Impact of COVID-19 and mitigation plans on essential health services: institutional experience of a hospital in Ethiopia

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Abstract

Background: Health systems around the world are being challenged by an on-going COVID-19 pandemic. The COVID-19 pandemic and associated response can have a significant downstream effect on access to routine health care services, and indirectly cause morbidity and mortality from causes other than the disease itself, especially in resource-poor countries such as Ethiopia. This study aimed to explore the impact of the pandemic on these services and measures taken to combat the effect.

Methods: The study was conducted at St. Paul’s hospital millennium medical college (SPHMMC) from December 15, 2020 to January 15, 2021 using a comparative cross-sectional study design. We collected data on the number of clients getting different essential health care services from May to October 2019 (Pre COVID) and the same period in 2020 (during a COVID-19 pandemic) from the patient registry book. The analysis was done with SPSS version 24 software.

Result: Overall, the essential services of SPHMMC were affected by the COVID-19 pandemic. The most affected service is inpatient admission, which showed a 73.3% (2044 to 682) reduction from the pre-COVID period and the least affected is maternal service, which only decreased by 13% (3671 to 3177). During the 6 months after the COVID-19 pandemic, there was a progressive increment in the number of clients getting essential health services.

Conclusion and recommendation: The establishment of a triple setup for fighting against COVID-19, which encompasses non-COVID services, an isolation center and a COVID-19 treatment center, played a vital role in preserving essential health services.

Keywords: Essential health services, Triple setup, COVID-19, SPHMMC, Ethiopia

Introduction

The outbreak of pneumonia of an unknown ethology was reported in December 2019 in Wuhan, Hubei Province, China [1]. Following this, a novel coronavirus, coronavirus disease 2019 (COVID-19), was identified as the causative virus for the pandemic in China and other parts of the world by the World Health Organization (WHO) [2].

As of March 25, 2021, more than 235 countries/territories are affected with more than 120,383,289 cases and 2,666,916 deaths were recorded worldwide. In Africa, 57 countries/territories were affected by more than 4,124,997 COVID-19 cases and more than 109,586 deaths were reported across the continent. On March 13, 2020 a COVID-19 positive case was first reported in Ethiopia. As of March 25, 2021, a total of 187,365 confirmed COVID-19 cases and 2657 deaths were recorded in the country [3].
The supply and demand for health care services have been shown to affect access to these services in the past. Patients may be hesitant to seek treatment because they believe health facilities are infected, or they have doubts about the competence of health care providers to implement adequate infection prevention and control procedures. When health systems are overburdened by outbreaks, people may be unable to get the care they need, resulting in an increase in the number of deaths from COVID-19-related and non-COVID-19 causes [4–6].

Many countries are struggling to strike a balance between COVID 19-related initiatives and the necessity to continue providing other critical health services. Many routine and optional services have been halted, and new techniques are being developed in response to the changing pandemic situation [7].

A country’s ability to maintain the supply of basic health care is determined by a number of factors. These are baseline health system capacity, illness burden, and COVID-19 transmission locally [8].

The Ethiopian essential health service package includes reproductive, maternal, neonatal, child, and adolescent health services; major communicable diseases; non-communicable diseases; surgical care; and emergency and critical care [9].

The Ebola outbreak in 2014–2015 resulted in an 18% drop in average health-care utilization. The decline was even greater for maternity and children’s health services, such as facility-based deliveries, which fell by 28%. The number of deaths from measles, malaria, HIV/AIDS, and tuberculosis has increased. Which was attributable to health system failures to provide those services [10–12].

Studies done in 22 hospitals in France (a country that has been struck early and with a high intensity by the COVID-19 wave) showed a 26% decline in all emergency department visits, including a decrease of 34% in strokes, 32% in transitory ischemic attacks, 64% in unstable angina, 42% in appendicitis and 36% in seizures [13, 14].

