

Impact of the COVID-19 Pandemic on Patient Attendance and Trends in the Use of Medical Imaging Modalities in a Referral Hospital in the City of Douala, Cameroon

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Abstract

Introduction: The COVID-19 pandemic has led to a massive influx of patients with suspected or confirmed flu to hospitals, paradoxically leading to a decrease in the attendance for some services. This study aspired to assess the impact of the COVID-19 pandemic on the attendance of patients at the Radiology and Medical Imaging Department of a tertiary hospital in Douala, Cameroon. **Materials and Methods:** This was an observational, retrospective and descriptive hospital-based study. Data on patient attendance was extracted from the medical records at the Radiology Unit of Douala Gyneco-Obstetric and Pediatric Hospital (DGOPH) between the 1st of March 2019 and the 30th of August 2021. **Results:** There was a drop in the number of sonographies and conventional radiographies by 25.73% and 18.26% respectively during the peaks pandemic period of 2020 compared to the preceding pre-pandemic era (2019). There was a recovery in 2021 as the numbers increased. Computed tomography studies increased by 40.65% during the peak pandemic period of 2020. **Conclusion:** This study enables us to understand the health-seeking behavior during the COVID-19 pandemic. The increase in CT utilization during the peak period of the pandemic nevertheless required caution in order to ensure safety and to promote rational cost-effective utilization.

Keywords

COVID-19, Impact, Imaging Trends, Radiology Department, Douala

1. Introduction

Since the diagnosis of the first case of the new respiratory viral disease called Coronavirus disease 2019 (COVID-19) in Cameroon, in March 2020 [1], the pandemic spread to the different regions of the country despite awareness campaigns among the population [2]. The outbreak of SARS-CoV-2 infection (severe acute respiratory syndrome coronavirus 2) has led to the implementation of numerous measures by the government of Cameroon from hand hygiene promotion, the mandatory wearing of face masks and social distancing in public offices, the temporary closure of schools and universities, the restriction of displacements to vaccination [3]. Dedicated units for the clinical management of cases of COVID-19 were also created within and out of health facilities in order to deal with the massive influx of patients [4].

Among these different health facilities, several had to hastily make considerable changes to their internal organization, such as changes in the patient circuit and the redistribution of personnel, in order to reinforce certain hospital services that were in great demand [5]. These hospitals also had to comply with the instructions of the health authorities especially with respect to providing of free care for patients suffering from the disease [6].

However, despite all the efforts made to encourage the population to continue using health facilities even during the pandemic we noted a general decrease in hospital admissions was observed [7] [8]. This decrease in patient hospital attendance was reported in other countries [9] and was due to the internal reorganization of services but also mainly to stigma associated with the disease [10].

The course of the COVID-19 pandemic remains unpredictable especially with the emergence of new and more contagious variants [11] and the relative reluctance of the population towards vaccination [12]. It is therefore difficult to rule out a new influx of patients to health facilities, particularly in Radiology units as was the case during the peak of the pandemic in the second quarter of 2020. The aim of this study was to assess the impact of the COVID-19 pandemic on patient attendance and the trends of utilization of imaging modalities at the Radiology and Medical Imaging Department of the Douala Gyneco-Obstetric and Pediatric Hospital (DGOPH). This facility has served as a treatment and vaccination center since the outbreak of the pandemic.

2. Materials and Methods

2.1. Study Design and Period

An observational, retrospective and descriptive study was conducted at a single hospital unit (Radiology). DGOPH is a tertiary-level university-affiliated referral

hospital in the health pyramid of Cameroon. The Radiology Department has state-of-the-art technology including conventional radiography and contrast studies, mammography, ultrasonography and multi-slice computed tomography (CT). The medical records at the Radiology Department were exploited from the 1st of March 2019 to the 30th of August 2021. Ethical clearance for the study was waived. Administrative authorization for data collection was obtained.

2.2. Data Collection

The data collected included the number of standard and specialized radiology examinations, ultrasounds, and CT scans.

2.3. Variables Studied

The variables studied were the number of standard and specialized radiology examinations, ultrasounds, and CT scans performed during a certain period of the year.

A data extraction form was used to collect data from the hard copy registers at the Radiology Unit. Data extracted included the number of patients received at the facility per imaging modality per month over the designated study period. The activities of certain modalities such as mammography were not recorded due to frequent maintenance problems that disrupted the continuity of service.

