

# Changes in surgical practice in 85 South African hospitals during COVID-19 hard lockdown

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**Background.** In preparation for the COVID-19 pandemic, South Africa (SA) began a national lockdown on 27 March 2020, and many hospitals implemented measures to prepare for a potential COVID-19 surge.

**Objectives.** To report changes in SA hospital surgical practices in response to COVID-19 preparedness.

**Methods.** In this cross-sectional study, surgeons working in SA hospitals were recruited through surgical professional associations via an online survey. The main outcome measures were changes in hospital practice around surgical decision-making, operating theatres, surgical services and surgical trainees, and the potential long-term effect of these changes.

**Results.** A total of 133 surgeons from 85 hospitals representing public and private hospitals nationwide responded. In 59 hospitals (69.4%), surgeons were involved in the decision to de-escalate surgical care. Access was cancelled or reduced for non-cancer elective ( $n=84$ ; 99.0%), cancer ( $n=24$ ; 28.1%) and emergency operations ( $n=46$ ; 54.1%), and 26 hospitals (30.6%) repurposed at least one operating room as a ventilated critical care bed. Routine postoperative visits were cancelled in 33 hospitals (36.5%) and conducted by telephone or video in 15 (16.6%), 74 hospitals (87.1%) cancelled or reduced new outpatient visits, 64 (75.3%) reallocated some surgical inpatient beds to COVID-19 cases, and 29 (34.1%) deployed some surgical staff (including trainees) to other hospital services such as COVID-19 testing, medical/COVID-19 wards, the emergency department and the intensive care unit.

**Conclusions.** Hospital surgical de-escalation in response to COVID-19 has greatly reduced access to surgical care in SA, which could result in a backlog of surgical needs and an excess of morbidity and mortality.

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On 31 December 2019, a cluster of 27 patients with an acute respiratory illness of unknown aetiology was reported in Wuhan, China. The causative agent was subsequently identified as a novel coronavirus (SARS-CoV-2), and the disease has been termed COVID-19 by the World Health Organization.<sup>[1]</sup> The basic reproduction number is 2 - 3, and without pre-existing natural immunity, all humans are at risk. Within 8 weeks, SARS-CoV-2 infected persons on 6 of 7 continents. As of 2 July 2020, 10.7 million persons had been infected in over 188 countries with >400 000 deaths.<sup>[2]</sup> Several countries, such as the USA, Brazil, Spain and Italy, have had their health systems and resources overwhelmed by COVID-19 patients. Specifically, there has been a need to provide intensive care with ventilation support for ~6 - 12% of those infected.<sup>[3]</sup>

The first COVID-19 case in South Africa (SA) was reported on 5 March 2020, and the nation declared a National State of Disaster from 18 March 2020, closing borders to high-risk travellers, shutting schools, and banning gatherings of >100 persons. On 27 March 2020, a national hard lockdown began, which closed all businesses except for essential activity and required all persons to stay in their domiciles. Since 1 May 2020, lockdown restrictions have been eased,

but all persons are encouraged to stay at home if possible. At the time of writing, there had been >150 000 cases nationally, with a continued rise in new cases.<sup>[2]</sup>

Surgical conditions account for up to one-third of the global burden of disease. Surgical care includes the provision of operative, perioperative and non-operative management, anaesthesia and obstetric care for all surgical conditions.<sup>[4]</sup> Robust surgical services are an important component of health system strengthening and universal health coverage in SA.<sup>[5]</sup> Before the onset of the COVID-19 pandemic, access to surgical care, especially for essential and emergency surgical conditions, had been inequitable in SA, with increased barriers in the public and rural private sectors.<sup>[6]</sup> Delayed or lack of access can lead to poor health on an individual level and to significant economic loss for society.<sup>[5]</sup>

As part of COVID-19 disaster planning, many hospitals nationwide reduced routine inpatient and outpatient services to free up hospital beds and healthcare workers.<sup>[7]</sup> Surgical services, which include operative treatment of elective and emergency conditions, are hospital based and may include the need for intensive care unit (ICU) admission, especially postoperatively. SA only has 2.8 hospital beds

per 1 000 persons and 0.8 - 0.9 ICU beds per 1 000 persons, while the USA, for example, has 2.3 - 3.2 ICU beds per 1 000 persons.<sup>[8]</sup> The 'collateral damage' of hospital COVID preparedness on non-COVID activities has been noted by several authors<sup>[9]</sup> and may include the loss of elective operations and outpatient care.<sup>[7]</sup>

## Objectives

To report changes in SA hospital surgical practices in response to COVID-19 preparedness during the national hard lockdown. In addition, the potential consequences of reduced access to surgical care during lockdown are discussed.