According to Global finance faculty prediction in Ethiopia there will be 238,000 women without access to facility-based deliveries, 15% percent increase child mortality and 8% increase in maternal mortality over the next year, due to the compromise in all essential services [15].

A study done in Switzerland showed a 43% decrease in elective visceral surgical procedures was observed after Covid-19 (295 vs. 165, p < 0.01), while emergency operations (all specialties) decreased by 39% (1476 vs. 897, p < 0.01). Fifty-two and 38 major oncological surgeries were performed, respectively, representing a 27% decrease (p < 0.316). Outpatient consultations dropped by 59%, from 728 to 296 (p < 0.01) [16].

**Methods**

**Study setting and design**

This comparative cross-sectional study was conducted on December 15, 2020 to January 15, 2021 at St. Paul’s Hospital Millennium Medical College (SPHMMC), the second largest hospital in Ethiopia located in Addis Ababa. Established in 1969, the hospital provides different medical care services to an estimated 1,000,000 people every year [17].

**Data collection and procedure**

We collected data on the number of clients attending different essential health care services from patient registry books in different service areas of the hospital from May 1st to October 31, 2019 and from May 1st to October 31, 2020. Aggregate data that was collected during the emergence of the COVID-19 pandemic was compared with the number of visits in the same six months of the previous year (pre-COVID). Data collectors also asked interview questions and observed service areas of the hospital.

**Data analysis**

Data was coded, entered and cleaned using the SPSS version 24 software package by the principal investigator. Simple descriptive statistics such as frequency distribution were done as appropriate and the results were presented in tables and graphs.

**Results**

Taking an average of six months from (COVID) season to (pre-COVID) season, this study analyzed the impact of the COVID-19 pandemic on six essential services provided at SPHMMC. Outpatient visits fell by 57% from pre-covid to post-covid (37,739 to 16,121) (p < 0.0126) (Table 3). From 13,888 to 6489 (53.27%), 6431 to 3000 (53.35%), 2112 to 1006 (52.37%), and 1460 to 647 (55.68%), respectively, the average number of patients visiting medical, surgical, pediatrics, and psychiatry average outpatient visits decreased by more than half compared to the same period the previous year.

During the COVID season, the average number of patients attending emergency departments decreased by 47% (4190 to 2204) (p < 0.0420) (Table 3). Patient visits to pediatric and adult emergency departments decreased by 70% from pre-COVID levels (from 554 to 164) and (1526 to 485) respectively. On average, the number of patients accessing our trauma wing, Addis Ababa Burn, Emergency, and Trauma Hospital (AaBET Hospital), decreased by 45% (966 to 527) per month (Tables 1 & 2).

