

Establishing a South African national framework for COVID-19 surgical prioritisation

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Background. Since the start of the COVID-19 pandemic, surgical operations have been drastically reduced in South Africa (SA). Guidelines on surgical prioritisation during COVID-19 have been published, but are specific to high-income countries. There is a pressing need for context-specific guidelines and a validated tool for prioritising surgical cases during the COVID-19 pandemic. In March 2020, the South African National Surgical Obstetric Anaesthesia Plan Task Team was asked by the National Department of Health to establish a national framework for COVID-19 surgical prioritisation.

Objectives. To develop a national framework for COVID-19 surgical prioritisation, including a set of recommendations and a risk calculator for operative care.

Methods. The surgical prioritisation framework was developed in three stages: (i) a literature review of international, national and local recommendations on COVID-19 and surgical care was conducted; (ii) a set of recommendations was drawn up based on the available literature and through consensus of the COVID-19 Task Team; and (iii) a COVID-19 surgical risk calculator was developed and evaluated.

Results. A total of 30 documents were identified from which recommendations around prioritisation of surgical care were used to draw up six recommendations for preoperative COVID-19 screening and testing as well as the use of appropriate personal protective equipment. Ninety-nine perioperative practitioners from eight SA provinces evaluated the COVID-19 surgical risk calculator, which had high acceptability and a high level of concordance (81%) with current clinical practice.

Conclusions. This national framework on COVID-19 surgical prioritisation can help hospital teams make ethical, equitable and personalised decisions whether to proceed with or delay surgical operations during this unprecedented epidemic.

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Since the beginning of 2020, the COVID-19 pandemic has swept across the globe at an unprecedented pace. As of 1 February 2021, there were >102 million cases in >188 countries.^[1] The COVID-19 pandemic brought about significant changes in health-seeking behaviour and healthcare service delivery, such as decreased inpatient admissions and outpatient visits in order to conserve hospital resources for the large number of persons with COVID-19.^[2] In March 2020, non-essential surgical care was greatly reduced in some countries, with an estimated 28 million procedures deferred during the first 12 weeks of the pandemic.^[3-7] Hospitals only performed essential surgery, including trauma-related life-saving procedures, and urgent planned surgery (such as for cancer), resulting in

countries experiencing huge surgical backlogs^[8-13] that will have significant long-term effects. Pre-COVID-19, surgical health systems in sub-Saharan Africa were already limited and inequitable, with long operation waiting times in many countries.^[14] The pandemic has exacerbated this lack of access to surgical care.

COVID-19 was first described in South Africa (SA) in March 2020, but despite severe measures such as a national lockdown, which after a year is still ongoing, the country has had over one million confirmed infections, representing more than half of all the cases on the continent.^[1] While the first wave peaked in July 2020 and the second wave in early 2021, the pandemic will not be controlled until vaccines are widely available and national herd immunity is reached.

As in most countries worldwide, SA hospitals reduced healthcare services by limiting outpatient clinics and non-essential surgeries.^[8] According to one estimate, procedure cancellations in SA in the first 12 weeks of the pandemic created a surgical backlog of >150 000 cases, which it is expected will take almost 2 years to catch up if healthcare facilities are able to manage a 10% increase in surgical capacity post-COVID-19.^[4,15] Since the pandemic has gone on for almost a year, this backlog is expected to be even greater now.

As SA public and private hospitals consider which operations to perform while balancing local pandemic factors and resources, there is a need for a national guideline around prioritisation of surgical care to balance access, equity, urgency, and COVID-19 infection risks to patients and staff. Currently, some hospitals have their own prioritisation systems, sometimes with operative theatre selection committees, while others allow their individual surgeons to decide on whom to operate.^[8]