## Methods

This was a cross-sectional study conducted through an online survey during a 2-week period in April 2020. The target populations were surgeons and surgeons in training working in SA hospitals. Surgeons working in non-SA hospitals were excluded. Participants were recruited through SA professional surgical association memberships, including the Federation of South African Surgeons, the Association of Surgeons of South Africa, the South African Society of Surgeons in Training, the South African Society of Endoscopic Surgeons, the Hepatobiliary Association of South Africa, the South African Colorectal Society, the Vascular Association of Southern Africa, and Surgicom. The survey consisted of 14 closed-ended questions regarding changes in hospital practice around decision-making, operating theatres, surgical services and surgical trainees, and one open-ended question regarding concerns around the effect of these changes.

Data were downloaded from Google Forms and analysed in Stata 13 (Stata-Corp, USA). Hospitals were de-identified. Descriptive statistics (counts and percentages) were used to describe responses. Responses from the same hospitals were amalgamated and the most frequent responses used as representative of that site. Some questions allowed more than one response (i.e. deployment to other hospital services), and all were included in the analyses.

Ethics approval for this study was given by the Stellenbosch University Human Research Ethics Committee (ref. no. N20/04/012\_COVID-19, project ID 15191). The Committee waived the need for individual informed consent given the online study design.

## Results

There were 133 responses from 88 hospitals. Three responses from surgeons working in non-SA hospitals were excluded, leaving 130 responses from 85 SA hospitals for analysis. Hospitals represented in the survey were located in 8 of 9 provinces (Fig. 1). There were 24 public (28.4%) and 58 private (68.2%) hospitals, and 3 (3.5%) of unknown status. The median bed number was 557 (interquartile range (IQR) 325 - 823) for public hospitals and 200 (IQR 150 - 300) for private hospitals.

### Decision-making

In 59 hospitals (69.4%), surgeons were involved in the decision to de-escalate surgical care. In 77 (92.1%), surgeons were involved in determining whether an operation was considered urgent enough to be performed.

### Operating theatres

Eighty-four hospitals (99.0%) cancelled or reduced non-cancer elective operations (Fig. 2). Sixty-one hospitals (71.8%) continued all cancer operations, 21 (24.7%) only continued symptomatic cancer operations, and 3 (3.5%) cancelled all cancer operations. Thirty-nine hospitals (45.9%) continued the same access, 44 (51.8%) reduced access, and 2 (2.3%) stopped all emergency operations. Twenty-six hospitals (30.6%) repurposed at least one operating room as a ventilated ICU bed (Fig. 3). Seventeen (20.0%) reported shortages of personal protective equipment (PPE) in the operating theatre.

### Surgical services

Routine postoperative visits were cancelled in 33 hospitals (36.5%) and conducted by

telephone or video in 15 (16.6%). Thirty-seven (43.5%) did not change postoperative care. Seventy-four hospitals (87.1%) cancelled or reduced new outpatient visits, 64 (75.3%) reallocated a proportion of surgical beds to COVID-19 inpatients, 48 (56.4%) had surgical staff working on a rotational basis or temporarily, with reduced hours because elective cases were cancelled, and 29 hospitals (34.1%) had deployed some surgical staff (including trainees) to other hospital services such as COVID-19 testing, medical/COVID-19 wards, the emergency department and ICUs (Fig. 4).

### Surgical trainees

Thirty-one hospitals reported data on surgical trainees. Two major academic hospitals reported that non-SA surgical trainees had returned to their home country, thereby reducing the surgical workforce. Of SA trainees, 14 (45.2%) were working on a rotational basis in order to reduce the number of non-COVID-19 staff in the hospital.

## Discussion

During the national hard lockdown, hospital surgical practices in SA changed significantly to prepare for COVID-19. Many professional surgical bodies such as the Association of Surgeons of South Africa and the American College of Surgeons have made recommendations to reduce non-emergency operations during the COVID-19 pandemic,<sup>[10,11]</sup> but to our knowledge, the present study is one of the first national surveys reporting actual changes in hospital surgical practice. Non-emergency operations and clinic visits were drastically reduced or cancelled, surgical wards and operating theatres were reconfigured, and surgical staff