Family planning services decreased by 47% (440 to 233) whereas dialysis services decreased by 53% (144 to 68) during the COVID season as compared to a similar
| Essential healthcare type | May 2019 | June 2019 | July 2019 | August 2019 | September 2019 | October 2019 | Monthly average |
|--------------------------|----------|-----------|-----------|-------------|---------------|--------------|----------------|
| **Outpatient services**  |          |           |           |             |               |              |                |
| Internal Medicine        | 12,413   | 15,627    | 13,913    | 15,775      | 12,008        | 13,596       | 13,888         |
| Surgery                  | 5605     | 6650      | 5780      | 6805        | 7925          | 5821         | 6431           |
| Gynaecology              | 3400     | 3765      | 3199      | 3412        | 3156          | 2808         | 3620           |
| Dermatology              | 1027     | 1217      | 1180      | 1104        | 1648          | 1432         | 1268           |
| Dental & Maxillofacial   | 888      | 930       | 1890      | 1756        | 1596          | 1049         | 1351           |
| Ophthalmology            | 7102     | 3651      | 3110      | 4438        | 4606          | 4713         | 4603           |
| Psychiatry               | 1450     | 1289      | 1181      | 1510        | 1696          | 1637         | 1460           |
| Ear Nose & Throat (ENT)  | 1330     | 1596      | 1867      | 1814        | 1706          | 1598         | 1651           |
| Renal Transplant         | 242      | 216       | 240       | 223         | 853           | 195          | 328            |
| Palliative care          | 6        | 5         | 6         | 4           | 4             | 5            |                |
| Oncology                 | 1182     | 1071      | 915       | 1007        | 1038          | 920          | 1022           |
| Pediatrics               | 1749     | 2059      | 2235      | 2055        | 2188          | 2389         | 2112           |
| **Emergency services**   |          |           |           |             |               |              |                |
| Pediatrics Emergency     | 503      | 610       | 499       | 579         | 549           | 554          | 554            |
| Adult Emergency          | 1330     | 1255      | 1217      | 1348        | 2815          | 1193         | 1526           |
| Gynaecology Emergency    | 929      | 1346      | 997       | 979         | 1462          | 1156         | 1144           |
| AaBET Emergency          | 948      | 1018      | 954       | 997         | 1223          | 658          | 966            |
| **Other services**        |          |           |           |             |               |              |                |
| Family planning          | 276      | 541       | 426       | 416         | 551           | 435          | 440            |
| Cervical cancer screening| 14       | 14        | 22        | 12          | 17            | 16           | 16             |
| Voluntary Counselling & Testing | 49   | 69        | 79        | 82          | 69            | 47           | 67             |
| Post Exposure Prophylaxis| 5        | 15        | 10        | 10          | 15            | 4            | 10             |
| Dialysis                 | 95       | 95        | 93        | 92          | 413           | 81           | 144            |
| **Maternal Service**     |          |           |           |             |               |              |                |
| Spontaneous Vaginal Delivery | 495  | 530       | 502       | 474         | 532           | 499          | 505            |
| Instrumental delivery    | 41       | 70        | 65        | 54          | 73            | 59           | 60             |
| Caesarean section        | 303      | 370       | 384       | 368         | 394           | 393          | 368            |
| Maternal death           | 1        | 1         | 0         | 0           | 0             | 0            | –              |
| Antenatal care           | 739      | 1124      | 2531      | 2592        | 2868          | 2652         | 2084           |
| Postnatal care           | 503      | 516       | 552       | 668         | 880           | 702          | 636            |
| **Surgical Service**     |          |           |           |             |               |              |                |
| Emergency surgery        | 138      | 329       | 248       | 253         | 273           | 286          | 254            |
| Elective surgery         | 243      | 446       | 399       | 393         | 405           | 423          | 384            |
| **Inpatient Service**    |          |           |           |             |               |              |                |
| Surgical ward            | 330      | 370       | 366       | 336         | 378           | 349          | 355            |
| Medical ward             | 83       | 91        | 89        | 92          | 94            | 55           | 84             |
| Pediatrics ward          | 55       | 82        | 73        | 67          | 68            | 65           | 68             |
| Maternity ward           | 452      | 464       | 523       | 515         | 571           | 456          | 497            |
| Gynaecology ward         | 108      | 141       | 161       | 131         | 175           | 209          | 154            |
| *Others                  | 662      | 891       | 889       | 833         | 1183          | 862          | 886            |
| **Total inpatient admission** | 1690 | 2039     | 2101     | 1974        | 2469          | 1996         | 2044           |

*Others: Dental & Maxillofacial, Ophthalmology, Psychiatry, ENT, ICU and Renal Transplant
Table 2 Number of visits to essential healthcare–delivering units in SPHMMC (from May 1 to October 31, 2020)

