Cross-sectional Study

The impact of novel coronavirus disease (COVID-19) on emergency and essential surgical care in Gedeo and Sidama zone hospitals: An institutional-based multicenter cross-sectional study

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ABSTRACT

Background: COVID-19 was initially detected in China’s Wuhan, the capital of Hubei Province, in December 2019, and has since spread throughout the world, including Ethiopia. Long-term epidemics will overwhelm the capacity of hospitals and the health system as a whole, with dire consequences for the developing world’s damaged health systems. Focusing on COVID-19-related activities while continuing to provide essential services such as emergency and surgical care is critical not only to maintaining public trust in the health system but also to reducing morbidity and mortality from other illnesses. The goal of this study was to see how COVID-19 affected essential and emergency surgical care in Gedeo and Sidama zone hospitals.

Method:ology: A cross-sectional study was carried out in ten (10) hospitals in the Gedeo and Sidama zone. The information was gathered with the help of the world health organization (WHO) situational analysis tool for determining emergency and essential surgical care (EESC) capability. Infrastructure, human resources, interventions, and EESC equipment and supplies were used to assess the hospitals’ capacity.

Result: 54.3% of the 35 fundamental therapies indicated in the instrument were available before COVID-19 at all sites, while 25.2% were available after the COVID-19 pandemic. During the COVID-19 pandemic, there was a sharing of resources for treatment centers, such as a scarcity of oxygen and anesthesia machines, and emergency surgery was postponed. Before admission, the average distance traveled was 58 km.

Conclusion: The COVID-19 pandemic, as well as existing disparities in infrastructure, human resources, service provision, and essential equipment and supplies, reveal significant gaps in hospitals’ capacity to provide essential and emergency surgical services and effectively address the growing surgical burden of disease and injury in Gedeo and Sidama zone primary, general, and referral hospitals.

1. Background information

Coronavirus (COVID-19) was originally found in China in December 2019 in Wuhan, the capital of Hubei province, and has since spread worldwide. In December 2019, a new coronavirus (COVID-19) was discovered in three individuals with pneumonia who were linked to a Wuhan, China, cluster of acute respiratory disease cases. Several nations, including Europe, have sustained local transmission by the end of February 2020. Fever is the most prevalent clinical complaint in hospitalized patients, followed by cough, dyspnea, and myalgia, as well as weakness [1].

Coronaviruses are antisense RNA viruses of the Coronavirinae subfamily of the Coronaviridae family of the Nidovirales order. Only six distinct coronaviruses were known to infect people till December of 2019. In immune-competent adults, four of these viruses (HCoV-NL63, HCoV-229E, HCoV-OC43, and HKU1) normally cause mild common cold-like symptoms, but the other two have caused severe respiratory syndrome pandemics in the last two decades [2].

Abbreviations: ACA Advanced Clinical Anesthesia, COVID Coronavirus disease; EESC Essential emergency surgical care, MSc Master of Science; SARS severe acute respiratory syndrome coronavirus, WHO World Health Organization.

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These viruses are ubiquitous in animals all over the world, but just a few cases have been reported in humans. COVID-19 was designated a pandemic by the World Health Organization (WHO) on March 11, citing approximately 118,000 instances of coronavirus disease in over 110 nations and territories around the world, as well as the ongoing risk of global spread [3].

Hospitals are an important aspect of the healthcare system because they provide necessary medical care to the public, especially in times of crisis. Long-term and simultaneous outbreaks can result in the progressive spread of disease, as well as quickly increasing service demands, which might overwhelm hospital and healthcare system capacity. During the current COVID-19 outbreak, disruption of these vital support services and supplies could jeopardize an unprepared healthcare facility’s ability to provide acute health treatment. In addition, a significant proportion of employee absenteeism is likely. A scarcity of vital equipment and supplies could obstruct access to care and have a direct impact on healthcare delivery [4].

The term “essential and emergency surgical care” refers to surgical operations that are vital in averting premature death and disability in a specific ailment. Surgical treatments at referral hospitals are an important part of comprehensive health care. The worldwide burden of surgical disease is constantly rising, with low- and middle-income nations bearing a disproportionate share of the burden [5].

The fast-growing outbreak places an unprecedented strain on our healthcare system’s effectiveness and long-term viability. The exponential increase in emergency department (ED) visits and inpatient admission volumes are two acute challenges [6].