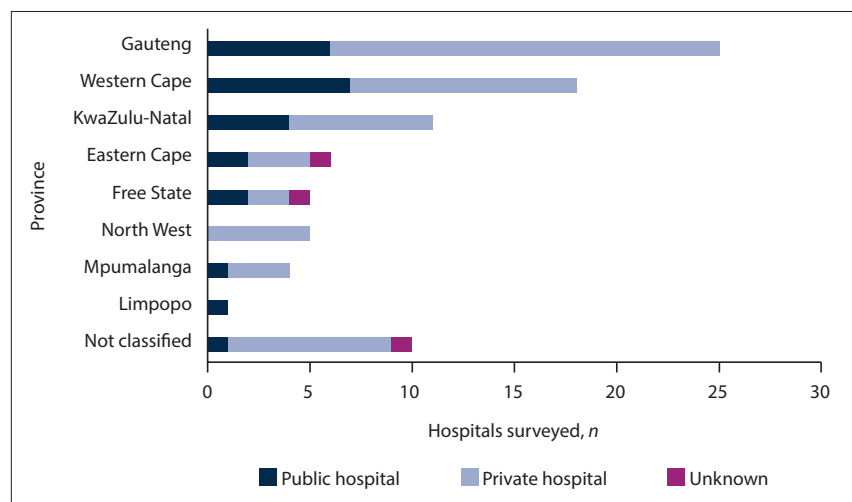


Fig. 1. Characteristics of 85 South African hospitals surveyed for changes in surgical practice.

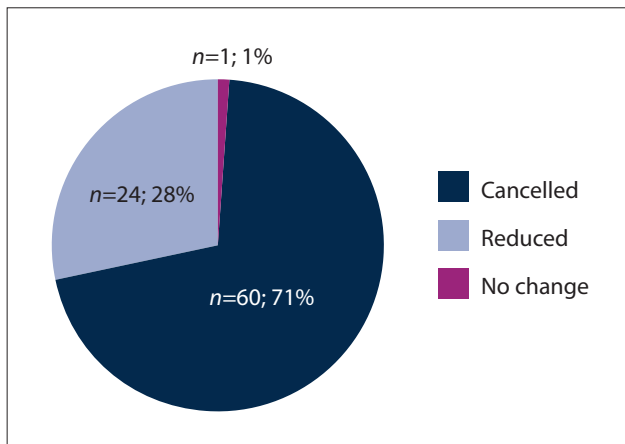


Fig. 2. Changes in elective operations due to COVID-19 hospital preparedness in South Africa.

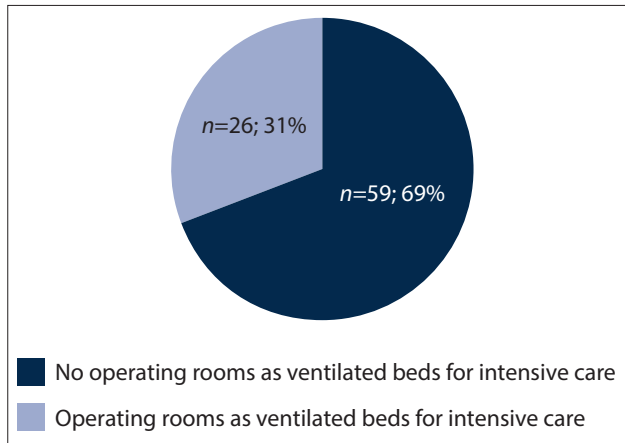


Fig. 3. Hospitals with operating rooms repurposed as ventilated beds for intensive care.

were deployed to other hospital services or told to stay at home in order to free up hospital beds and resources for COVID-19 patients.

The definition of non-emergency operations was not explored in this study, but is likely to have varied between hospitals, depending on available physical and human resources. In the majority of hospitals, surgeons were involved in the decision to de-escalate surgical services. At some facilities, surgeons are members of multidisciplinary committees to determine the urgency of specific procedures. Decisions around allocation of healthcare during this pandemic are complex and a multitude of factors need to be considered, including the burden of COVID-19, the availability of PPE, and the available resources of the hospital to treat surgical and non-surgical conditions.

The short- and long-term effects of the disruption to surgical services will be detrimental to the health of South Africans. Some participants noted that even though access to emergency surgical care was still available at their hospitals, fewer patients with emergency conditions were presenting than expected. This same reduction in health-seeking behaviour has been reported worldwide for non-surgical emergency conditions such as heart attacks and strokes.<sup>[12]</sup> The reasons for the reduction in seeking care could include fear of contracting COVID-19 from health facilities,<sup>[13]</sup> but further studies are needed to explore this. In some hospitals, access to timely operative care for cancer operations has been reduced, which could lead to an excess in deaths.<sup>[14]</sup> In addition, if elective surgical conditions such as

inguinal and ventral hernias are left untreated, they could become urgent if they become complicated by incarceration or strangulation.<sup>[15,16]</sup> Surgical care treats a significant proportion of the burden of disease in SA, and these drastic reductions in access could have long-term consequences. According to a recent modelling study, there could be a backlog of >150 000 cases in SA during the peak 12 weeks of disruption due to COVID-19.<sup>[17]</sup> Pre-COVID-19 surgical services in the public and rural private sectors were already limited, and these increased barriers will lead to an excess in morbidity and mortality.<sup>[18]</sup>