| Essential healthcare type | May 2020 | June 2020 | July 2020 | August 2020 | September 2020 | October 2020 | Monthly average |
|---------------------------|----------|-----------|-----------|-------------|----------------|--------------|----------------|
| **Outpatient services**   |          |           |           |             |                 |              |                |
| Internal Medicine         | 3297     | 6172      | 6497      | 7010        | 8141           | 7820         | 6489           |
| Surgery                   | 2551     | 2255      | 2254      | 3235        | 3725           | 3976         | 3000           |
| Gynaecology               | 769      | 866       | 890       | 1128        | 1502           | 1477         | 1105           |
| Dermatology               | 0        | 58        | 186       | 326         | 475            | 686          | 289            |
| Dental & Maxillofacial    | 252      | 169       | 184       | 242         | 388            | 711          | 324            |
| Ophthalmology             | 232      | 494       | 928       | 1696        | 2495           | 3572         | 1569           |
| Psychiatry                | 602      | 598       | 615       | 697         | 594            | 777          | 647            |
| Ear Nose & Throat (ENT)   | 0        | 234       | 510       | 629         | 879            | 1078         | 555            |
| Renal Transplant          | 170      | 270       | 267       | 259         | 333            | 350          | 275            |
| Palliative care           | 1        | 0         | 2         | 3           | 4              | 4            | 3              |
| Oncology                  | 538      | 804       | 832       | 1016        | 1075           | 987          | 879            |
| Pediatrics                | 473      | 418       | 917       | 690         | 2168           | 1373         | 1006           |
| **Emergency services**    |          |           |           |             |                 |              |                |
| Pediatrics Emergency      | 173      | 116       | 172       | 187         | 254            | 205          | 164            |
| Adult Emergency           | 426      | 400       | 554       | 571         | 701            | 694          | 485            |
| Gynaecology Emergency     | 1063     | 1002      | 879       | 1004        | 1135           | 1064         | 1028           |
| AaBET Emergency           | 629      | 538       | 260       | 372         | 595            | 431          | 527            |
| **Other services**        |          |           |           |             |                 |              |                |
| Family planning           | 220      | 178       | 298       | 230         | 286            | 265          | 223            |
| Cervical cancer screening | 1        | 0         | –         | –           | 17             | 16           | 6              |
| Voluntary Counselling & Testing | 0 | 0 | 6 | 77 | 4 | 0 | 14 |
| Post Exposure Prophylaxis | 0        | 1         | –         | 15          | 0              | 0            | 3              |
| Dialysis                  | –        | –         | 206       | 194         | 211            | 200          | 68             |
| **Maternal Service**      |          |           |           |             |                 |              |                |
| Spontaneous Vaginal Delivery | 443     | 537       | 442       | 291         | 529            | 528          | 462            |
| Instrumental delivery     | 45       | 38        | 33        | 33          | 47             | 252          | 37             |
| Caesarean section         | 372      | 347       | 356       | 356         | 426            | 399          | 376            |
| Maternal death            | 0        | 0         | 0         | 1           | 1              | 0            | –              |
| Antenatal care            | 1860     | 2235      | 1605      | 1352        | 1119           | 1307         | 1746           |
| Postnatal care            | 384      | 520       | 558       | 509         | 880            | 427          | 546            |
| **Surgical Service**      |          |           |           |             |                 |              |                |
| Emergency surgery         | 203      | 148       | 209       | 192         | 270            | 245          | 193            |
| Elective surgery          | 142      | 133       | 181       | 190         | 206            | 344          | 168            |
| **Inpatient Service**     |          |           |           |             |                 |              |                |
| Surgical ward             | –        | –         | 130       | 145         | 230            | 261          | 128            |
| Medical ward              | –        | –         | 76        | 72          | 81             | 66           | 49             |
| Pediatrics ward           | –        | –         | 74        | 75          | 73             | 70           | 49             |
| Maternity ward            | –        | –         | 491       | 503         | 607            | 524          | 354            |
| Gynaecology ward          | –        | –         | 114       | 127         | 162            | 142          | 91             |
| *Others                   | 211      | 166       | 828       | 524         | 648            | 650          | 504            |
| **Total inpatient admission** | 211 | 166 | 1713 | 1446 | 1801 | 1713 | 682 |

*Others: Dental & Maxillofacial, Ophthalmology, Psychiatry, ENT, ICU and Renal Transplant
six-month period prior to the emergence of the COVID-19 pandemic.