Surgical disease has been estimated to constitute 11% of the total global burden of disease. But, Due to the pandemic of COVID-19, health facilities and the workforce are currently inundated by a plethora of activities related to controlling the pandemic. Essential health services, such as surgical services, that communities anticipate from the health system may be jeopardized as a result. Furthermore, health-seeking may be postponed due to social/physical distance requirements or community apprehensions about healthcare institutions being infected [7].

COVID-19 is expected to compromise emergency and essential surgical care, which means there is an increased risk of adverse outcomes by delaying surgical care for an undetermined period, due to a lack of focus, resource mobilization to COVID-19-related issues, fear of infection, availability of personal protective and infection prevention equipment, and so on. Focusing on COVID-19-related activities and continuing to provide essential services is critical not only to maintaining people’s trust in the health system’s ability to deliver essential health services, such as emergency and essential surgical care but also to reducing morbidity and mortality from other diseases [8].

2. Objectives of the study

2.1. General objective

To evaluate the impact of novel coronavirus disease-19 (COVID-19) on essential and emergency surgical care in Gedeo and Sidama zone hospitals from May 2020 to July 2020.

2.2. Specific objectives

To assess the impact of novel coronavirus disease-19 (COVID-19) on Emergency and essential surgical interventions.

To assess the impact of novel coronavirus disease-19 (COVID-19) on Emergency and essential surgical care equipment and supplies.

To assess the impact of novel coronavirus disease-19 (COVID-19) on the Availability of infrastructures.
To assess the impact of novel coronavirus disease-19 (COVID-19) on human resources.

3. Methodology

3.1. Study design and period

The institutional-based multi-center cross-sectional study was conducted from May 2020 to July 2020. Ethical clearance was taken from the Dilla University institution review board. Informed consent was taken from each hospital, which was included in the study unit. All hospitals in Gedeo and Sidama, which have active operating rooms, were included in the study, and Hospitals selected for the COVID-19 center were excluded from the study. Hospitals in the Gedeo and Sidama zone were categorized into clusters and ten hospitals were selected by lottery method as shown in Fig. 1 below. The WHO integrated management for emergency & essential surgical care (IMEESC) toolkit, Was used to assess emergency and essential surgical care (EESC) capacity among hospitals in Gedeo and Sidama zone hospitals. The capacity of the hospitals was evaluated before and after the COVID-19 by investigating four areas: infrastructure, human resources, interventions, and EESC equipment and supplies. The tool queries the availability of eight (8) types of care providers, 35 surgical interventions, and 67 items of equipment. The tool was distributed to ten public hospitals in Gedeo and Sidama zone and was completed in all health facilities by trained data collectors [9]. After completion of data collection, the data were manually checked for errors; and entered into SPSS version 20 for analysis. Descriptive statistics were used to determine indices both before and after COVID-19. STROCSS 2021 checklist was used to state our completed activities by each item [10] and the manuscript registration number was 7676 https://www.researchregistry.com/browse-the-registry#home/.

4. Result and discussion

4.1. Result

Out of 10 hospitals, Dilla university referral hospitals had a high population service of around 750000 followed by adare general hospital with around 300000 population services as indicated in Table 1.

Table 1
Profile of surveyed hospitals. (n = 10).

| Indicators name of the hospital | Dilla | Gedeb | Yirga chefe | Bule | Daye | Adare | Hula | Chere | Chuko | Aletawendo |
|--------------------------------|-------|-------|-------------|------|------|-------|------|-------|-------|------------|
| Estimated population served    | 75000 | 110000| 160000      | 125000| 130000| 300000| 170000| 120000| 150000| 180000     |
| Number of beds                  | 165   | 35    | 55          | 45   | 40   | 155   | 65   | 47    | 65    | 70         |
| Number of admissions (per year) | 2500  | 450   | 620         | 500  | 550  | 2500  | 750  | 650   | 800   | 950        |
| Number of functioning operating rooms | 4     | 1     | 1           | 1    | 1    | 3     | 1    | 1     | 1     | 1          |
| Number of patients requiring surgical procedures (per year) | 900   | 90    | 120         | 85   | 95   | 750   | 130  | 75    | 135   | 145        |
| Number of children (<15 years) requiring surgical procedures (per year) | 120   | 30    | 45          | 40   | 35   | 110   | 55   | 30    | 48    | 54         |
| Number of patients referred to a higher level of care for surgery (per year) | 200   | 50    | 60          | 30   | 40   | 150   | 65   | 45    | 70    | 80         |
| Average distance traveled to the facility (km) | 300   | 35    | 25          | 23   | 18   | 150   | 28   | 22    | 30    | 45         |
| Average distance traveled if referred elsewhere (km) | 350   | 40    | 36          | 48   | 60   | 250   | 43   | 55    | 65    | 89         |