Guidelines on surgical prioritisation during COVID-19 have been published, but are specific to high-income countries.^[16,17] These guidelines recommend certain prerequisites such as decreasing local daily COVID-19 cases, adequate personal protective equipment (PPE) for surgical staff, and availability of preoperative SARS-CoV-2 polymerase chain reaction (PCR) testing. In addition, a US surgical group created the medically necessary, time-sensitive (MeNTs) scoring system to help with decision-making on specific surgical patients during COVID-19, considering patient, disease, procedural and local pandemic factors.^[18] In low- and middle-income countries, return to 'normal' may be challenging given the lack of PPE, limited preoperative SARS-CoV-2 PCR testing, and fewer intensive care unit and ward beds in these lower-resourced settings. There is a pressing need for context-specific guidelines and a validated tool for prioritising surgical cases during the COVID-19 pandemic. Return to pre-pandemic volumes of surgery may not be possible for many months or for years, depending on local pandemic factors.

In early March 2020, the SA National Department of Health (NDoH) convened a task team to create a National Surgical Obstetric and Anaesthesia Plan. This group consists of academic surgeons, anaesthesiologists, obstetrician/gynaecologists, emergency medicine physicians and critical care specialists from five SA universities and the NDoH. A COVID-19 subgroup was formed to establish an SA national framework for COVID-19 surgical prioritisation.

Objectives

The primary objective of this publication was to describe the development of this national framework, including a set of recommendations and a COVID-19 risk calculator for operative care.

Methods

The SA national framework for COVID-19 surgical prioritisation was developed in three stages: (i) a literature review of international, national and local recommendations on COVID-19 and surgical care was conducted; (ii) a set of recommendations was drawn up based on the available literature and through consensus of the COVID-19 Task Team; and (iii) a COVID-19 surgical risk calculator was developed and evaluated.

Literature review

MEDLINE was searched via PubMed and Google Scholar for the key words 'surgery', 'COVID-19', 'operation' and 'prioritisation'. All publications including commentaries and research articles from any country were included through 15 June 2020. In addition, grey literature, or in-house policy documents, from SA hospitals on COVID-19 surgical prioritisation were included. Each publication

was reviewed by a member of the COVID-19 Task Team and key points were extracted.

National recommendations and COVID-19 risk calculator

Based on the literature review and discussions with the COVID-19 Surgical Task Team members who work in various hospitals nationwide, national recommendations and a COVID-19 risk calculator were created through consensus.

Evaluation of recommendations and COVID-19 risk calculator

Study design

A cross-sectional study conducted via an online survey between 11 September and 15 November 2020 was used to evaluate the recommendations and COVID-19 surgical risk calculator. Participants were recruited through professional societies, hospital and academic department meetings, and snowball sampling. Surgeons, anaesthesiologists, obstetrician/gynaecologists and other physicians who participate in operative care were eligible to participate.

Ethical considerations

Ethics approval for the study was obtained from the Stellenbosch University Human Research Ethics Committee (ref. no. N20/08/050_COVID-19). An explanation of the study was provided in the preface of the online questionnaire and informed consent was implied if the participant completed the questionnaire. All data were anonymous.

Survey

Participants were asked to score each recommendation on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Each participant was asked about local COVID-19 factors in order to create their facility pandemic score. Participants evaluated 10 hypothetical cases representing general, trauma, orthopaedic, neurological, gynaecological, ophthalmological and urological surgical subspecialties based on their pandemic score. In addition, each participant reported whether the case would have been operated on at their hospital facility, given the current pandemic score (supplementary file 1, available at <http://samj.org.za/public/sup/15603-surr.pdf>).

Data analysis

Data were imported from Google drive into Statistical Package for the Social Sciences (SPSS) version 27 (IBM, USA) for statistical analysis. Each recommendation statement was scored from 1 to 5. Mean scores ≥ 4 were considered positive support for the statement. For the 10 hypothetical cases, concordance was measured between the COVID-19 surgical risk calculator and the participant decision on the case. Non-concordant responses were further analysed to identify whether the risk calculator was more or less permissive than participants' opinion. The results were analysed using descriptive statistics (frequencies and percentages). Concordance of >80%, as agreed by the COVID-19 subcommittee *a priori*, was considered acceptability of the risk calculator. Cronbach's alpha test was used to measure internal consistency for case concordance.

