, etc.).

Secondly, the month of December 2020 in our study shows it very well: the return of patients to our services leading to over frequentation and over-mortality.

This foreshadows peak mortality in the department in 2021 if nothing hinders the admissions of cardiology patients to the cardiology departments.

Table 4. Description of annual global mortality from 2016 to 2020 in the cardiology department/HOGIP.

	Global annual mortality (%)
Year 2016	11.97
Year 2017	12.24
Year 2018	15.91
Year 2019	14.43
Year 2020	9.79

Thirdly, the fact that arterial hypertension, diabetes, heart disease increase the morbidity and mortality of COVID-19, we must add the fact that although being a viral infectious pathology with pulmonary tropism, COVID-19 generates major systemic inflammation with formidable cardiovascular complications (myocarditis, pulmonary embolism, thrombophlebitis, acute coronary thromboembolic syndromes, etc.) [14] [41] [45].

So this considerable drop in annual overall mortality in the service in 2020 can only be explained by a massive diversion of patients who should have been treated in cardiology services in normal times, to the benefit of epidemic treatment centers and infectious diseases services. This diversion will continue until November 2020.

COVID-19 although being a viral transmissible pathology with pulmonary tropism, its mortality is due to both respiratory failure and cardiovascular damage. Its morbidity and mortality is supported by major non-communicable diseases and their risk factors (Heart disease, Asthma, Chronic obstructive pulmonary disease, Diabetes, Smoking, Obesity, etc.).

This is why even in times of epidemic or even pandemic of infectious disease, it is important not to relegate to the background the fight against major non-communicable diseases and their risk factors. They are the real health dangers of this century [10] [47] [48] [49] [50].

6. Strengths and Limitations

One of the strengths of our present study lies in having taken into consideration the whole of 2020 with significant hindsight of 4 years.

However, it would have been good to conduct a qualitative contextualized study on the staff of the Cardiology/HOGIP department. This would have allowed us to know the dominant emotions, their evolution over the year 2020 and the factors that influenced them in the context of our service. Therefore, our understanding of figures would have been much better, more solid and contextualized.

7. Conclusions

The hospital activities of the cardiology department of HOGIP have been hit hard by the effect of COVID-19. Activities fluctuated according to the epidemiological curve of COVID-19 at the national level, according to the feelings of the medical profession to this pathology during the year 2020 and according to the rhythm of the control measures undertaken at the level of the service and at the national level.

In the light of this study, we recommend that the authorities should not relegate to the background, at any time, the fight against major non-communicable diseases, especially cardiovascular diseases, even in times of an infectious disease pandemic.

They should capacity early cardiology services to maintain the offer of care

and follow-up even in infectious and contagious contexts.

Finally, would connected cardiology be the solution in this world plagued by emerging and re-emerging infectious diseases (Ebola, Dengue, Coronavirus, Zika, etc.)?

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Republic of Senegal, Ministry of Health and Social Action (2020) Response to the Epidemic of the New Coronavirus COVID-19. Senegal Situation Report No. 75 of December 28, 2020, 7.

[2] Coronavirus Disease 2019 (COVID-19): What You Need to Know. https://www.who.int/fr/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-covid-19

[3] Epidemiology—COVID Reference. https://covidreference.com/epidemiology_fr

[4] One Year of Coronavirus: The Key Dates for the COVID-19 Pandemic. https://www.futura-sciences.com/sante/actualites/coronavirus-an-coronavirus-grandes-dates-pandemie-covid-19-84897

[5] Coronavirus: A First Case in Africa, According to the Egyptian Ministry of Health—Jeune Afrique. https://www.jeuneafrique.com/896745/societe/coronavirus-un-premier-cas-en-afrique-selon-le-ministere-egyptien-de-la-sante

[6] First Case of Novel Coronavirus in Africa. https://www.voaafrique.com/a/eggypt-premier-cas-de-nouveau-coronavirus-en-afrique/5291254.html

[7] COVID-19 Pandemic in Africa—Wikipedia. https://fr.wikipedia.org/wiki/Pand%C3%A9mie_de_Covid-19_en_Afrique

[8] Senegal: First Confirmed Case of New Coronavirus on a French|AFP Extract—YouTube. https://www.youtube.com/watch?v=VT2zArlBC0E

[9] Senegal Declares First Case of COVID-19|Regional Office for Africa. https://www.afro.who.int/fr/news/le-senegal-declare-le-premier-cas-de-covid-19

[10] World Health Organization, UNDP (2020) United Nations Development Program, UN Interagency Task Force on NCDs. The Fight against Noncommunicable Diseases during and after the COVID-19 Pandemic.

