



Humanitarian Surgical Missions in Times of COVID-19: Recommendations to Safely Return to a Sub-Saharan Africa Low-Resource Setting

Víctor Lopez-Lopez¹ · Ana Morales² · Elisa García-Vazquez³ · Miguel González⁴ · Quiteria Hernandez¹ · Alberto Baroja-Mazo⁵ · Dolores Palazon¹ · Jose A. Tortosa⁶ · Maria A. Rodriguez⁷ · Nuria M. Torregrosa⁸ · Winnie Kanyi⁹ · J. K. Ndungu¹⁰ · José Gil Martínez¹ · José M. Rodríguez¹

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Abstract

Background Since the declaration of the pandemic, humanitarian medicine has been discontinued. Until now, there have been no general recommendations on how humanitarian surgical missions should be organized.

Methods Based on our experience in the field of humanitarian surgical missions to Sub-Saharan Africa, a panel of recommendations in times of COVID-19 was developed. The fields under study were as follows: (1) Planning of a multidisciplinary project; (2) Organization of the infrastructure; (3) Screening, management and treatment of SARS-COV-2; (4) Diagnostic tests for SARS-COV-2; (5) Surgical prioritization and (6) Context of patients during health-care assistance. We applied a risk bias measurement to obtain a consensus among humanitarian health-care providers with experience in this field.

Results A total of 94.36% of agreement were reached for the approval of the recommendations. Emergency surgery must be a priority, and elective surgery adapted. For emergency surgery, we established a priority level 1a (< 24 h) and 1b (< 72 h). For an elective procedure, according our American College of Surgeon adaptation score, process with more than 60 points should be reconsidered. Due to the low life expectancy in many African countries, we consider 45–50 years as age of risk. In case of SARS-COV-2 active infection or high clinical suspicion, the screening, management and treatment should be following the international guidelines adapted to duration of the stay, available infrastructure, size of the cooperation team and medical resources.

Conclusions Humanitarian surgical mission in times of COVID-19 is a challenge that must extrapolate the established recommendations to the local cooperation environment.

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✉ Víctor Lopez-Lopez
victorrellopez@gmail.com

¹ Department of Surgery, Virgen de la Arrixaca Clinic and University Hospital, IMIB-Arrixaca, El Palmar, Murcia, Spain

² Department of Neurology, Virgen de la Arrixaca University Hospital, IMIB-Arrixaca, Murcia, Spain

³ Department of Internal Medicine, Virgen de la Arrixaca University Hospital, IMIB-Arrixaca, Murcia, Spain

⁴ Department of Surgery, Reina Sofía University Hospital, Murcia, Spain

⁵ Digestive and Endocrine Surgery and Transplantation of Abdominal Organs, Biomedical Research Institute of Murcia, IMIB-Arrixaca, Murcia, Spain

⁶ Department of Anesthesiology, Molina Hospital, Murcia, Spain

⁷ Department of Maxilofacial Surgery, Virgen de la Arrixaca University Hospital, IMIB-Arrixaca, Murcia, Spain

Introduction

Since COVID-19 first appeared, it has spread rapidly across the globe causing a change in the operation of health-care services and to the establishment of strict, specific measures to control the pandemic [1]. The collateral damage caused by this totally necessary measure is the drastic reduction in humanitarian surgical missions in sub-Saharan Africa (SSA). Humanitarian medicine has been fundamental in maintaining basic levels of health in some of these countries [2].

According to the WHO the main causes of mortality in SSA are infections, infestations and transmissible diseases [3]. However, many of the deaths that occur in rural African communities are due to the lack of proper surgical care, meaning that there is an urgent need for collaboration in both surgical care and infrastructure/ surgical equipment [4–6].

Besides the current pandemic-related shortage of international health volunteers to support surgical care in these countries, there appears to be uncertainty as to how the de-escalation of humanitarian health-care projects should be organized. The lack of adequate epidemiological control, the shortage of health education, the complex access to future vaccination programmes and the major difficulty in controlling a pandemic suggest that these countries will take longer than more developed nations to bring the pandemic under control [7–12]. Moreover, the limited access to a diagnostic test means that on many occasions patients must be treated with the same measures of protection used when treating an infected patient [13–15].

Most scientific societies have proposed guidelines for managing their patients in the COVID-19 era, but the state of sanitary equipment, socioeconomic conditions, and hygiene and cultural factors in SSA mean that such guidelines may be irrelevant in our own environment [16]. Different authors stressed their concern about how COVID-19 might affect access to safe surgery, especially in low-income countries [17–19].