When compared to other essential health services, maternal services were the least affected, with only a 13% decrease (3671 to 3167). The average number of mothers attending antenatal visits decreased by 15% (2084 to 1746), while postnatal visits decreased by 16%. In terms of facility birth services, spontaneous vaginal deliveries fell by 9% (505 to 462) and instrumental deliveries fell by one-third (60 to 37), whereas the number of caesarean sections performed increased somewhat during the COVID-19 pandemic (Tables 1 & 2).

The average number of emergency surgeries done during the COVID-19 pandemic showed a 24% reduction (254 to 193), whereas the average number of elective surgeries decreased by 56.3% (384 to 168) as compared to a similar six-month period in the pre-COVID year. The most affected service by the COVID-19 pandemic is inpatient admissions, which showed a 73% (2044 to 682) reduction from a similar six month period prior to the COVID-19 emergence and a prominent effect on surgical admissions, decreasing by 64% (355 to 128) (Tables 1 & 2).

Regarding the number of patients visiting SPHMMC during the consecutive six months after the emergence of COVID-19 in Ethiopia, there is an overall increment. The number of patients visiting outpatient departments increased by 61% (8885 to 22,811), whereas visits to different emergency departments increased by 5% (2291 to 2394) over a period of six months. The number of surgeries (both elective & emergency) has increased by 41% (345 to 589), whereas inpatient admissions by 88% (211 to 1713). Unlike the overall increment, maternal services decreased by 13% (3104 to 2686) (Figs. 1 & 2).

**Discussion**

Overall, the essential services of SPHMMC were affected by the COVID-19 pandemic. In maternity and emergency services, a higher number of clients were provided than predicted by the Ethiopian Federal Ministry of Health. This could be due to the lack of limits on maternity and emergency care, as opposed to other non-emergent services that were stopped completely or partially in the early stages of the pandemic to reduce COVID-19 transmission. The institution took various actions using different social media platforms, mainstream media such as television channels, and distributing information via a free call center, the hospital continues to raise awareness of COVID-19 symptoms, prevention measures, and what to do if customers have symptoms or worries.

The hospital has devised a three-pronged strategy for combating COVID-19, including non-COVID services, an isolation facility for suspect patients, and a COVID-19 treatment center with its own personnel and restricted space for confirming patients. Different teams (sample team, ambulance team, Personal Protective Equipment (PPE) quantification team, infection prevention and control (IPC) team, safety & quality team specialized to COVID-19 isolation and treatment center) were organized in addition to the triple arrangement. This makes early testing and notification of suspect patient results easier and more convenient, as well as contact tracing, patient transfer, rational use and supply of PPE, and the availability of standard and transmission-based precaution facilities, all of which help to ensure that proper IPC measures were taken and maintained, as well as that the services delivered are of the expected quality. In addition to the aforementioned procedures, a task force unit made up of hospital executives and key individuals in charge of various service areas and units that directly or indirectly affect COVID-19 service was formed. This task force is in charge of overcoming obstacles, making crucial choices, and developing strategies.
When comparing the findings of this study to those of other similar studies, studies conducted in 22 French hospitals revealed a 26% reduction in all emergency department visits [9, 13]. In comparison to the pre-COVID era, this study found a 47% decrease in the percentage of patients attending all emergency departments of the hospital. COVID 19 occurrences had a significant relationship with a decrease in the number of patients visiting the emergency department ($P > 0.0420$) (Table 3).

The attendance for the three-month period from March to May 2020 (COVID period) in Ireland’s pediatric emergency department was 21,545. From 39,772 in the same period in 2018/2019, there was a 46% reduction [18]. This study in the pediatric emergency department yielded a substantially higher result. During the COVID period, attendance plummeted by 70% from 554 to 164 patients in average.