[11] Barry, I.S., Baldé, E.Y., Béavogui, M., Camara, A., Samoura, A., Koïvogui, K., *et al.* (2021) Impact of the COVID-19 Pandemic on the Activities of the Cardiology Service of the Ignace Deen National Hospital of the Conakry CHU. *Annales de Cardiologie et d' Angéiologie*, **70**, 102-105. https://doi.org/10.1016/j.ancard.2020.09.041

[12] Hasan, S., Ur Rahman, H., Patil, A., Lewis, C., Haye, C., Townsend, S., *et al.* (2021)

Impact of COVID-19 on Cardiology Services in a District Hospital and Adapting to the New Normal. *Postgraduate Medical Journal*, **97**, 330-331. https://doi.org/10.1136/postgradmedj-2020-138228

[13] Fersia, O., Bryant, S., Nicholson, R., McMeeken, K., Brown, C., Donaldson, B., *et al.* (2020) The Impact of the COVID-19 Pandemic on Cardiology Services. *Open Heart*, **7**, e001359. https://doi.org/10.1136/openhrt-2020-001359

[14] Negreira, C.M., Piqueras, F.J. and Mateo, G.C. (2020) Impact of COVID-19 Pandemic in Cardiology Admissions. *Medicina Clínica* (*English Edition*), **155**, 179-180. https://doi.org/10.1016/j.medcle.2020.05.006

[15] Adam, S., Zahra, S.A., Chor, C.Y.T., Khare, Y. and Harky, A. (2020) COVID-19 Pandemic and Its Impact on Service Provision: A Cardiology Prospect. *Acta Cardiologica*, **76**, 830-837.

[16] Republic of Senegal, Ministry of Economy, Planning and Cooperation (2020) Compendium of the Main Texts Issued since the Start of the Health Crisis Linked to COVID-19—Presentation of the Texts.

[17] Ndongo, Z.E.A. (2020) Analysis of the Trends in the COVID-19 Pandemic in Senegal.

[18] Republic of Senegal, Ministry of Health and Social Action (2020) Response to the Epidemic of the Novel Coronavirus COVID-19. Senegal Situation Report No. 25 of June 1, 2020, 8.

[19] Mapping Risk Factors for the Spread of COVID-19 in Africa. 12.

[20] Coronavirus: in Senegal, the State of Emergency and a Curfew. https://www.lemonde.fr/afrique/article/2020/03/24/coronavirus-etat-d-urgence-et-couvre-feu-en-vigueur-au-senegal_6034223_3212.html

[21] Message to the Nation: Lifting of the State of Emergency Established in the Context of the Fight against the Coronavirus Disease COVID-19. https://www.presidence.sn/actualites/message-a-la-nation-levee-de-letat-durgence-instaure-dans-le-cadre-de-la-lutte-contre-la-maladie-a-coronavirus-covid-19_2030

[22] Macky Sall: "I Have Decided to Lift the State of Emergency and the Associated Curfew"—BBC News Africa. https://www.bbc.com/afrique/region-53229867

[23] Tine, J.A.D., Bondha, A.C., Bassoum, O. and Faye, A. (2020) Analysis of the Epidemiological Evolution of the COVID-19 Pandemic in Senegal from March 2 to August 31, 2020. Master's Thesis in Public Health Option: Epidemiology, Cheikh Anta DIOP University, ISED Library, Dakar.