Table 2
Personal profiles in Gedeo and Sidama zone hospital.

| Workforce                          | Total Health workers before COVID-19 | Total Health workers after COVID-19 |
|------------------------------------|-------------------------------------|------------------------------------|
| The general physician performing surgery | 15                                  | 11                                 |
| Anesthesiologists                  | 1                                   | 0                                  |
| Obstetrician                       | 14                                  | 10                                 |
| General doctors providing surgery  | 0                                   | 0                                  |
| General doctors providing anesthesia| 0                                   | 0                                  |
| The clinical officer providing anesthesia | 61                                  | 51                                 |
| The clinical officer providing surgery | 17                                  | 14                                 |
| Midwives/paramedics                | 318                                 | 265                                |

Table 3
Availability of infrastructures and health resources in Gedeo and Sidama zone Hospital s before COVID-19 and after COVID-19 (N = 10).

| Indicators                           | Before COVID-19 | After COVID-19 |
|--------------------------------------|-----------------|----------------|
|                                      | All the time    | sometimes     | Not available |
| Oxygen cylinder                      | 10              | 0              | 7              | 3              | 0              |
| Running water                        | 7               | 3              | 6              | 3              | 1              |
| Electricity                          | 10              | 0              | 9              | 1              | 0              |
| Functioning anesthesia machine       | 7               | 3              | 6              | 4              | 0              |
| Medical record                       | 10              | 0              | 10             | 0              | 0              |
| Blood bank                           | 10              | 0              | 10             | 0              | 0              |
| Hemoglobin and urine testing         | 4               | 3              | 3              | 2              | 5              |
| Functional x-ray machine             | 4               | 2              | 4              | 2              | 4              |
| Functional pulse oximeter            | 10              | 0              | 8              | 2              | 0              |
| Management guidelines for anesthesia | 5               | 3              | 2              | 5              | 3              |
| Management guidelines for surgery    | 6               | 3              | 6              | 3              | 1              |
| Management guidelines for emergency care | 5               | 0              | 5              | 0              | 5              |
| Management guidelines for pain relief | 8               | 0              | 8              | 0              | 2              |
| The area designated for emergency care | 10              | 0              | 10             | 0              | 10             |
| The area designated for post-operative care | 6               | 0              | 4              | 4              | 0              | 6              |
Regarding the availability of infrastructure & health resource during COVID-19 time, there were sharing of resource for the treatment center like the shortage of O2& anesthesia machine as indicated in Table 3.

Before COVID-19, 54.3 percent of all facilities offered basic surgical interventions; after COVID-19, 25.2 percent of all facilities offered basic surgical operations. Due to staff leave and some equipment sharing for a treatment center, there was a significant variance in surgical intervention following COVID-19. Emergency surgery, such as appendicitis, emergency C/S, and foreign body removal, is commonly referred to referral hospitals as indicated in table4.

There was frequently a shortage of capital outlays for resuscitation secondary to lock down & sharing equipment during the COVID-19 pandemic in Gedeo and Sidama zone hospitals (see Table 4). Face masks, airway & disposable gloves were frequently in shortage as indicated in Table 5.

Endotracheal tubes & laryngoscope were frequently in shortage in 6 & 8 hospitals respectively after COVID-19 (see Table 6). There was no fully available infuser bag in all hospitals as indicated in Table 7.

### Discussion

Our findings demonstrate that before COVID-19, only 54.3 percent of fundamental surgical interventions were available at all facilities; after COVID-19, only 25.2 percent of basic surgical interventions were available at all facilities. Due to staff departure and some equipment sharing for a treatment center, there was a large variance in surgical intervention following COVID-19. Emergency surgery, such as appendicitis, emergency C/S, and foreign body removal, is frequently referred to referral hospitals. Our findings demonstrate that sharing resources for a treatment center, granting COVID-19 breaks to vulnerable employees, and resource discrepancies harmed emergency and vital surgical services in the southern part of Ethiopia. We were getting the report from 8 primary hospitals 15 emergency patients died on the road during traveling to referral hospitals secondary to hemorrhage and septic according to the report. This finding is consistent with the findings of a scoping review study conducted in India by K.Soreide et al. on the long and short-term impact of COVID-19 on surgical care [11].