Results

Literature review

Thirty documents, including published articles and unpublished sources, were identified: 16 international and 14 SA (Table 1). Recommendations around the prioritisation of surgical care during COVID-19 were put into four categories: local pandemic, hospital

Table 1. Publications and sources identified in a rapid review of international and local recommendations on COVID-19 and surgical care

International	South African
American College of Surgeons, American Society of Anesthesiologists, Association of Perioperative Registered Nurses, American Hospital Association. Joint statement: Roadmap for resuming elective surgery after COVID-19 pandemic. 17 April 2020. https://www.asahq.org/about-asa/newsroom/news-releases/2020/04/joint-statement-on-elective-surgery-after-covid-19-pandemic (accessed 21 May 2020).	Federation of Surgeons of South Africa (FOSAS). FOSAS consensus document on the resumption of elective surgery after the COVID-19 'lockdown' period in South Africa. 26 April 2020.
American Society of Anesthesiologists, Anesthesia Patient Safety Foundation. The ASA and APSF Joint Statement on Perioperative Testing for the COVID-19 Virus. 1 June 2020. https://www.asahq.org/about-asa/newsroom/news-releases/2020/06/asa-and-apsf-joint-statement-on-perioperative-testing-for-the-covid-19-virus (accessed 21 May 2020).	Friedland R. COVID-19 executive memo: Netcare's policy on elective surgery, screening and testing of patients for COVID-19. 7 May 2020.
British Orthopaedic Association. Re-starting non-urgent trauma and orthopaedic care: Summary guidance. 12 May 2020. https://www.rcsed.ac.uk/medial/681196/boa-guidance-summary.pdf (accessed 21 May 2020).	Friedland R. Netcare's recommended policy on the continuation of medical and surgical aspects of care post stage 5 lockdown. 1 May 2020.
Christ Hospital Health Network. Accessing care during COVID-19. 2020. https://www.thechristhospital.com/patient-resources/covid-19/ways-to-access-care (accessed 21 May 2020).	KwaZulu-Natal Department of Health. COVID-19 Outbreak Response Plan for Inkosi Albert Luthuli Central Hospital. 8 May 2020.
Coimbra R, Edwards S, Coimbra BC, Tabuenca A. Resuming elective surgical services in times of COVID-19 infection. <i>Trauma Surg Acute Care Open</i> 2020;5(1):1-5. https://doi.org/10.1136/tsaco-2020-000511	Lenmed Hospital. COVID-19 communication: Guidelines for endoscopy during the COVID-19 pandemic. 25 May 2020.
International Federation of Gynecology and Obstetrics (FIGO). COVID-19 – restarting elective surgery. 22 May 2020. https://www.figo.org/covid-19-restarting-elective-surgery (accessed 21 May 2020).	Lenmed Hospital. Guidelines for COVID-19 operating theatre and surgical intervention. 25 May 2020.
Iyengar KP, Jain VK, Vaish A, Vaishya R, Maini L, Lal H. Post COVID-19: Planning strategies to resume orthopaedic surgery – challenges and considerations. <i>J Clin Orthop Trauma</i> 2020;11(Suppl 3):S291-S295. https://doi.org/10.1016/j.jcot.2020.04.028	Life Healthcare Group. COVID-19 – update to our specialists and referring general practitioners. 25 March 2020.
Michigan Value Collaborative. Resource utilization for 17 common elective surgeries at Michigan hospitals. 15 April 2020. https://michiganvalue.org/wp-content/uploads/2020/04/MVC-Resource-Utilization.pdf (accessed 21 May 2020).	Mediclinic. COVID-19: Resumption of elective surgery. 30 April, 2020.