Our findings show that maternal services declined by 13% (3671 to 3177), which is similar to the Population Foundation of India’s projection of a 10% drop in coverage of pregnancy-related services [19]. However, when contrasted to the findings from the Ebola outbreak in 2014 and 2015, where facility-based deliveries plummeted by 28%, this study shows better maternal service attendance [10].

Maternal death was anticipated to rise by 8% in 2020 after the outbreak of this pandemic [14] by global finance professors, however our research found no increase in maternal mortality when compared to the same period previous to the outbreak.

In a study conducted in Switzerland, urgent operations were shown to have decreased by 39% (all specialties, 1476 vs. 897, $p < 0.001$) [15]. Our research yielded a more positive result. During the COVID-19 pandemic, there was a 24% decline in the number of emergency surgeries performed. It is evident that having a separate isolation surgical room and performing emergency procedures regardless of the patient’s COVID-19 result while maintaining the appropriate IPC precautions will result in this.

Regarding elective visceral surgeries, the study in Switzerland showed a 43% reduction after the emergence of COVID-19 (295 vs 165, $p < 0.01$) [15]. The higher result was found in this study, which showed a 56.3% (384 to 168) reduction in elective surgeries during the COVID-19 pandemic. This could be attributed to the fact that elective surgeries are performed after the RT-PCR test for COVID-19 is negative and the result arrives within 72 h of the surgery. The result usually takes 48–96 h. Outpatient surgical consultations dropped by 59%, from 728 to 296 ($p < 0.01$) in the Switzerland study [15]. Similar results were observed in this study. The number of patients visiting surgical OPD decreased by 53.35% (6431 to 3000 as a comparison between before and after the emergence of COVID-19.

When we compared the number of patients receiving essential health services six months after COVID-19 emerged, we found a gradual increase in all services except maternal services, which fell by 13%. (3104 to 2686). This could be owing to an influx of patients from other private and public healthcare institutions, hospitals, and homes during the early stages of the epidemic, as a result of the complete or partial shutdown of most facilities due to fear, stigma, and misinformation.

This study showed a significant association between the occurrence of COVID 19 and the number of clients seen in outpatient ($p < 0.0126$) and emergency departments ($p < 0.0420$) (Table 3). This may be due to extended appointments for chronic patients and restrictions on the number of patients seen in outpatient clinics. In the
### Table 3 Chi-square test between per- COVID-19 and COVID group

| Essential healthcare type          | per- COVID-19 season (average) | COVID-19 season (average) | P value  |
|-----------------------------------|--------------------------------|---------------------------|----------|
| **Out patient**                   |                                |                           |          |
| Internal Medicine                 | 13,888                         | 6489                      | 0.0126 * |
| Surgery                           | 6431                           | 3000                      |          |
| Gynaecology                       | 3620                           | 1105                      |          |
| Dermatology                       | 1268                           | 289                       |          |
| Dental & Maxillofacial            | 1351                           | 324                       |          |
| Ophthalmology                     | 4603                           | 1569                      |          |
| Psychiatry                        | 1460                           | 647                       |          |
| Ear Nose & Throat (ENT)           | 1651                           | 555                       |          |
| Renal Transplant                  | 328                            | 275                       |          |
| Palliative care                   | 5                              | 3                         |          |
| Oncology                          | 1022                           | 879                       |          |
| Pediatrics                        | 2112                           | 1006                      |          |
| **Emergency**                     |                                |                           | 0.0420 * |
| Pediatrics Emergency              | 554                            | 164                       |          |
| Adult Emergency                   | 1526                           | 485                       |          |
| Gynaecology Emergency             | 1144                           | 1028                      |          |
| AaBET Emergency                   | 966                            | 527                       |          |
| **Other services**                |                                |                           | 0.0657   |
| Family planning                   | 440                            | 223                       |          |
| Cervical cancer screening         | 16                             | 6                         |          |
| Voluntary Counselling & Testing   | 67                             | 14                        |          |
| Post Exposure Prophylaxis         | 10                             | 3                         |          |
| Dialysis                          | 144                            | 68                        |          |
| **Maternal Service**              |                                |                           | 0.0947   |
| Spontaneous Vaginal Delivery      | 505                            | 462                       |          |
| Instrumental delivery             | 60                             | 37                        |          |
| Caesarean section                 | 368                            | 376                       |          |
| Maternal death                    | 0                              | 0                         |          |
| Antenatal care                    | 2084                           | 1746                      |          |
| Postnatal care                    | 636                            | 546                       |          |
| **Surgical Service**              |                                |                           | 0.1623   |
| Emergency surgery                 | 254                            | 193                       |          |
| Elective surgery                  | 384                            | 168                       |          |
| **Inpatient Service**             |                                |                           | 0.0638   |
| Surgical ward                     | 355                            | 128                       |          |
| Medical ward                      | 84                             | 49                        |          |
| Pediatrics ward                   | 68                             | 49                        |          |
| Maternity ward                    | 497                            | 354                       |          |
| Gynaecology ward                  | 154                            | 91                        |          |
| Others                            | 886                            | 504                       |          |
| Total                             | 2044                           | 682                       |          |

