Trends of follow-up clinic visits and admissions three-months before and during COVID-19 pandemic at Tikur Anbessa specialized hospital, Ethiopia: an interrupted time series analysis

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Abstract

Background: Following the first report of the COVID-19 case in Ethiopia on the 13th of March 2020, the country adopted a lockdown policy to contain the spread of the virus. Responding to the health-care burden imposed by the COVID-19 pandemic had to be coupled with ensuring essential health care services. This study assessed the impact of COVID-19 on the trends of non-COVID follow-up visits and admissions at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia.

Methods: A retrospective, time-series study with the 1st case of COVID-19 report as a reference time examined the trend in follow-up visits and admissions between December 1st, 2019 and May 31st, 2020. A comparison of health care utilization between December 2019 to May 2020 and its equivalent period in 2018/19 was also done. A data abstraction tool was used to collect secondary data from the hospital's electronic medical recordings and logbooks of each unit.

Results: A total of 7,717 visits from eight follow-up clinics and 3,310 admissions were collected during three months before the onset of COVID-19. During the following three months after the pandemic, 4,597 visits and 2,383 admissions were collected. Overall, a 40.4% decrease in follow-up visits and a 28% decline in admissions were observed during the COVID-19. The drop in the daily follow-up visits was observed for both genders. The number of visits in all follow-up clinics in 2019/2020 decreased when compared to the same months in 2018/19($p<0.05$). Follow-up visits were substantially lower for renal patients (-68%), patients with neurologic problems (−53.9%), antiretroviral treatment clinics (−52.3%), cardiac patients (−51.4%). Although pediatric emergency admission was significantly lower (−54.1%) from the

baseline (p=0.04), admissions from the general pediatric and adult wards did not show a significant difference.

Conclusions: Significant decreases in-hospital follow-up clinic visits were observed during the first months of the COVID-19 pandemic. Public health guidance on how best to access care, more for patients with serious illnesses are required. Promoting self-care, alternatives health-care services like home-based care, and phone clinics might be considered for patients with mild symptoms. Further studies needed to track the long-term effect of the pandemic among non-COVID-19 patients.

Keywords: Admission, COVID-19, Ethiopia, Follow-up visit, Health-care utilization, TASH, Trends.

Background

In Ethiopia, the first case of the novel coronavirus disease 2019 (COVID-19) was reported on 13th of March 2020. Ethiopia adopted a lockdown policy to contain the spread of the virus and schools were closed on March 16, 2020 and travel bans were put in place on March 20, 2020. Subsequently stay at home orders were recommended to the public and the country declared a state of emergency on April 8, 2020 (1, 2). Despite efforts to prevent the spread of COVID-19 in Ethiopia, new cases continued to emerge among individuals with travel history and even without clear exposure. The community transmission has been already established and the virus has been distributed to every part of the country. As of November 5th, 2020, the total number of confirmed COVID-19 cases in Ethiopia was 98391, of which 1508 died and 57000 recovered (3, 4). Although the virus was detected in all age groups, severe symptoms were reported mainly in older age groups. People with pre-existing medical conditions such as hypertension, diabetes, and heart disease appear to be more vulnerable to becoming severely ill with COVID-19 (5).

The COVID-19 pandemic continues to challenge the healthcare systems around the world. Responding to the healthcare burden imposed by the pandemic required intense resources. Even more, this had to be coupled with ensuring essential healthcare services (6). Countries struggled to fairly allocate resources for these needs. Hospitals operated with less capacity due to the distribution of resources for COVID-19 prevention, detection, and case management. Some of the care provided in hospitals such as elective surgery and other non-critical medical services were purposefully curtailed (7). In addition, following the initial public health messaging that discouraged unnecessary healthcare use, many patients delayed or canceled follow-up appointments in hospitals (8, 9). The low utilization of emergency services was also evident (10). In Singapore, doctor visits decreased by up to 30% while a massive drop of 63.8% in pediatric

emergency health-care utilization was observed in Germany and a comparable 63.5% reduction in emergency department visits were reported in the U.S. (11-13).