The lack of consensus on the management of surgical patients in humanitarian medicine reveals the need to establish a plan of action. Based on our own experience of health-care assistance in the field of humanitarian medicine, and taking into consideration the general guidelines on the management of patients and medical staff in the COVID-19 era, the aim of this study was to generate

recommendations and suggestions for humanitarian surgical missions so that they can be useful to all those who carry out humanitarian medicine.

Methods

Since 2000, our non-governmental organization “Cirugía Solidaria” has conducted 21 health-care assistance missions in SSA, during which a total of 14,394 patients have been seen (including more than 4,000 children). Of these patients, 4203 have received surgery for a range of pathologies, with special emphasis on the prioritization of processes according to their effectiveness. Given the duration of these activities and their excellent results, the health-care model of cooperation in SSA appeared to have been consolidated [20–23]; however, the reality of the COVID-19 pandemic means that this model now needs rethinking, as described below.

A working group was developed with an interest in humanitarian medicine, and the current situation caused by COVID-19 in low- and middle-income countries (Supplementary information). The fields under study were as follows: [1] Planning and development of a project involving multidisciplinary humanitarian health-care team; (2) Organization of the health-care infrastructure (consulting rooms, operating rooms and hospitalization areas); (3) Screening, management and treatment of active SARS-CoV-2 infection; (4) Diagnostic tests for acute SARS-CoV-2 infection; (5) Prioritization in the scheduling of patients for surgery and (6) Context of patients seen during a humanitarian health-care assistance. For each of the six fields of interest, two experts in humanitarian health-care assistance were assigned to establish the recommendations. Each of the experts conducted a literature research through MEDLINE/PubMed, Scopus, Embase, CINAHL or Web of Science to find relevant publications related to their points of interest. Keywords used in the search included a terms combination of “COVID-19,” “SARS-CoV-2,” “humanitarian surgery,” “humanitarian medicine,” “low- and middle-income countries,” “testing,” “vaccines,” “drug treatment,” “organization and administration” and “prevention and control.” Furthermore, a manual search of references from relevant articles was performed.

After searching, discussions occurred both within the subgroup and with members of other subgroups. Later, a clearly defined set of suggestions was formulated about the organization of a humanitarian surgical mission in COVID-19 times. Subsequently, the study coordinators contacted with a selection of international health volunteers with

⁸ Department of Surgery, Santa Lucía University Hospital, Cartagena, Murcia, España

⁹ Health Muranga County, Maragua, Kenia

¹⁰ Department of Surgery Maragua Hospital, Maragua, Kenia

experience in the field of humanitarian medicine to perform a validation to the consensual recommendations. The evaluation committee was composed by surgeons, nursing staff, anesthetists, neurologists, nephrologists, internists, specialists in infectious diseases and emergencies, traumatologists, pediatricians and otolaryngologist. We apply a risk bias measurement to obtain a consensus among cooperators. In this way, we developed a checklist with 13 items for a critical evaluation of the quality of the recommendations. This checklist was inspired by the Downs and Black checklist [24], an instrument designed for evaluating different study designs (Supplementary information Table S1). A total of 94.36% of agreement were reached by all respondents for the approval of the recommendations and suggestions (Supplementary information Figure S1).

Planning and development of a project involving multidisciplinary cooperation humanitarian health-care assistance

Once a cooperation team has been formed, a pre-campaign commission must be set up to evaluate the epidemiological situation of the destination zone. The commission should be made up of members of the team, their local counterparts, government health authorities and corresponding health-care institutions. All team members must have a COVID PCR test done 48 h before departure. Any individual with symptoms indicating possible infection will be excluded from the expedition. The team must include two or more internists with specialist training in COVID-19. Most of the surgical and medical equipment should be sent on ahead and the rest, for example medication and COVID-19 equipment, should be carried by the aid workers. In this way, we will be able to ensure that essential material is not in danger of contagion and will be readily available on arrival.

Organization of the health-care infrastructure: consulting rooms, operating rooms and hospitalization areas

This initial contact will identify cases of COVID-19 in the area and the possibility of conducting diagnostic tests. The crowding of patients waiting to be evaluated is common, and the safety distance must be organized ensuring the safety distance (Supplementary information Figure S2). Reducing the number of face-to-face consultations by encouraging remote consultations is difficult in SSA due to the absence of devices for telemedicine [25]. Even so, it should be attempted where necessary. Patients must be unaccompanied except in the case of minors or people requiring help for mobility. All patients must undergo

screening for COVID-19 under the direction of the internists. They will then be referred for primary health-care screening to differentiate between possible medical and surgical pathologies.