[24] INFO-COVID|Promoter. http://www.sneips.sante.gouv.sn/INFO-COVID

[25] Novel Coronavirus (2019-nCoV): Advice for the General Public. https://www.who.int/fr/emergencies/diseases/novel-coronavirus-2019/advice-for-public

[26] Coronavirus: "Stay at Home", Insists Christophe Castaner—YouTube. https://www.youtube.com/watch?v=-MogL4Ky5Ic

[27] State of Emergency in Senegal "Stay Home"—YouTube. https://www.youtube.com/watch?v=8edb1bDKEsM

[28] Elhadi, M., Alsoufi, A., Bin Zarti, M.A., Abulmida, S., Alnafati, N., Alfurjani, N., *et al.* (2020) Impact of the COVID-19 Pandemic on Cardiologists in a Country with Limited Resources. *Global Heart*, **15**, 61. https://doi.org/10.5334/gh.878

[29] Republic of Senegal, Ministry of Health and Social Action (2020) Response to the Epidemic of the New Coronavirus COVID-19. Senegal Situation Report No. 45 of August 10, 7.

[30] Republic of Senegal, Ministry of Health and Social Action (2020) Response to the Epidemic of the Novel Coronavirus COVID-19. Senegal Situation Report No. 60 of October 1, 2020, 8.

[31] Sougou, N.M., Diouf, J.B., Diallo, A.A. and Seck, I. (2020) Analyse des risques perçus des prestataires de santé en milieu hospitalier dans le cadre de la pandémie à COVID-19: Une étude qualitative dans le Centre Hospitalier Roi Baudoin de Guédiawaye, lors de la réception du 1er cas communautaire du Sénégal. *The Pan African Medical Journal*, **37**, Article No. 23.
https://doi.org/10.11604/pamj.supp.2020.37.1.25389
https://www.panafrican-med-journal.com/content/series/37/1/23/full

[32] El-Hage, W., Hingray, C., Lemogne, C., Yrondi, A., Brunault, P., Bienvenu, T., *et al.* (2020) Les professionnels de santé face à la pandémie de la maladie à coronavirus (COVID-19): Quels risques pour leur santé mentale? *L'Encéphale*, **46**, S73-S80.
https://doi.org/10.1016/j.encep.2020.04.008

[33] Rashedi, J., Mahdavi Poor, B., Asgharzadeh, V., Pourostadi, M., SamadiKafil, H., Vegari, A., Tayebi-Khosroshahi, H. and Asgharzadeh, M. (2020) Risk Factors for COVID-19. *Infezioni in Medicina*, **28**, 469-474.

[34] Wingert, A., Pillay, J., Gates, M., Guitard, S., Rahman, S., Beck, A., *et al.* (2021) Facteurs de risque de gravité de la COVID-19: Un examen rapide pour éclairer la priorisation des vaccins au Canada. *BMJ Ouvert*, **11**, e044684.
https://doi.org/10.1136/bmjopen-2020-044684

[35] Jassat, W., Cohen, C., Tempia, S., Masha, M., Goldstein, S., Kufa, T., *et al.* (2021) Mortalité hospitalière COVID-19 en Afrique du Sud: L'intersection des maladies chroniques transmissibles et non transmissibles dans un contexte de prévalence élevée du VIH. *SSRN Electronic Journal*. https://www.ssrn.com/abstract=3783089

[36] #COVID19 autre communiqué du jour, Mercredi 18 août 2021 au Sénégal—Fr—Dr Mounir DIA—YouTube. https://www.youtube.com/watch?v=Q7YHmNSPH2M

[37] Fang, L., Karakiulakis, G. and Roth, M. (2020) Are Patients with Hypertension and Diabetes Mellitus at Increased Risk for COVID-19 Infection? *The Lancet Respiratory Medicine*, **8**, e21. https://doi.org/10.1016/S2213-2600(20)30116-8

[38] Coronavirus et COVID-19: Qui est le plus à risque?|Médecine Johns Hopkins.
https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/coronavirus-and-covid19-who-is-at-higher-risk

[39] COVID-19: Qui est le plus à risque de symptômes graves?—Clinique Mayo.
https://www.mayoclinic.org/diseases-conditions/coronavirus/in-depth/coronavirus-who-is-at-risk/art-20483301