Ozturk K, Unkar EA, Ozturk AA. Perioperative management recommendations to resume elective orthopaedic surgeries for post-COVID-19 'new normal': Current vision of the Turkish Society of Orthopaedics and Traumatology. <i>Acta Orthop Traumatol Turc</i> 2020;54(3):228-233. https://doi.org/10.5152/j.aott.2020.20183	National Department of Health, South Africa, COVID-19 Online Resource & News Portal. Guideline on the deployment of health care workers ≥60 years of age and those with high-risk medical comorbidities during the COVID-19 epidemic. 28 April 2020. https://sacoronavirus.co.za/wp-content/uploads/2020/08/Guideline-on-the-deployment-of-Health-Care-Workers-%E2%89%A560-years-of-age-during-COVID-Final_28Apr2020.pdf (accessed 9 June 2020).
Piedmont Health. Elective Surgery Algorithm. 15 March 2020.	South African Private Practitioners Forum. Position Statement: During the COVID-19 pandemic, who should decide whether surgical procedures are necessary and whether the risks are acceptable. 2020.
Prachand VN, Milner R, Angelos P, et al. Medically necessary, time-sensitive procedures: Scoring system to ethically and efficiently manage resource scarcity and provider risk during the COVID-19 pandemic. <i>J Am Coll Surg</i> 2020;231(2):281-288. https://doi.org/10.1016/j.jamcollsurg.2020.04.011	South African Society of Anaesthesiologists. A pragmatic approach to surgery during COVID-19 period in South Africa. 23 April 2020.
Royal College of Surgeons of England. Clinical guide to surgical prioritisation during the coronavirus pandemic. 2020. https://www.rcseng.ac.uk/coronavirus/recovery-of-surgical-services/#s1 (accessed 21 May 2020).	South African Society of Anaesthesiologists. PPE selection flowchart for procedural based care in consideration of asymptomatic COVID disease and false negative possibilities. https://sasaapi.sasaweb.com/Newsletters/Document/PPEWorkflowGuidanceFinal20-04-2020_637229811771497600.pdf (accessed 21 May 2020).
Spanish Ministry of Health. Recommendations for the safe restart of elective surgery after the pandemic phase COVID-19. 16 May 2020. https://sensor.org/en/2020/recomendaciones-de-reinicio-seguro-de-cirurgia-electiva/ (accessed 21 May 2020).	South African Society of Anaesthesiologists. Risk associated with operating during the coronavirus pandemic, 2020.
State of Illinois: Illinois Department of Public Health. Elective Surgeries and Procedures. 24 April 2020. http://www.dph.illinois.gov/sites/default/files/Elective_Surgery_04.24.20.pdf (accessed 9 June 2020).	Waaert J, Matley PJ, Brand M, on behalf of FosSAS. Federation of Surgeons of South Africa consensus document for the resumption of elective surgery after level 5 COVID-19 'lockdown' period in South Africa. 2020. http://www.surgeon.co.za/wp-content/uploads/2020/05/FOSAS-Consensus-Documents-Document-on-Resumption-of-Elective-Surgery.pdf (accessed 9 June 2020).
Tennessee Hospital Association. THA principles for returning to elective surgery and procedures. 2020. https://tha.com/tha-principles-for-returning-to-elective-surgery-and-procedures/ (accessed 21 May 2020).	
Ti L, Ang L, Foong TW, et al. What we do when a COVID-19 patient needs an operation: Operating room preparation and guidance. <i>Can J Anaesth</i> 2020;67:756-758. https://doi.org/10.1007/s12630-020-01617-4	