In ideal conditions, there will be at least two independent blocks, so that one of them will always be available for scheduled or emergency management of a COVID-19 patient. The reprocessing of surgical equipment should be done following protocols for cleaning, disinfection and sterilization with moist heat (autoclave 134 °C). During hospitalization, there must be a physical space set aside exclusively for patients with COVID-19 or suspected COVID-19. Priority should be given to early discharge, with a contact number provided for any complications.

The aim is to protect both patients and workers from the risks of SARS-CoV-2 infection and ensure health care [26, 27]. It will be important for everybody on the expedition to avoid quarantine, which means establishing work groups that are balanced with regard to the workers' skills and functional units to which they belong (Table 1).

Screening, management and treatment of active SARS-COV-2 infection

As mentioned above, for the duration of the SARS-COV-2 pandemic, continual screening for the disease must be done in patients seeking medical or surgical evaluation as well as before and after treatment [28–31]. It will therefore be necessary to check for symptoms of COVID-19 and suspected infection during several key stages.

Initial medical evaluation

It will be crucial to conduct a clinical interrogation on the presence of respiratory symptoms and epidemiological contacts, as well as a physical exploration, auscultation of the lungs and pulse oximetry. The patient's epidemiological situation should also be determined, differentiating whether they are isolating for COVID-19 or positive for COVID-19, or have been in contact with a person who has tested positive for COVID-19 during the previous fortnight, or are health or special workers with a respiratory infection.

The data will be used to classify patients as having a high or low suspicion for COVID-19 infection. If feasible, a test to diagnose acute infection will be requested. The test can be done if circumstances permit (e.g., if it is available locally or provided by the aid workers). This will classify patients as COVID-19-positive, highly suspicious for COVID-19 (if the test is negative but clinical suspicion is very high) and COVID-negative. Patients who are COVID-positive or highly suspicious for COVID-19 will be

Table 1 Recommendations for health-care workers, non-health workers and family member in contact with persons having confirmed or suspected COVID-19.*Recommendations for the protection of humanitarian health-care providers*

At least two “surgery units” consisting of a preoperative area, operating room and postoperative recovery area (ensuring a COVID-1^D zone).

Always maintain proper protective measures with a COVID-positive or suspected COVID-positive patient

Divide aid workers into closed stable work groups.

Try to minimize contact between workers without face covering during their rest breaks.

Try to ensure the dining room is spacious and allows a distance of 1.5 m between tables during mealtimes and is well aired. It should preferably be outdoors.

Continuous training of professionals about the use of PPE and the use of chemoprophylaxis and immunoprophylaxis as soon as available.

Recommendations regarding information to patients and family members

Detailed information about the risks and benefits of undergoing surgery in the transitory situation of the COVID-19 pandemic, and the risks if surgery is deferred.

Education campaigns for patients and family members in measures to prevent SARS-CoV-2 infection.