[40] Ko, J.Y., Danielson, M.L., Town, M., Derado, G., Greenlund, K.J., Kirley, P.D., Alden, N.B., Yousey-Hindes, K., Anderson, E.J., Ryan, P.A., Kim, S., Lynfield, R., Torres, S.M., Barney, G.R., Bennett, N.M., Sutton, M., Talbot, H.K., Hill, M., Hall, A.J., Fry, A.M., Garg, S., Kim, L. (2020) COVID-NET Surveillance Team. Risk Factors for Coronavirus Disease 2019 (COVID-19)-Associated Hospitalization: COVID-19-Associated Hospitalization Surveillance Network and Behavioral Risk Factor Surveillance System. *Clinical Infectious Diseases*, **2**, e695-e703.
https://doi.org/10.1093/cid/ciaa1419 .

[41] Aidan, V., Davido, B., Mustafic, H., Dinh, A., Mansencal, N. and Fayssoil, A. (2021) Impairment of the Cardiovascular System in Patients with Coronavirus Disease 19. *Annales de Cardiologie et d'Angéiologie*, **70**, 106-115.
https://doi.org/10.1016/j.ancard.2020.11.004

[42] Yahia, F., Zakhama, L. and Abdelaziz, A.B. (2020) COVID-19 and Cardiovascular

Diseases Scoping Review Study. *La Tunisie médicale*, **98**, 12.

[43] Zhou, F., Yu, T., Du, R., Fan, G., Liu, Y., Liu, Z., *et al.* (2020) Clinical Course and Risk Factors for Mortality of Adult Inpatients with COVID-19 in Wuhan, China: A Retrospective Cohort Study. *The Lancet*, **395**, 1054-1062.
https://doi.org/10.1016/S0140-6736(20)30566-3

[44] Risk Factors of Mortality COVID-19.
https://www.contagionlive.com/view/greatest-risk-factors-of-mortality-from-covid-19

[45] Mohammed, M., Muhammad, S., Mohammed, F.Z., Mustapha, S., Sha'aban, A., Sani, N.Y., *et al.* (2020) Risk Factors Associated with Mortality among Patients with Novel Coronavirus Disease (COVID-19) in Africa. *Journal of Racial and Ethnic Health Disparities*, **8**, 1267-1272. https://doi.org/10.1007/s40615-020-00888-3
http://link.springer.com/10.1007/s40615-020-00888-3

[46] Cardiac Involvement Is Very Common and Dramatically Increases Hospital Mortality in COVID-19 Patients.
https://www.cardio-online.fr/Actualites/Revues-de-la-litterature/L-atteinte-cardiaque-est-tres-frequente-et-augmente-considerablement-la-mortalite-hospitaliere-chez-the-COVID-19-patients

[47] The Challenge of the Fight against Noncommunicable Diseases for Human Capital, Economic Growth and the Health of the Working Population.
https://www.banquemondiale.org/fr/news/immersive-story/2020/02/06/tackling-worlds-deadliest-diseases-can-boost-healthy-workforce-and-economic-growth

[48] World Health Organization, United Nations Children's Fund (2020) Healthcare, Awareness Activities and Community Campaigns in the Context of the COVID-19 Pandemic.

[49] Senegalese Society of Cardiology, Ministry of Health and Social Action (2021) Recommendations to Patients with Cardiovascular Diseases during This COVID-19 Epidemic.

[50] Michael R. Bloomberg and Dr Tedros Call for Priority Focus of Global Efforts on the Fight against Noncommunicable Diseases in Order to Save Lives in the Face of COVID-19.
https://www.who.int/fr/news/item/03-02-2021-michael-r.-bloomberg-and-dr-tedros-adhanom-ghebreyesus-call-for-global-focus-on-noncommunicable-diseases-to-save-lives-from-covid-19

Annexe

Survey form:
○ Month and year of the report: …/…
○ Number of discharged patients: ………….
○ Number of deceased patients: ………….
○ Average monthly length of stay: ………….