

**Recommendations for the operating room in the face of COVID-19: an integrative review***Recomendaciones para el quirófano ante el COVID-19: una revisión integradora**Recomendações para o centro cirúrgico frente ao enfrentamento da COVID-19: uma revisão integrativa***Abstract**

The aim was to present the new recommendations for the surgical center, in the face of facing SARS-CoV-2. This is an integrative literature review, carried out in three databases Virtual Health Library, Scientific Electronic Library Online and Medical Literature Analysis and Retrieval System Online. Through the Health Sciences Descriptors: Perioperative Assistance, Perioperative Care, Atención Perioperativa; Coronavirus Infections, Respiratory Syndrome, COVID-19, SARS-CoV-2; Surgical Center, Surgicenters and Surgical Center; Best Practices Recommendation, Practice Guideline, Clinical Practice Guide. Database searches were carried out from March 2020 to March 2021. The articles extracted from the PICO research question: What were the changes that occurred in the Surgical Center in the face of COVID-19? We resulted in eight scientific articles. Among the new recommendations found, new practices were highlighted for the reorganization of surgical procedures, the safety of health professionals, the organization of the OR, postoperative recovery and the cleaning and disinfection of the OR. The new recommendations described in the literature can direct care towards the professionals working in perioperative care, as well as towards safe and quality patient care.

**Descriptors:** SARS-CoV-2; COVID-19; Surgery Center; Perioperative Assistance; Practice Guideline.

**Resumen**

El objetivo fue presentar las nuevas recomendaciones para el centro quirúrgico, de cara al enfrentamiento del SARS-CoV-2. Se trata de una revisión integrativa de la literatura, realizada en tres bases de datos Biblioteca Virtual en Salud, Biblioteca Electrónica Científica en Línea y Sistema de Análisis y Recuperación de Literatura Médica en Línea. A través de las Ciencias de la Salud Descriptores: Asistencia Perioperatoria, Cuidado Perioperatorio, Atención Perioperatoria; Infecciones por Coronavirus, Síndrome Respiratorio, COVID-19, SARS-CoV-2; Centro Quirúrgico, Quirúrgicos y Centros Quirúrgicos; Recomendación de Buenas Prácticas, Guía de Práctica, Guía de Práctica Clínica. Las búsquedas en bases de datos se realizaron desde marzo de 2020 hasta marzo de 2021. Los artículos extraídos de la pregunta de investigación del PICO: ¿Cuáles fueron los cambios ocurridos en el Centro Quirúrgico ante el COVID-19? Damos como resultado ocho artículos científicos. Entre las nuevas recomendaciones encontradas, se destacaron nuevas prácticas para: la reorganización de los procedimientos quirúrgicos, la seguridad de los profesionales de la salud, la organización del quirófano, la recuperación postoperatoria y la limpieza y desinfección del quirófano. Las nuevas recomendaciones descritas en la literatura pueden orientar la atención hacia los profesionales que actúan en el perioperatorio, así como hacia una atención segura y de calidad al paciente.

**Descriptores:** SARS-CoV-2; COVID-19; Centro Cirúrgico; Asistencia Perioperatoria; Guía de Práctica Clínica.

**Resumo**

Objetivou-se em apresentar as novas recomendações para o centro cirúrgico, frente ao enfrentamento do SARS-CoV-2. Trata-se de uma revisão integrativa de literatura, realizada em três bases de dados Biblioteca Virtual em Saúde, *Scientific Electronic Library Online* e *Medical Literature Analysis and Retrieval System Online*. Através dos Descriptores em Ciências da Saúde: Assistência Perioperatória, *Perioperative Care*, *Atención Perioperativa*; *Coronavirus Infections*, *Respiratory Syndrome*, *COVID-19*, *SARS-CoV-2*; Centro Cirúrgico, *Surgicenters* e *Centros Quirúrgicos*; Recomendação de Boas Práticas, *Practice Guideline*, *Guía de Práctica Clínica*. As buscas na base de dados foram realizadas no período de março de 2020 a março de 2021. Os artigos extraídos da pergunta de pesquisa PICO: Quais foram as mudanças ocorridas no Centro Cirúrgico no enfrentamento da COVID-19? Resultamos em oito artigos científicos. Dentre as novas recomendações encontradas, foram destacadas novas práticas para: a reorganização dos procedimentos cirúrgicos, a segurança dos profissionais de saúde, a organização da S.O, recuperação pós-operatória e a limpeza e desinfeção da S.O. As novas recomendações descritas na literatura podem direcionar os cuidados para com os próprios profissionais atuantes na assistência perioperatória, bem como em prol do atendimento seguro e de qualidade ao paciente.