The delayed access or provision of care affected both acute and chronic care (14, 15), and resulted in increased adverse outcomes from non-COVID-19-related illnesses (16, 17). The main reason for the reduced hospital visits was fear of contracting COVID–19 in health-care settings and restricted transports due to social distancing measures (18, 19). However, a reduction in some acute infections that have a person-to-person transmission risk and illnesses related to environmental exposure such as allergens and air pollution as well as traumas was also observed in some settings (14, 20). Furthermore, the application of telemedicine created alternative access to care; partly explaining the reduced number of in-person care (21).

In this study, we assessed the impact of COVID-19 on the trends in hospital visits and admissions at Tikur Anbessa Specialized Hospital (TASH) in Ethiopia. We compared the rate of follow-up clinic visits and admissions for the three months before and after the first report of the COVID-19 case in 2020. In addition, we compared the trends in hospital visits from December 2019 to May 2020 to the equivalent period in the previous year (Dec 2018 to May 2019).

Methods

Setting

This study was conducted at TASH located in Addis Ababa, Ethiopia. TASH serves as a public institute training center with about 700 beds. The hospital serves a large population of patients referred for outpatient and inpatient care in all core specialties (internal medicine, emergency, critical care, surgery, pediatrics and obstetrics/gynecology). The hospital also provides specialized and sub-specialized clinical services to the patients referred from other hospitals and health institutions across all parts of the country. Of the total beds, about 150 are medical (including 12 intensive care unit [ICU] beds), 172 beds are in pediatrics (including 4 pediatric ICU beds). Both adult and pediatric emergency rooms (ER) are open to patient's 24 hours a day and seven days a week. Clinical care teams composed of nursing staff; medical students and residents supervised by attending staff provide all care for in-patients. TASH started to have functional electronic database recording system for most of the adult clinics since 2018; however, the health records from pediatrics and some clinics from adult side were still paper-based recordings.

Study design and period

A retrospective time series study was conducted to collect daily follow-up visits, and monthly admissions data at TASH between December 1st, 2019 and May 31st, 2020. A before-after study was done to analyze the trend in daily follow-up visits and monthly admissions with the 1st case of COVID-19 report (March 13th 2020) as a cut of point. We also compared health care utilization, between December 2019 to May 2020 and its equivalent period in 2018/19. A quantitative method using structured data abstraction tools was used to collect the data. Data abstraction was conducted from May to June 30, 2020.

Data collection and procedures

A study team comprised of clinicians and public health experts developed a data abstraction tool after reviewing the available literature. We collected secondary data during the selected periods from the hospital's Health Management Information System (HMIS) and logbooks in each outpatient clinic, emergency/casualty department, and wards of TASH. A one-day training to data collectors was conducted on the data collection tools and procedures. Trained nurses from each unit collected data that were collected as part of the routine hospital service. Eight outpatient follow-up clinics (4 adult and 4 pediatric clinics) were included. These clinics were selected based on the availability of the documentation of the required information. In addition, both adult and pediatric inpatient wards were included. The main outcome variables were daily follow-up visits and monthly hospital admissions of adult and pediatric wards.

Inclusion/Exclusion

Follow-up clinics visits, and admissions, between December 1st, 2019, and May 31st, 2020 as well as previous year follow-up clinics visits, and admissions between December 1st, 2018 and May 31st 2019 were included in this study. Clinics with incomplete documentation were excluded

Statistical analysis

All data were entered into a password-secured database using Microsoft Excel. After cleaning the data were exported to STATA version 14. We analyzed the trend of daily follow-up visits and monthly hospital admissions. Data were summarized using graphs; mean (standard error of mean [SEM])). Wilcoxon Signed-Ranks test was used to detect mean differences of 2018/19 and 2019/20 trend of the follow up visits and ward admission differences. P-value below 0.05 was considered as significant.