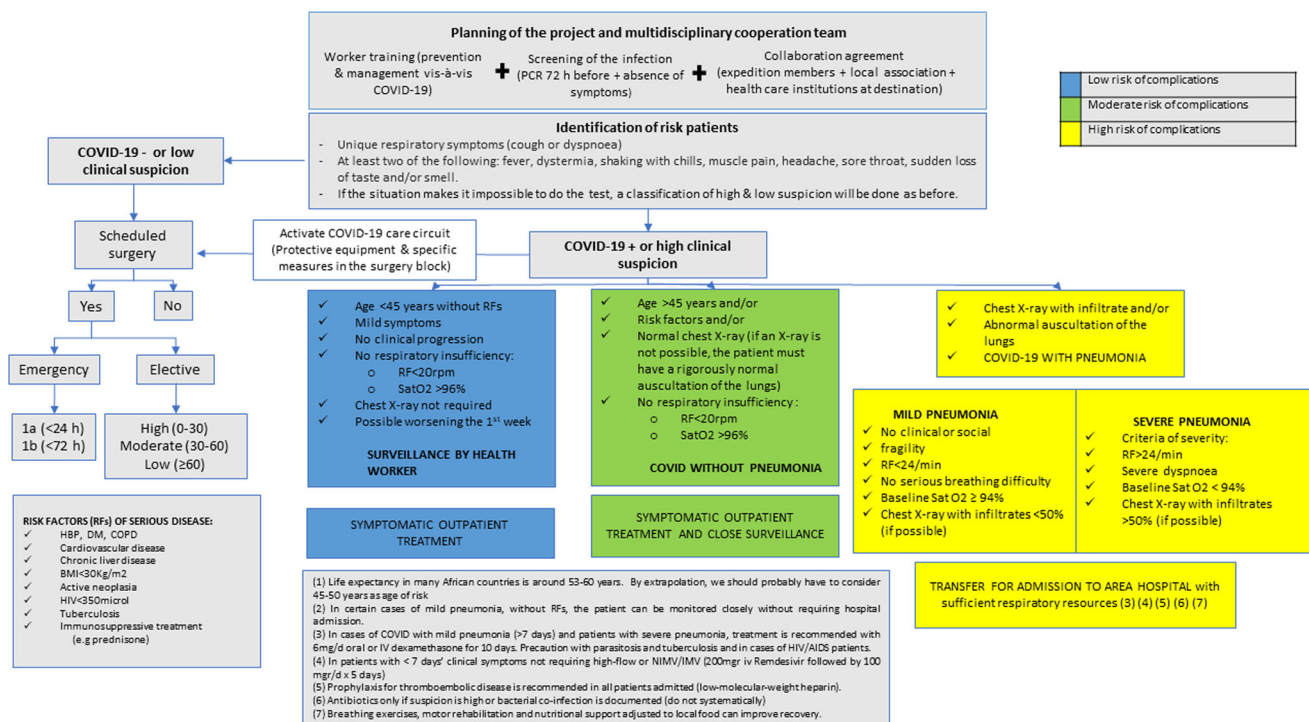


Fig. 1 Algorithm for planning a surgical health-care cooperation in times of COVID-19 in relation to the identification of patients at risk, surgical planification and management based on the symptoms associated with SARS-COV-2 infection. PCR: polymerase chain

reaction, RFs: risk factors, RF: respiratory frequency, HBP: high blood pressure; DM: diabetes mellitus; COPD: chronic obstructive pulmonary disease; BMI: body mass index; HIV: human immunodeficiency viruses

stratified according to the clinical situation indicated in the following algorithm (Fig. 1).

Perioperative evaluation

If a patient requires surgical care, they will be sent to the corresponding consulting room, where the indication and priority for surgery will be established. During the surgery,

all the staff will follow the anaesthesiologist guidelines reported in the context of COVID-19 pandemic [32]. After the operation if any suspicious symptoms or signs are detected, the procedure will be as above and if possible will include a test and then clinical assessment and intervention according to the algorithm.

Table 2 Recommendations for prioritization*Priority Ia—Emergency procedures to be performed in < 24 h*

Emergency laparotomy

Postoperative complications

Appendectomy

Fractures, hemorrhages, vascular injuries and traumas

Drainage of localized sepsis—necrosis

Perforated esophagus/stomach

Acute airway obstruction

Major burns

Necrotizing fasciitis

Polytrauma due to road accident*

Stings, bites and wounds caused by machete, knife or firearm*

Testicular torsion*

Ectopic pregnancy complications

Emergencies related to pregnancy and childbirth (instrumental delivery, perineal repair, manual removal of placenta, cervical cerclage, hysterectomy, early pregnancy and abortion care)

*Priority Ib Procedures to be performed in 24–72 h*Bowel obstruction, colectomy for acute severe ulcerative colitis, abscess¹/other infection, urgent nutrition compromise, failed conservative management of localized intra-peritoneal infection, sphincter repair following rape*, incarcerated hernia*, goitres with respiratory compromise, acute abdomen in the context of typhoid disease*

Adaptation of the usual standards of treatment for an oncological surgical pathology based on available resources and reasons of expediency. Although chemotherapy or radiation therapy is not possible in this context, evaluate whether surgery might be curative or useful in preventing tumor-related complications

Prioritization of complex pathologies subsidiary to complications during the first few days

Potentially deferrable benign procedures in which the only possibility of treatment is a cooperation surgical mission. Schedule during the campaign in response to resources

Potentially deferrable benign procedures in which the only possibility of treatment is a cooperation surgical mission. Schedule during the campaign in response to resources

*Emergencies adapted to the context of international cooperation

Information given to the patient and family members

The patient will be given information on the safety measures to be taken, with special attention to frequent hand-washing, social distancing and the use of hospital areas with more space and good ventilation. Aid workers should organize training activities regarding these measures in their country of origin (Table 1).