* Significant association (p-value < 0.05)
emergency department, it could be the fear of contracting COVID-19 while visiting for other concerns.

**Conclusion**

The number of clients visiting almost all essential health care services declined during the COVID-19 pandemic. The most affected services were inpatient admissions that showed a 73% (2044 to 682) reduction from the previous year and the list of affected maternal services only decreased by 13% (3671 to 3177). During six months of follow up after the emergence of COVID-19, a progressive increment in the number of patients getting essential services was observed.

Essential healthcare services are as important as COVID-19 prevention and treatment. These services should be provided alongside COVID-19 services. We can improve the number of clients visiting hospitals in times of a pandemic by endorsing a continuous information campaign with available media, implementation and monitoring of IPC measures, and establishing a holistic triple setup for delivering quality medical service in times of a pandemic.

**Recommendation**

1. At the national level the health care system should be rearrangement the classification of “COVID” and “non-COVID” health facilities in each town in the event of a particularly significant caseload. This helps us to limit the danger of contamination, enhance patient routes, and combine health facilities and skilled caregivers; while on the other hand, it allows us to continue managing non-COVID patients without raising risk.

2. At national level there should be continues awareness creation of COVID-19 symptoms, prevention measures and treatment options. Develop educational materials and disseminate using different social media platforms and mainstream media such as television channels.

3. At hospital level we recommend creating a triple setup to battle COVID-19, which includes non-COVID services, an isolation center for suspect patients, and a COVID-19 treatment center with its own personnel and restricted access.

**Limitation**

We did not include all essential services and it was conducted in a single hospital.

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**Authors’ contributions**

BT conceived of and designed the research, reviewed the literature, prepared the data and contributed to the revision of the final manuscript. FD drafted the manuscript, discussed the results, performed the analysis and contributed to the revision of the final manuscript. DA supported data preparation, conducted data collection and analysis, and contributed to the revision of the final manuscript. All authors read and approved the final manuscript.

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**Availability of data and materials**

The datasets used and/or analysed during the current study are available from the corresponding author upon reasonable request.

**Declarations**

**Ethics approval and consent to participate**

The current manuscript had ethical approval from Saint Paul’s Hospital Millennium Medical College (SPHMMC) IRB as part of the original research proposal which was entitled “Impact of Covid-19 and Mitigation Plans on Essential Health Services: Institutional Experience of St. Paul’s Hospital Millennium Medical College”. Informed consent was obtained from all study participants before they enrolled in the study. They were told that their participation was voluntary, and they could withdraw at any time or refuse to answer any question if they wanted to. No information concerning the individual was passed to a third party. Therefore, in general, we carried out the current research by fulfilling all the requirements of the institutional (SPHMMC) IRB guidelines and relevant guidelines of BMC.

**Consent for publication**

Not applicable.

**Competing interests**

The authors declare that they have no competing interests.