Ethical consideration

The study was granted ethical approval from the Institutional Review Board (IRB) of the College of Health Sciences, Addis Ababa University (Protocol Number:042/20/SPH). Informed consent was waived by the IRB, which approved the study. All personnel involved in this study trained in infection prevention and control procedures (standard contact, droplet or airborne precautions). Data were completely anonymous. All methods were carried out in accordance with relevant guidelines and regulations.

Results

Overall, 12,314 follow-up visits and 5,693 hospital admissions solely non-COVID-19 data were collected. Taking 1st case of COVID-19 report in country as a cut of, 7,717 follow-up visits happened before (3 months) and the rest 4,597 follow-up visits after (3 months). Separately, 3,310 hospital admissions before (3 months) and 2,383 admissions after (3 months) of the 1st case of COVID-19 report was collected **(Table 1).** Similarly, 15, 583 follow-up visits and 6,639 hospital admissions solely non-COVID-19 data of last year of the same time also collected. The decrease in follow-up clinic visits and admissions after the onset of COVID-19 was 40.4% and 28%, respectively. We observed variations in the number of visits and admissions across the follow-up clinics and inpatient wards. Follow-up visits were substantially lower for renal patients (−68% below baseline), patients with neurologic problems (−53.9%), Anti-retroviral treatment clinics (−52.3%), cardiac patient (−51.4%t). Although, pediatric emergency admission was significantly lower (−54.1%) from the baseline, admissions from the general pediatric (-14.7%) and adult (-6.9%) wards were not that much affected**.**

Table 1. Number of follow-up visits and admissions before and during COVID-19, and percentage reduction, TASH, 2020

Characteristics	Pre-COVID-19			Total	During-COVID-19			Total	*Percent (%) reduction
	Dec	Jan	Feb		Mar	Apr	May		
Follow-up clinics									
Neurology	599	643	467	1709	275	265	247	787	-53.9
Cardiac	511	618	422	1551	288	260	206	754	-51.4
Hema. - Oncology	481	525	582	1588	449	460	465	1374	-13.5
Pediatric - ART	296	337	264	897	127	152	149	428	-52.3
Endocrine	251	238	269	758	222	205	139	566	-25.3
HRIC	226	110	196	532	125	130	133	388	-27.1
Renal	123	128	124	375	38	40	42	120	-68.0
Gastro-intestinal	110	71	126	307	88	58	34	180	-41.4
2019/20 (Overall visit) Total	**2597**	**2670**	**2450**	**7717**	**1612**	**1570**	**1415**	**4597**	**-40.4**
2019/20 (Ped. ER admission)	406	421	398	1225	200	212	150	562	-54.1
2019/20 (Ped. Ward admission)	532	535	469	1536	460	480	370	1310	-14.7
2019/20 (Adult ward admission)	173	181	195	549	185	164	162	511	-6.9
Overall admission	**1111**	**1137**	**1062**	**3310**	**845**	**856**	**682**	**2383**	**-28.0**

*****Percentage Changes in follow-up clinics visits & admission

In total, 131observation (daily working days hospital follow up visits in six months) occurred at TASH during the analyzed period with 66 before and 65 after first COVID-19 case seen in Ethiopia. We described the daily mean and standard error of mean separately for male and female who visited outpatient clinics three months before and after the first report of COVID-19 case reported in Ethiopia. There were statistically significant declines in the number of daily visits in all follow-up clinics except the Endocrine and GI clinics **(Table 2).**

Table 2. Comparison of number of outpatient visits by gender before and after the first case of COVID-19, TASH, 2020