Diagnostic tests for acute SARS-COV-2 infection

According to currently available data, there are mainly two techniques for establishing a diagnosis of acute SARS-COV-2 infection [33]. The microbiological diagnosis of COVID-19 is based mainly on SARS-CoV-2 viral RNA detection using RT-PCR (Reverse transcription polymerase chain reaction) in a nasopharyngeal or oropharyngeal exudate. A more rapid alternative is antigen detection in nasopharyngeal exudate. The main advantage of this technique is that it provides a quick diagnosis (15–20 min)

and is a simple, low-cost procedure that can be performed in the health-care center. This and similar tests on the market may be a good tool in the diagnostic strategy for COVID-19 in Africa [13, 14].

Prioritization in the scheduling of patients for surgery

The proper selection of patients for surgery is possibly the most important aspect of this approach [34, 35]. Patient screening over the first few days will be fundamental, and patients must be prioritized in anticipation of possible eventualities such as an outbreak or the need to slacken or suspend the health-care assistance. Prioritization must take into consideration the severity of the pathology and the risk of complications (depending on the type of surgery or patient). Emergency surgery must always be a priority, and elective surgery adapted to the characteristics of the project (duration of the stay, available infrastructure, size of the team and availability of medical resources).

Table 3 ACS scale of surgical prioritization during the coronavirus pandemic in elective surgery adjusted to the population in which international collaborations are usually conducted

	1	2	3	4	5
Effectiveness of conservative treatment	Non-existent / unavailable	Effectiveness <40% of that provided by surgery	Effectiveness 40–60% of that provided by surgery	Effectiveness 60–95% of that provided by surgery	Effectiveness totally equivalent to surgery
Impact of a 6 month deferral on the disease*	Very serious worsening	Significant worsening	Moderate worsening	Mild worsening	No worsening
Impact of a 1 year deferral on the disease*	Very serious worsening	Significant worsening	Moderate worsening	Mild worsening	No worsening
Impact on social & work life*	Yes			No	
Operating time (min)	<30	30–60	60–120	120–180	>180
Mean length of stay	Minor surgery/Major outpatient surgery	< 24 h	24–48 h	3 days	>4 days
Probability of need for ICU	Improbable	<5%	5–10%	10–25%	> 25%
Blood loss	<100 cc	100–250 cc	250–500 cc	500–750 cc	>750 cc
Surgical team members	1	2	3	4	>4
Site	None of the following	Upper & lower abdomen via laparoscopy	Lower abdomen via open approach	Upper abdomen via open approach, thyroid surgery	Head & neck, chest, complex esophagogastric
Age*	<20 years	20–40 years	40–50 years	50–65 years	>65 years
Chronic lung disease (COPD, asthma, cystic fibrosis)	No			On-demand treatment	Usual treatment
OSAS	No			No treatment	N/A*
Cardiovascular disease	No		Yes	N/A*	N/A*
BMI	<25 Kg/m ²			25–30 Kg/m ²	>30 Kg/m ²
Type 2 diabetes mellitus	No		Yes	N/A*	N/A*
Flu syndrome	No				Yes
Contact with COVID-19 in past fortnight	No		Unsure		Yes

Min: minutes; ICU: intensive care unit; COPD: chronic obstructive pulmonary disease; OSAS: Obstructive sleep apnea syndrome; BMI: body mass index. *Modifications made to original scale for the context of humanitarian medicine.

High priority
Medium priority
Low priority
Low risk of complications
Moderate risk of complications
High risk of complications
Not applicable

To establish recommendations for prioritization we used the Clinical Guide to Surgical Prioritization during the Coronavirus Pandemic published by the Federation of Surgical Speciality Associations (FSSA) and the American College of Surgeons (ACS) and adapted it to the context of humanitarian medicine (36, 37). For emergency surgery we established a priority level 1a (procedures to be performed in < 24 hours) and 1b (procedures to be performed in < 72 hours), which we modified from the FSSA guide to include the most common procedures we are likely to encounter in the context of humanitarian surgical missions (Table 2). Whereas some procedures that cannot be resolved via endoscopy or radiology would be automatically proposed for surgical management.