environment, patient, and surgical needs/backlog factors. These were subdivided into COVID-19 epidemiology, COVID-19 screening and testing, hospital bed availability, PPE, staff and equipment availability, dedicated COVID-19 teams, quality of care, prioritisation factors, order of cases, protocol/guidelines, and patient factors. The importance of each of these recommendations was ranked by the task team and incorporated into the national recommendations and risk calculator.

National recommendations

Six national recommendations were created and are listed in Table 2. These were based on the best evidence in the literature on perioperative mortality of COVID-19-positive patients and infection control measures. A COVID-19 risk calculator was created for the SA context in three parts. The first part, the individual risk assessment score which was based on the MeNTS score,^[18] considers disease, procedure, and patient comorbidity factors. Several variables were modified including the effect of delay on the natural history of the disease and some of the procedure categories. In addition, COVID-19 symptoms were removed from the patient factors since preoperative testing was included as a recommendation. The facility pandemic score was created to adjust the final decision for the local COVID-19 context (supplementary file 2, available at <http://samj.org.za/public/sup/15603-risk.pdf>).

Evaluation of the recommendations and COVID-19 risk calculator

Participants' demographics

The demographic characteristics of the study participants are shown in Table 3. A total of 99 participants from eight of the nine SA provinces completed the questionnaire.

Recommendations

All six recommendations received mean ratings >4 on the 5-point Likert scale (Table 2). The recommendations with the highest rankings were the need to assess individual patient risk and health facility readiness (mean 4.7), obtaining consent for risk of COVID-19 infection (mean 4.7) and mandatory COVID-19 testing (mean 4.6).

COVID-19 risk calculator

The pandemic scores reported by participants ranged from 4 to 16, with a mean (standard deviation) of 7.1 (3.2). The overall concordance of the COVID-19 surgical risk calculator with current clinical practice was 81% (Table 4). Further analysis of the 19% non-concordant

responses demonstrated that in circumstances when the risk calculator suggested that surgery be done, the majority (93.6%) of the healthcare providers would not have carried out surgery in such instances. The Cronbach alpha test for internal consistency was 0.71.

Table 5 illustrates the feedback of the study participants on the COVID-19 risk calculator. A total of 54 participants (54.5%) felt that the risk calculator was helpful to either determine individual patient risk or prioritise patients against others. Sixteen participants (16.2%) said that the risk calculator was not helpful, while 59 (59.6%) felt it would be a helpful tool for other hospital staff.

Discussion

There is no panacea for the surgical backlog created by the COVID-19 pandemic. SA has inequitable surgical access, especially in the rural

Table 3. Demographic characteristics of the study participants (N=99)

	n (%)
Province	
Western Cape	34 (34.3)
KwaZulu-Natal	24 (24.2)
Gauteng	21 (21.2)
Free State	7 (7.1)
Eastern Cape	7 (7.1)
Limpopo	3 (3.0)
Mpumalanga	2 (2.0)
Northern Cape	1 (1.0)
Health sector	
Public	58 (58.6)
Private	31 (31.3)
Both	10 (10.1)
Geographical area	
Urban	82 (82.8)
Semi-urban	9 (9.1)
Rural	8 (8.1)
Specialty	
Anaesthesiologist	43 (43.4)
Surgeon	45 (45.5)
Family physician	4 (4.0)
Other	7 (7.1)

Table 2. Key recommendations on COVID-19 and surgery

Ranking	Key recommendation	Rating, mean (SD)
1	Safe reintroduction of surgery in the presence of community transmission of COVID-19 requires assessment of individual patient risk as well as health facility readiness	4.7 (0.7)
2	Surgery with coexisting COVID-19 infection poses an increased risk of morbidity and mortality, and non-emergency surgery should be avoided	4.4 (0.9)
3	Preoperative COVID-19 testing should ideally be performed on all patients scheduled for non-emergency surgery and surgery postponed if positive (for at least 10 days after last day of symptoms or from test if asymptomatic)	4.6 (0.8)
4	Where testing is not available or turnaround time is prohibitively long, patients with COVID-19 symptoms should be postponed	4.4 (0.9)
5	For patients who have recovered from COVID-19, assessment for COVID-19 sequelae is part of the risk evaluation. Routine repeat PCR testing is not recommended	4.4 (0.9)
6	Risk of concomitant and nosocomial COVID-19 infection should be discussed as part of the consent process	4.7 (0.6)

SD = standard deviation; PCR = polymerase chain reaction.