The statistical data was subdivided into 3 periods which were compared. The first period P1 denoted “pre-pandemic” was from the 1st of March to the 30th of September 2019, corresponding to the period before the onset of the disease. The second period P2 termed “per-pandemic” was from the 1st of March to the 30th of September 2020, corresponding to the first months of disease occurrence in the local health system. The third period P3, denoted as the “post-pandemic” period was from the 1st of March to the 30th of September 2021. Differences in attendance numbers were calculated between P1 and P2 as well as between P2 and P3.

2.4. Statistical Analysis

All statistical analyses were performed using the software Epi info version 12.

3. Results

During the study periods of the past 3 years, we carried out 10,593 combined examinations, which included 5603 ultrasounds, 3570 conventional X-rays, and 1425 scans in our unit.

Table 1 shows the number of ultrasonography examinations carried out during the periods P1, P2, and P3, over the three years concerned. There was a decrease in the number of examinations in 2020 amounting to 516 or 25.73% particularly in the month of May as illustrated in **Figure 1**. In 2021 a complete recovery in activity was noted compared to 2020, with 620 additional examinations or 29.39%. This represents a virtual return to normal pre-pandemic statistics.

The number of conventional radiographic studies also decreased significantly as

summarized in **Table 2** with 233 less examinations or 18.26% decrease in the month of May 2020 (**Figure 2**) compared to the previous year. There was moderate recovery in activity in 2021, with 208 more studies carried out or a 19.94% increase in comparison to the equivalent period in 2020. The resumption of activities objectified in standard X-rays remains lower than the activities of the pre-pandemic period, probably due to a few repeated breakdowns of standard X-ray devices.

Table 1. Distribution of the number of ultrasound examinations from March to September 2019, 2020, and 2021.

Ultrasound	March	April	May	June	July	August	September	Total
P1: 2019	306	313	278	291	305	256	252	2005
P2: 2020	340	170	149	169	189	211	261	1489
P3: 2021	317	297	270	306	306	314	299	2109
Subtotal	963	780	697	766	800	781	812	5599
Variance P1 - P2								-516 (25.73%)
Variance P2 - P3								+620 (29.39%)

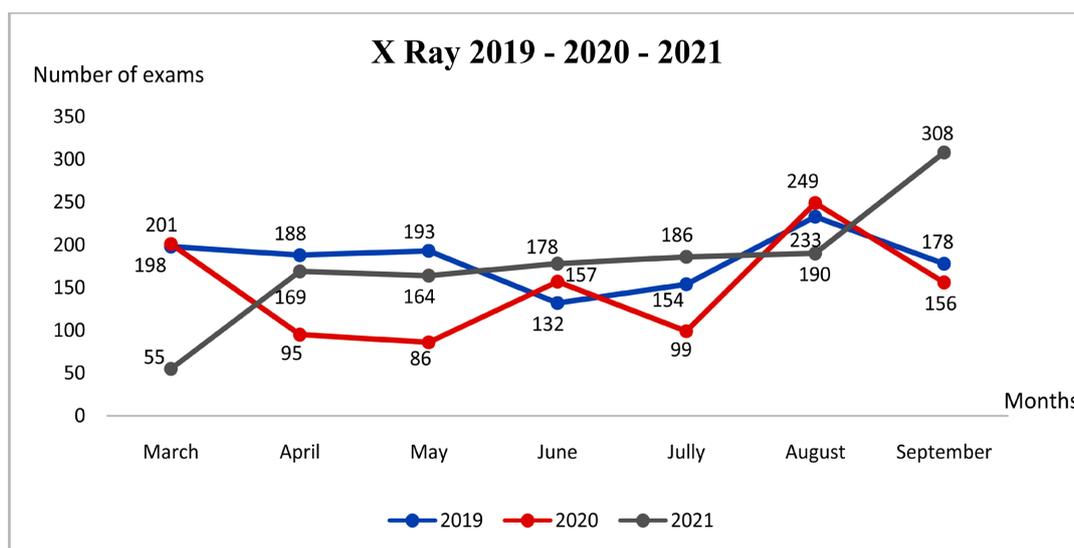


Figure 1. Change in the number of ultrasound examinations from March to September 2019, 2020, and 2021.

Table 2. Distribution of the number of conventional radiology examinations from March to September 2019, 2020, and 2021.