Clinics	Average daily visits 3months before 1st COVID case		Average daily visits 3months after 1st COVID		*P*-value
	Daily mean (±SEM)	95% CI	Daily mean (±SEM)	95% CI	
***ART clinic**					
Male	13.8 (0.7)	12.3-15.2	12.2(0.8)	10.5-13.8	0.07
Female	23.6(1.0)	21.5-25.6	19.7(1.3)	17.1-22.3	0.01
Cardiac clinic					
Male	24.5(2.4)	19.8-29.3	11.8(1.7)	8.3-15.2	0.00
Female	37.2 (3.6)	30.0-44.6	17.1(2.4)	12.3-21.8	0.00
Chest clinic					
Male	13.2 (1.5)	10.1-16.2	7.0(1.0)	5.0-9.0	0.00
Female	12.8 (1.6)	9.6-15.9	8.5(1.3)	6.0-11.0	0.02
Endocrine clinic					
Male	19.0 (3.1)	12.7-25.3	15.1(2.5)	9.9-20.1	0.16
Female	23.9 (3.9)	16.0-31.7	17.5(2.9)	11.6-23.4	0.09
# GI clinic					
Male	2.0(0.4)	1.3-2.8	1.5(0.3)	0.8-2.1	0.13
Female	1.2(0.2)	0.8-1.7	0.7(0.2)	0.4-1.1	0.05
$ HRIC clinic					
Male	3.3 (0.2)	2.9-3.8	2.0(0.2)	1.7-2.3	0.00
Female	2.8 (0.2)	2.3-3.2	1.9(0.2)	1.6-2.4	0.00
Neurology clinic					
Male	18.7 (1.0)	16.7-20.7	10.7(0.7)	9.3-12.1	0.00
Female	11.8 (0.7)	10.5-13.2	6.2(0.4)	5.3-7.0	0.00

***ART=Anti Retroviral Treatment, #GI=Gastro-Intestinal, $HRIC=High Risk Infant Clinic**

The trend for six-month daily attendance by male and female patients from two follow-up clinics (Cardiac and ART) at TASH is illustrated in (**Fig 1).** The clinics were selected since these clinics had daily follow-up throughout the week over the observation period. There was a sharp drop in the daily hospital visits for both genders after mid-March, when the first COVID-19 case was reported. Hospital visit did not rebound to the baseline observation period by the end of May 2020.

Figure 1. Trends in the number of daily follow-up visits from selected clinics by gender from December 2019 to May 2020

Figure 2 shows the total number of follow-up visits and admissions for six months of Dec 2019-May 2020 compared with the same period of last year (2018/19). The number of visits at the follow up clinics decreased when compared to the same time period in 2018/19. Ward admissions at TASH decreased after the month of February, however the trend is not similar with the follow-up clinics.

Figure 2. Trends in the number of daily follow-up visits from selected clinics by gender from December 2019 to May 2020

Figure 3 depicted follow up clinics visits separately. In 2019/20, the number of visits at the follow up clinics decreased when compared to the same time period in 2018/19. The relative reduction in monthly follow-up visits was observed in all clinics, except endocrine and hematology- oncology clinics.

Figure 3: Monthly follow-up visits, December 2019 to May 2020 relative to equivalent period in 2018/19.

The trend of admissions in the pediatric emergency between December 1st, 2019, and May 31st, 2020 is illustrated in **Figure 4.** The monthly report of the number of children who were admitted to the pediatrics Emergency room (ER) showed a significant drop in the month of March and there was no rebound in the month of May **(p=0.04**).

Figure 4: Pediatric ER Admission, December 2019 to May 2020 relative to equivalent period in 2018/19.

Figure 5a and 5b illustrate the monthly pediatrics and adult ward admissions and deaths respectively. Pediatrics ward admissions at TASH decreased since the month of February, with the highest drop observed in the month of May 2020. However the difference was not statistically significant **(p=0.34)**. Adult medical admissions did not show any difference in 2020 compared to the previous year **(P=0.12).**

Figure 5a **Figure 5b**

Figure 5a and 5b: Pediatrics and adult ward admissions, December 2019 to May 2020 relative to equivalent period in 2018/19.

Discussion

This study demonstrated a significant decrease in follow-up clinics visits and emergency admissions during the first three months of the COVID-19 pandemic in a tertiary care center in Ethiopia. Furthermore, the case numbers in follow-up clinics during the observed period decreased when compared to the same time in 2018/19. However, the number of children who were admitted to the pediatrics and adult wards didn't show significant difference in the months following March.