As the COVID-19 pandemic continues to rage in SA, decision-making around the timing and process of surgical re-escalation will be challenging. Several SA private hospital groups (unpublished data) and international guidelines have outlined recommendations on the timing and conditions needed to re-introduce elective operations, including a reduction in the number of new COVID-19 cases locally, the availability of PPE, and the capacity to test preoperative and postoperative patients for COVID-19.<sup>[11,19]</sup> In addition, an international scoring system has been created that considers patient, procedure and disease factors in order to triage the necessity of each operation.<sup>[20]</sup> The SA National Department of Health is in the process of creating a framework for surgical care during the COVID-19 pandemic that considers these complex factors.

Access to care between the private and public sectors in SA is inequitable, and this situation has been accentuated by the COVID-19 pandemic. The public sector, which serves >80% of the population, has experienced a severe shortage in COVID-19 testing capacity and long turnaround times for results. Early data suggesting high morbidity and mortality of SARS-CoV-2-infected persons undergoing surgery make preoperative testing to assess risk of paramount importance.<sup>[21]</sup> Public hospital testing limitations have hindered a return to elective procedures. In addition, the hospitalised COVID-19 burden has been higher in public hospitals than in private facilities,<sup>[22]</sup> reducing staff and bed availability for surgical care. In contrast, private hospitals have been able to provide COVID-19 testing for preoperative patients with rapid turnaround times, and at least some facilities returned to elective surgery during May and June 2020 (unpublished data). The COVID-19 pandemic emphasises the need for both sectors to work together as one co-ordinated health system. A single surgical backlog list of the most medically time-sensitive surgical conditions, shared between the public and private sectors, could be one solution to mitigate excess morbidity and mortality from cancelled operations.<sup>[23]</sup>

### Study limitations

The results of this study are limited by the study design, which sampled surgeons through email invitation. The findings could have been biased by surgeons who chose to respond. We estimate that our response rate was 34%, because only ~250 of the 600 hospitals in SA have surgeons working at their facilities. In addition, although this study documented hospital-level changes, the actual numbers of diverted operations or reallocated staff were not measured. Furthermore, the sample size was not large enough to identify differences between provinces and health sectors. Finally, the survey described changes in response to the government-regulated hard lockdown early in the pandemic. Further studies will be needed once the pandemic has peaked to estimate the ultimate collateral damage.

### Conclusions

Hospital surgical de-escalation in response to COVID-19 greatly reduced access to surgical care in SA, a country with pre-existing

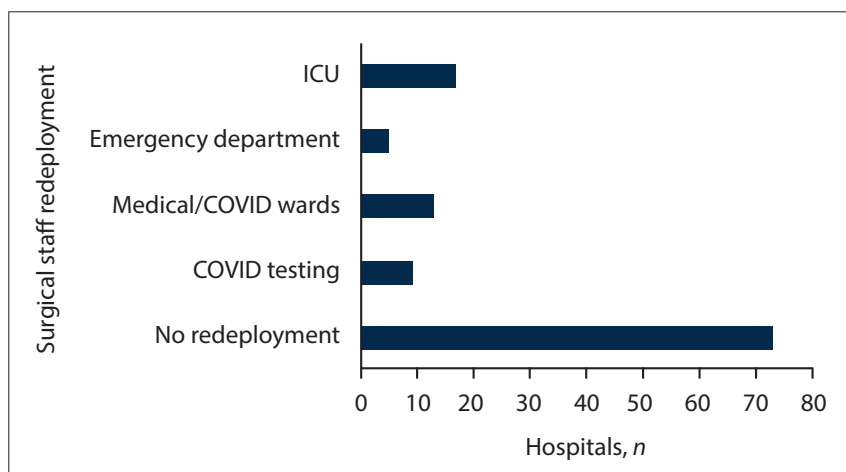


Fig. 4. Hospitals with surgical staff redeployed to other service areas during COVID-19 preparedness. (ICU = intensive care unit.)

limitations in surgical services. Once the COVID-19 pandemic has peaked, there will be a large backlog of surgical conditions needing care. The long-term impact of COVID-19 on reducing access to care for non-COVID-19 diseases is unknown, but should not be underestimated.

#### Declaration. None.

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**Conflicts of interest.** None.

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