X-ray images	March	April	May	June	July	August	September	Total
2019	198	188	193	132	154	233	178	1276
2020	201	95	86	157	99	249	156	1043
2021	55	169	164	178	186	190	308	1251
Subtotal	454	452	443	467	439	672	642	3569
Variance P1 - P2								-233 (18.26%)
Variance P2 - P3								+208 (19.94%)

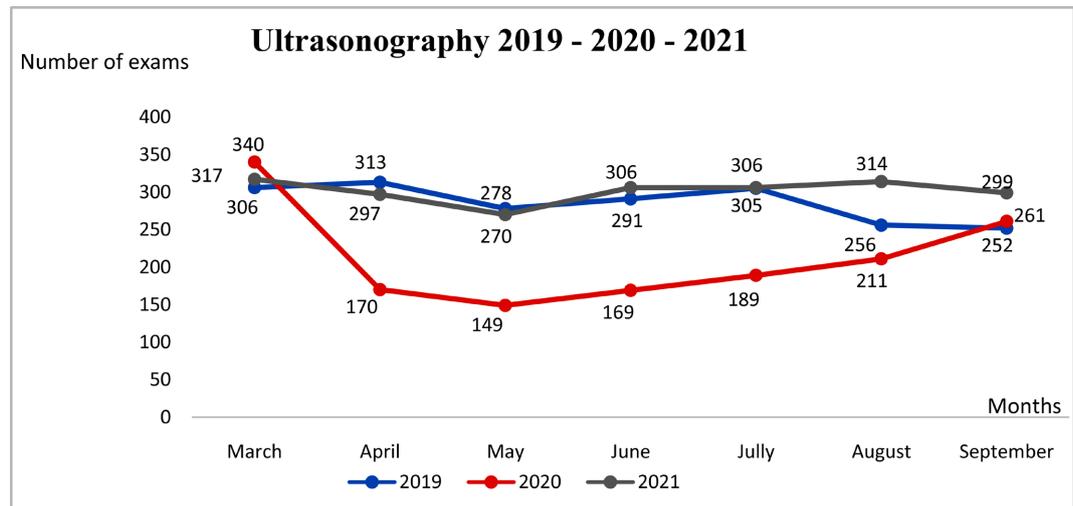


Figure 2. Change in the number of conventional radiology examinations from March to September 2019, 2020, and 2021.

Table 3. Distribution of the number of CT scan examinations from March to September 2019, 2020, and 2021.

CT scan	March	April	May	June	July	August	September	Total
2019	72	73	94	64	58	79	52	492
2020	93	104	141	144	91	71	48	692
2021	0	0	0	0	53	88	100	241
Subtotal	165	177	235	208	202	238	200	1 425
Variance P1 - P2								+200 (40.65%)
Variance P2 - P3								ND

ND: No Determinate.

Table 3 shows the variation in the number of CT scans with a surge of 200 additional studies in 2020 (40.65%), which is very significant in May and even more in June. In 2021 there was a prolonged shutdown for the CT scanner due to equipment breakdown.

It emerges from the analysis of these various tables and **Figure 3** that the month of May 2020 was the month most impacted by the drop in patient attendance of our unit, regarding conventional radiography and ultrasound. This occurred almost 2 months after the diagnosis of the 1st case in Cameroon, on March 6, 2020.

4. Discussion

Although the diagnosis of certainty of COVID-19 is obtained through the Real Time Polymerase Chain Reaction (RT-PCR) test, imaging, particularly the CT scan, has proven indispensable in the management of patients as highlighted by several studies [13]. However despite this relative adoption, our radiology unit experienced significant variations in patient attendance during the peak pandemic