The decline in the number of overall visits was consistent with the reports from a study in the U.S. where a decline of 0.7 million non- COVID admissions in April 2020 compared to April 2019 was demonstrated in hospitals across the nation (20). The decline in non-COVID admissions ranged from 39.5% to 50% in the minimally affected to greatly affected regions respectively.

Similar studies revealed that the decrease was observed in both primary health care and emergency department visits (17, 22). Moreover, these findings were true for pediatric and adult populations across specialty clinics (23-25).

Ethiopia, compared to other countries that had significant surge of COVID-19 cases in the first months of 2020, reported fewer cases. However, as a measure of prevention of the spread of the COVID-19 virus in the hospital and effective case management, hospitals were designated as COVID-19 and non-COVID-19 case management centers. TASH was among the designated non-COVID-19 case management centers, patients who were suspected to have COVID-19, were isolated in a ward and those whose tests confirmed the diagnosis of COVID-19 were transferred out to COVID-19 centers. However, considering the overcrowding and the limited use of personal protective equipment at TASH the anxiety associated with being at an increased risk in this setting was understandable. The fear of contracting COVID-19 in the health-care settings was the commonest explanation for the drop in hospital visits (7, 13). Moreover, the testing capacity at institutions and in the country at large was poor to support prevention of transmission. The communication of alarming medical information to the public and the announcement of stay at home order, have also impacted health care seeking behavior.

Being a referral hospital, it was believed that patients who were on follow-up and those visiting the emergency department of TASH often have a real need that requires hospital management. In such situations, people opted for a conservative, ‘watch and wait’ approach (7) while some might have resorted to traditional medicine, as it is a common cultural alternative in Ethiopia. The delay in seeking appropriate health care will have deleterious health outcomes (12). Few outpatient departments had phone clinics that provided an alternative for accessing health care. A compelling contrary argument for the decreased hospital visit was a reduced incidence of illnesses

such as community-acquired pneumonia, which was a reason for most of the pediatric ED visits and in adult patients with co-morbidities (13, 23).

Looking at the number of children who were admitted to the pediatrics and adult wards showed overall decline −28, which is lower with the report from U.S where all medical admissions in April declined by 34.1 percent (95% CI: −34.6, −33.6) (20). We can still consider the drop in admission is significant since TASH is a big hospital/ward where usually all beds were occupied.

The impact of COVID-19 on health care resource is huge in the world and more so in low-income countries. Ethiopia being among the low-income countries struggles to adequately allocate human resource, support community-based testing capacity, and provide equipment needed to manage COVID- 19 cases. It is wise to consider that the attempt to respond to the COVID-19 pandemic has compromised the attention given for non-COVID illnesses, which might be a reason for admission declines to reserve beds for possible anticipated surge (13).

Limitations

We abstracted a secondary data, and the data were not crosschecked. We took data from the clinics not from individuals therefore we did not do subgroup analysis except by sex. The data in the hospital was not collected for scientific purposes and poor documentation was the reality in our setting so there may be cases that were not documented (missed). TASH is a referral center, and the service was structured according to sub-specialty/specialty clinics so these findings might not be generalized to primary health care and other health care systems.

Conclusion

A significant decrease in follow-up clinics visit and emergency admissions was observed during the first months of the COVID-19 pandemic. Appropriate public health guidance on how best to access care emphasizing on the importance of continuing to visit the health-care facilities for

serious illnesses is required. Promoting of self-care, implementing of home care and strengthening of phone clinics might be considered for patient with mild symptoms. Further studies needed to track the long-term effect of the pandemic among non-COVID-19 patients.

Declarations

Consent for publication

Not applicable

Availability of data and material: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests: We declare that we have no competing interest

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Author Contributions

WA, AW, W. Amogne and WD conceived and designed the study. WA, TM, TH, DM and AH supervised data collection. WA and NT prepared the final dataset for analysis. WA and AW analyzed and interpreted the data. WA and NT drafted the manuscript. WD, AW and TM provided major roles in revising the manuscript. All authors read and approved the final manuscript.

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