Correctional survey studies show that Five million individuals around the world were estimated to be without timely, safe, and cheap surgical and anesthetic services. This situation is exacerbated in low and
middle-income countries, where 6.5% of all procedures are conducted in the poorest countries. In low-income countries, improving surgical access requires a systems-based approach that addresses infrastructural deficiencies, trained/skilled staff, suitable equipment and drugs, and necessary and emergency surgical treatment [12].

Complete disregard for emergency and vital surgical services would be regarded as undesirable collateral damage, increasing the number of lives and life-years lost as a result of the COVID-19 pandemic accidently. When surgical theatres are shut down or reduced to a minimum of activity, and triage for the recommended and urgent surgeries is necessary, this might present ethical difficulties in a time of limited resources and heavy strain on critical care workers [13].

This study found critical shortcomings in basic infrastructure and competent human power required to offer surgical services in line with a cross sectional survey study in Sub-Saharan Africa, which has been well reported in earlier studies. The equipment was mostly insufficient, with considerable gaps in the availability of running water, hemoglobin and urine testing, a working x-ray machine, and a working pulse oximeter.

A retrospective comparative study by Ciarleglio, F.A., et al., shows that Lockdown procedures made it impossible for some patients to get to the emergency room, and the worry of contracting COVID-19 in the hospital added to the difficulty. Furthermore, the socioeconomic ramifications of public health interventions are likely to contribute to poor long-term health outcomes, and the COVID-19’s effects reduced the quality of surgical care, with poorer prognosis and greater morbidity rates. Due to delayed emergency department access and a “filter effect” caused by public fear of COVID-19 infection, only the most serious cases reached the emergency department on time, which was in line with our study [15,16].

5. Implications of study

This finding indicates that primary hospitals previously lacked EES services, and the inclusion of the COVID-19 pandemic further harmed the service, implying that the ministry of health should establish guidelines for dealing with similar pandemics. Of course, the ministry of health developed unique surgical system development methodologies that focus on saving lives through safe surgery (SaLTS). At all levels of the healthcare system, this national initiative aims to improve access to safe, required, and emergency surgical and anesthetic services. So far, no comprehensive assessment of surgical care capability in Ethiopia has been conducted in terms of physical resources and service supply at various levels of the health care system, especially in primary hospitals which were found in rural areas [17]. Therefore, this finding gives a clue for the development of new guidelines or improving this SaLTS system for the early management of such conditions.

6. Challenge

The main challenge during this project was a lack of COVID-19 personal protective equipment, and during data collection, the
hospital management and several assistant managers tried to provide us with false information to hide their weaknesses. We solved the scarcity of personal protective equipment by communicating with various organizations, finally, Dilla university helped us by supplying important equipment, and we solved the data collection challenge by asking professionals who work in specific departments, visiting infrastructure blindly, and maintaining smooth communication with staff who are heavily involved in the management of the EES service area.

### 7. Conclusion

The COVID-19 pandemic, as well as existing disparities in infrastructure, human resources, service provision, and essential equipment and supplies, show that hospitals in the Gedeo and Sidama zone have significant gaps in their ability to deliver EESC and effectively address the growing surgical burden of disease and injury. The necessity for continuing investment in EESC infrastructure, equipment, and supplies, as well as adequately qualified surgeons, anesthesiologists, and obstetricians/gynecologists, is highlighted in this study.

#### Ethical approval

Ethical approval was taken from Dilla University institutional review board.

#### Sources of funding

Dilla university.

#### Author contribution

Teshome Regasa and Abebayehu Zemedkun, and Derartu Neme, contributed to study conception, collected data, prepared manuscript, and performed statistical analysis. Zemedu Awoke, Belete Alemu, Muddin Tadese, Seyoum Hailu, and Hailemariam Getachew contributed in statistical analysis. All the authors read the manuscript and approved the final submission.

#### Trial registry number

The research were registered on research registry platform with a unique identification number of researchregistry7676.

#### Guarantor

Teshome Regasa.

#### Consent

Informed consent was taken from each included hospital. Dilla University funded us 200 dollars for the research project. The sponsor has no role in the research activity. The sponsor did not take part in any action of the research project other than funding.

#### Provenance and peer review

Not commissioned, externally peer-reviewed.

#### Declaration of competing interest

There is no conflict of interest to declare.

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