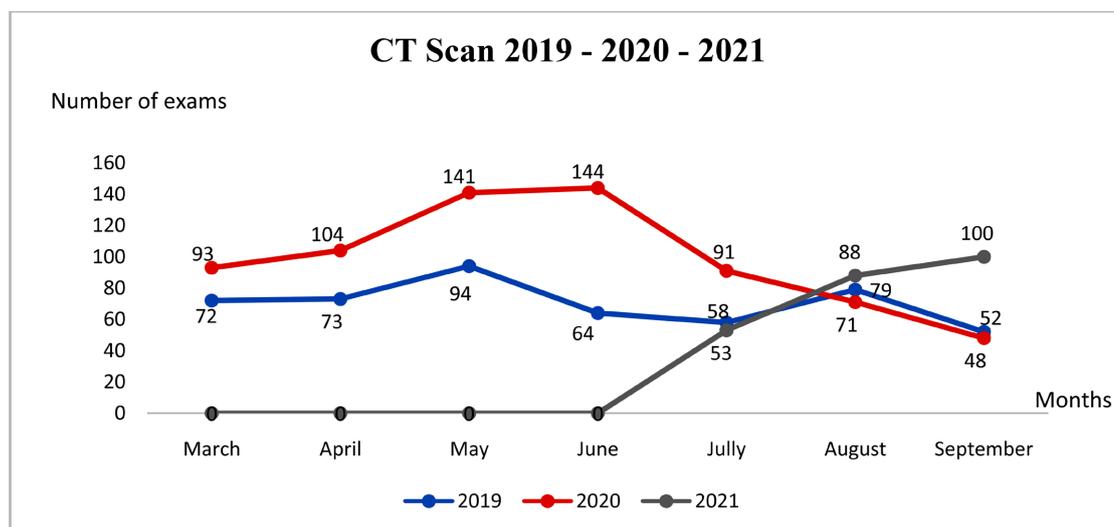


Figure 3. Change in the number of CT scans from March to September 2019, 2020, and 2021.

periods. Nevertheless these variations contrasted with a significant drop in medical procedures observed locally during the period in some other units such as Surgery [14].

This study was carried out at DGOPH which is a structure mainly dedicated to the promotion of the health of women and children. The desertion of health services especially imaging units which are essential for the diagnosis and management of diseases could have repercussions on the health of populations as the World Health Organization (WHO) has reported [7] [8].

A 25% decrease in ultrasonography examinations during the per-pandemic period was observed. This reduction was mainly in obstetrical ultrasounds. These pregnant women might have turned to other structures or contacted other less experienced health personnel, which could have been detrimental, especially for high-risk pregnancies. Moreover, as Abdoulaye *and al.* in Niger reported, all activities contributing to maternal health also experienced a decline in many sub-Saharan African countries [7]. This finding contrasted with that of Nick *and al.* who reported a redistribution of obstetric ultrasonography, probably due to the importance of pregnancy follow-up [15]. It is clear that efforts to raise patient awareness in an epidemic context, especially among pregnant women, could be useful in the management of any future health crisis. Nevertheless, in the course of 2021 the activity regained prominence with a 29.39% increase, and was similar to the performance during the pre-pandemic period. This suggests a virtual return to normal, although the disease continues to plague our environment.

There was a decrease in conventional radiography studies by almost 55% during the peak pandemic period. This decrease in standard radiology acts, and in particular chest X-rays, may seem paradoxical during a pandemic linked to a mainly respiratory condition. However, it is also this pattern was similar to reports from France during the first months of the pandemic, which also estimated

a drop of up to 95% in this modality [16] depending on the region. This downward trend may be explained mainly by the low sensitivity of chest radiography for COVID-19 infection [17]. However, in 2021 despite the recurrent breakdowns of the equipment there was some recovery in activity quantified at 25%. Especially since the other hospital units, whose doctors are the main prescribers of radiology examinations, had resumed service with a gradual resumption of activity and medical procedures.

With respect to CT scan, this was the only imaging modality that witnessed a significant increase during the per-pandemic period of almost 55% compared to the previous year. Diop *et al.* in Senegal reported a moderate decrease in CT use by 24% [13]. This finding could be partially explained by the fact that chest CT was free of charge in the management of suspected or confirmed COVID-19 cases. CT was also routinely used as a “screening tool” in settings where RT-PCT testing was unavailable or there were significant delays in the delivery of test results hence increasing overall CT use [18]. It is important to emphasize that RT PCR tests were not as widely available and popularized during the first months of the pandemic in our environment, and very often clinicians had to make do with Rapid Screening Tests (RDTs). Equipment breakdowns prevented some comparisons from being made and also highlighted the need for preventive maintenance of imaging equipment as earlier reported by Guegang *et al.* [19]. This would allow our hospitals to regularly provide quality care to patients, and also save money in the long term.

Some limitations to this study include its retrospective aspect with investigators having to rely in recorded data on hard copy registers. Also financial data could not be assessed yet financial incentives for health personnel could have an effect on the services provided, patient satisfaction and turnover [10].

5. Conclusion

Through this study the trends in the use of imaging modalities in the context of the COVID-19 pandemic have been highlighted, hence contributing to the understanding of the health-seeking behavior during the COVID-19 pandemic. The increase in CT utilization during peak periods of the pandemic was attributed to its role in the management of confirmed and suspected cases, but this nevertheless requires caution in order to ensure safety and to promote a rational cost-effective utilization.

Authors' Contributions

All authors contributed to the drafting, read and approved the final version of the manuscript.

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Conflicts of Interest

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

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