To determine the priority of elective procedures we adapted the ACS scale to focus on the factors dependent on the base process, procedures, stage of the patient and/or presence of COVID-19 disease. We made a series of modifications to the scale to adjust it to the context of our activity. First of all, we modified the item “impact of deferral” by extending it to 6 months or 1 year, because the humanitarian health-care assistance takes place at most twice per year and occasionally not even in the same place. Secondly, certain fields related to obstructive sleep apnoea syndrome and treatment of cardiovascular disease or diabetes were modified because there is no access to the necessary medications. Thirdly, we propose replacing the item “immunosuppression” with “impact of the pathology on work or social life.” In this context, some people are disabled by pathologies such as hernias or giant hydroceles (Figure S2), which prevent them from doing any work. Another example is large goitres (Figure S2), which lead to young women not being able to marry and have children due to the social rejection they cause. Lastly, we color-coded the scale according to priority and risk of complications to facilitate decision-making. The ACS scale proposes a cutoff point of 55–57 points for reconsidering how appropriate a procedure is. In our own context, it is probably the cases with an accumulated score of more than 60 points where the appropriateness of the elective procedure should be reconsidered, although the procedure should not necessarily be canceled. A customized evaluation will be carried out for each patient and the lower the score the more advisable the need for surgery. The scores for each process are 0–20 (high priority), 20–40 (medium priority) and 60 (low priority) (Table 3).

Context of patients seen during a cooperation humanitarian health-care assistance

The panorama of certain surgical pathologies in humanitarian health-care assistance needs to be reconsidered [35]. The context of these low- and medium-developed countries

and the circumstances of a pandemic change the scenario significantly. In fact, many of the processes to be treated are benign, which means they have a temporary nature and can be deferred easily. But, we must not forget that those processes labeled as benign and can have an impact on health and social life in these environments.

It is important to remember that hernia surgery in most cases is a procedure that can be deferred [38, 39]. According to the indications of the European Hernia Society, recommendations will vary between countries with different levels of outbreak, resource utilization for COVID patients, local testing capacities and availability of PPE [40]. The problem is that more than 60% of the population of SSA is made up of farmers, and agricultural activities account for about 23%. Physical work is therefore key to their professional and economic development, such that hernia repair is vitally important. Another example is thyroid pathology. Patients with stage III–IV goitres have a limited quality of life and cannot work, which implies a major financial loss for the family. All this gives these pathologies a different connotation to that in developed countries, as they have a greater effect on the local economy. Shaha et al. reported some principles regarding thyroid surgery during the COVID-19 pandemic, specifying without any clear guidelines that management depended primarily on the characteristics of the lesion (giving priority to tumor pathology) and on the pandemic-related pressure on hospitals [41]. Under the label “benign,” we also find multiple pathologies that can be treated with outpatient procedures and which carry a low risk of contagion because of the reduced production of aerosols [42, 43]. However, despite causing a great deal of social harm they may be postponed because they are benign, and priority should be given to cases of acute infection, potential malignancy, uncontrollable pain, or a condition where the prognosis would become significantly worse.

Conclusions

A great deal of information has been published on how patients should be managed in the health-care settings of the more developed countries, but up until now there have been no guidelines on how humanitarian health-care assistance could be resumed. COVID-19 is far from disappearing completely, and it is crucial we do not forget the less developed countries, where the consequences of the pandemic may be even more devastating. The development of the vaccine will also mean a change in the organization of this humanitarian health-care assistance. The problem is that we still do not know when it will be available and much less how access to it will be in the lower- and middle-income countries. Although the development of these

surgical missions depends on a number of factors, there must be some general, basic recommendations, in addition to specific recommendations on the screening and management of COVID-19, adapted to the special characteristics of the low-resource areas where this cooperation will take place. We are aware that the organization of these humanitarian health-care activities is complicated, which is why further studies are necessary so that cooperation can be resumed as soon as possible. The recommendations were established based on the experience in humanitarian medicine of the working group and the most outstanding findings in the literature related with COVID-19. To give more robustness to these recommendations, they were validated by experienced cooperators with more than 94% agreement. We would like to emphasize that the recommendations have been made based on our experience in Sub-Saharan Africa low-resource setting, so they are especially directed to cooperation in these regions. Even so, many of the recommendations and suggestions that we make can be extrapolated to humanitarian medicine and surgical projects in other low- and middle-income countries due to many of them share a similar social and health-care context.

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Compliance with ethical standards

Conflict of interest The authors have nothing to disclose and declare no conflicts of interest.

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