Table 4. Concordance of the COVID-19 risk calculator with clinical practice

	<i>n</i>	Clinical decision		Non-concordant responses	
		Concordant	Not concordant	Risk calculator: Yes Clinical practice: No	Risk calculator: No Clinical practice: Yes
Case 1	90	69 (76.7)	21 (23.3)	20 (95.2)	1 (4.8)
Case 2	82	68 (82.9)	14 (17.1)	13 (92.9)	1 (7.1)
Case 3	83	62 (74.7)	21 (25.3)	19 (90.5)	2 (9.5)
Case 4	91	82 (90.1)	9 (9.9)	8 (88.9)	1 (11.1)
Case 5	88	72 (81.8)	16 (18.2)	13 (81.3)	3 (18.7)
Case 6	80	59 (73.8)	21 (26.3)	20 (95.2)	1 (4.8)
Case 7	78	60 (76.9)	18 (23.1)	18 (100)	0
Case 8	77	66 (85.7)	11 (14.3)	11 (100)	0
Case 9	79	76 (96.2)	3 (3.8)	2 (66.7)	1 (33.3)
Case 10	79	56 (70.9)	23 (29.1)	23 (100)	0
Total	827	670 (81.0)	157 (19.0)	147 (93.6)	10 (6.4)

Table 5. Feedback on the COVID-19 surgery risk calculator

Variables	<i>n</i> (%)
Was the COVID-19 surgery risk calculator helpful for you?	
Yes*	54 (54.5)
Maybe/don't know	29 (29.3)
No†	16 (16.2)
Would this COVID-19 surgery risk calculator help others at your hospital?	
Yes	59 (59.6)
Maybe/don't know	33 (33.3)
No†	7 (7.1)

*To determine individual patient risk or to prioritise patients.
†Because surgical decisions are made using a different method.

public sector^[19] and between the public and private health systems. The COVID-19 pandemic has exposed inherent weaknesses in the surgical health system throughout the country. Until new infections can be controlled through improved public health measures such as vaccination and non-pharmaceutical interventions, access to surgical care will continue to be limited and variable between facilities and health sectors. Some hospitals will provide a full complement of non-essential and essential operations, while others will only provide the latter. Until now, the process of selecting operations to perform has not been uniform, with decisions about which procedures to cancel, delay or proceed with made on a case-by-case basis. A national framework to guide this decision-making, which has both overarching key recommendations and guidance on how to integrate individual patient risk factors with the rapidly changing intensity of the COVID-19 pandemic, is necessary.

To this end, the national COVID-19 surgical task force has created tools to assist hospital perioperative teams to objectively evaluate risks and benefits of each surgery. Six recommendations around preoperative COVID-19 screening and testing as well as the use of appropriate PPE were created. In addition, a COVID-19 surgical risk calculator was developed and tested, which considers local pandemic severity, as well as patient factors such as anaesthesia risk, disease severity, and SARS-CoV-2 transmission risk during the proposed operation. This risk calculator had a high acceptability and level of concordance with current clinical practice among nearly 100 perioperative practitioners. Looking at discordant cases, practitioners tended to be more conservative than the risk calculator, with the majority cancelling or delaying operations even when the risk calculator recommended proceeding, suggesting that other

factors such as fear of poor outcomes or staff and bed shortages could be contributing to their clinical decision-making.

Study limitations

The limitations of this study are that the COVID-19 pandemic is changing clinical practice rapidly, and the literature review will no longer be up to date at the time of publication. In addition, the snowball sampling frame may have introduced bias, and those who have accepted the risk calculator use may have been more likely to respond, thereby overestimating its acceptance.

Conclusions

This is the first SA national framework for COVID-19 surgical prioritisation tool, created using the best available evidence and validated by surgical stakeholders. This framework was endorsed by the Ministerial Advisory Committee on COVID-19 on 28 August 2020,^[20] as well as by the Association of Surgeons of South Africa, but it still needs to be widely implemented. We believe that the COVID-19 recommendations and risk calculator are useful tools for the SA context, which may help perioperative teams provide equitable, ethical and personalised patient care.

Declaration. None.

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Author contributions. KMC and MS conceived the study design and wrote the first draft. LC, BMB and MM created the first draft of the risk calculator. JM designed the data collection tool. EOO analysed the data.

KMC, TCH, SM, PDG, HG and LC performed the literature review. All authors contributed to manuscript revisions and approved the final version.

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Conflicts of interest. None.

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