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**References**

1. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet. 2020;395(10223):507–13. https://doi.org/10.1016/S0140-6736(20)30211-7.

2. IHR Emergency Committee on Novel Coronavirus (2019-nCoV) [Internet]. [cited 2020 Nov 12]. Available from: https://www.who.int/director-general/speeches/detail/who-director-general-s-statement-on-ihr-emergency-committee-on-novel-coronavirus-(2019-ncov).

3. EPHI_PHEOC_COVID-19_Weekly_Bulletin_47_English_03252021.pdf.

4. Parpia AS, Ndeffo-Mbah ML, Wenzel NS, Galvani AP. Effects of response to 2014-2015 Ebola outbreak on deaths from malaria, HIV/AIDS, and tuberculosis, West Africa. Emerg Infect Dis. 2016;22(8):1383–41. https://doi.org/10.3201/eid2208.150977.

5. Brolin Ribacke KJ, Saulnier DD, Eriksson A, von Schreeb J. Effects of the West Africa Ebola virus disease on health-care utilization - a systematic review. Front Public Health. 2016;4:222. https://doi.org/10.3389/fpubh.2016.00022.
6. Elston JWT, Cartwright C, Ndumbi P, Wright J. The health impact of the 2014-15 Ebola outbreak. Public Health. 2017;143:6–70. https://doi.org/10.1016/j.puhe.2016.10.020.

7. WHO. Maintaining essential health services: operational guidance for the COVID-19 context. Interim guidance; June 2020.

8. Strategies and plans: strategic preparedness and response plan [website]. Geneva: World Health Organization; 2020. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/strategies-and-plans Accessed 8 Dec 2020.

9. Essential Health Services Package of Ethiopia. Federal Ministry of Health; 2019. Available at: https://www.hfgproject.org/essential-package-of-health-services-country-Snapshot-ethiopia/. Accessed 26 Oct 2020.

10. Ribacce KB, Saulnier DD, Eriksson A, Von Schreeb J. Effects of the West Africa Ebola virus disease on health-care utilization - A systematic review. Front Public Health. 2016;6:1–12.

11. Wilhelm JA, Helleringer S. Utilization of non-Ebola health care services during Ebola outbreaks: A systematic review and meta-analysis. J Glob Health. 2019;9(1).

12. Sochas L, Channon AA, Nam S. Counting indirect crisis-related deaths in the context of a low-resilience health system: the case of maternal and neonatal health during the Ebola epidemic in Sierra Leone. Health Policy Plan. 2017;32(suppl_3):32–9. https://doi.org/10.1093/heapoli/czx108.

13. Morell N, Rota E, Terracciano C, Immovilli P, Spallazzi M, Colombi D, et al. The baffling case of ischemic stroke disappearance from the casualty department in the COVID-19 era. Eur Neurol. 2020;93(2):1–3. https://doi.org/10.1159/000507666.

14. Kansagra AP, Goyal MS, Hamilton S, Albers GW. Collateral effect of Covid-19 on stroke evaluation in the United States. N Engl J Med. 2020;383(4):400–1. https://doi.org/10.1056/NEJMc2014816.

15. Global financing faculty: Preserve Essential Health Services during the Covid-19 Pandemic, Ethiopia; 2020.

16. Hübner M, Zingg T, Martin D, Eckert P, Demartines N. Surgery for non-Covid-19 patients during the pandemic. PLoS ONE. 2020;15(10):e0241331. https://doi.org/10.1371/journal.pone.0241331.

17. Annual Report of Liaison Office. St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia; 2019.

18. McDonnell T, Nicholson E, et al. Assessing the Impact of COVID-19 Public Health Stages on Paediatric Emergency Attendance. Int J Environ Res Public Health. 2020;17:6719. https://doi.org/10.3390/ijerph17186719.

19. The Impact Of Covid-19 On Women (POLICY BRIEF): Population Foundation of India (PFI); 2020.

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