**Descriptores:** SARS-CoV-2; COVID-19; Centro Cirúrgico; Assistência Perioperatória; Recomendação de Boas Práticas.

**Thatilla Rodrigues Campos<sup>1</sup>**

ORCID: 0000-0002-8568-6835

**Lisandra Rodrigues Risi<sup>1</sup>**

ORCID: 0000-0001-8436-5100

**Ricardo de Oliveira Meneses<sup>1</sup>**

ORCID: 0000-0001-9962-2827

**Cintia Silva Fassarella<sup>1</sup>**

ORCID: 0000-0002-2946-7312

<sup>1</sup>Universidade do Estado do Rio de Janeiro. Rio de Janeiro, Brazil.

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**Corresponding author:**

Thatilla Rodrigues Campos

E-mail: [thatilla\\_tata@hotmail.com](mailto:thatilla_tata@hotmail.com)

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## Introdução

The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) virus is known as COVID-19, this new species of virus that has spread significantly across numerous countries. The first cases infected with SARS-CoV-2 were through zoonotic transmission in Wuhan, Hubei Province, China in December 2019. People sought hospital services with symptoms of severe pneumonia of unknown cause<sup>1,2</sup>.

Coronaviruses belong to the Coronaviridae family. They are positive-sense RNA viruses (27 to 34 kilobases) and an enveloped helical symmetry nucleocapsid ranging from 60 nm to 140 nm in diameter, very similar to spikes on their surface, when viewed by the electron microscope, they appear crown, hence the name coronavirus<sup>1,3</sup>.

Because the disease is transmitted from person to person, it has spread so quickly from China to other parts of the world. In March 2020, a pandemic was declared by the WHO due to the infection having spread to more than 381,000 people in 195 countries/regions and killed more than 16,000<sup>2</sup>.

The main route of transmission is respiratory, through the inhalation of droplets and aerosols from infected patients. The signs and symptoms can be mild in some people, being symptoms of a common flu such as fever, cough, sore throat, shortness of breath, fatigue, malaise, conjunctivitis, among others. Therefore, these are indistinguishable from other respiratory infections<sup>1,3</sup>.

However, they can worsen in other patients, especially those with comorbidities and the elderly, which can progress to pneumonia, acute respiratory distress syndrome (ARDS) and multiple organ dysfunction. Many people are asymptomatic<sup>1-5</sup>.

Due to the pandemic scenario, numerous industries responsible for the production of hospital supplies, medicines and equipment, had difficulty in access, market dispute and bureaucracy with regard to purchases from third-party suppliers, so that later, their manufacture went ahead and then they had to replan logistically, for the distribution of quality, safety and timely inputs<sup>6</sup>.

The logistics sector of hospital institutions, responsible for the acquisition of supplies, faced a great challenge during this period, to supply the stocks of these scenarios, in the same dimension of use, due to the high demand for care, however, there was a rapid increase in costs in the market and difficulty in borrowing from other institutions. Consequently, there was a need to postpone elective procedures and prioritize emergencies, in order to make inpatient beds available for severe respiratory patients, minimize viral spread, and conserve resources and supplies. Elective surgeries should progressively return, recommended by the Surgical Review Committee, composed of the surgery, anesthesiology and nursing team<sup>7,8</sup>.

Elective surgeries should be postponed until they are sure that all infrastructure and support services for the SC are able to provide assistance. Therefore, new protocols have emerged to plan anesthetic and surgical procedures,

thus promoting a reduction and control of the transmission of the new virus<sup>9</sup>.

One of the impacts caused by COVID-19 is the exhaustion of nursing professionals due to excessive workload, low salary, fear of transmitting the disease to family members, shortage of supplies and reduced staffing due to illness. Increasingly exacerbating the physical and mental health of these professionals, as they do not know when the pandemic will end<sup>10</sup>.

In view of the above, having as research object: The Surgical Center in the face of COVID-19, we raised the following research problem: What were the changes that occurred in the Surgical Center in the face of COVID-19?

## Methodology

This is an integrative literature review, which consists of building a very broad analysis of the literature, contributing to discussions on research methods and results, as well as on future research, based on previous studies<sup>11</sup>.

The integrative review is followed by six distinct steps similar to conventional research. First step: identification of the theme and selection of the hypothesis or research question; second stage: establishment of criteria for inclusion and exclusion of studies; third step: definition of information to be extracted from selected studies/study categorization; fourth step: evaluation of included studies; fifth stage: interpretation of results and sixth stage: presentation of the review/synthesis of knowledge<sup>11</sup>.

Data collection was performed through findings from three databases, namely the Virtual Health Library (VHL), Scientific Electronic Library Online (SciELO), Medical Literature Analysis and Retrieval System Online (PubMed/MEDLINE). Based on the PRISMA Statement methodology (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). A flowchart was built in Word, presenting the data found in the databases, according to: title, abstract and inclusion criteria. Demonstrating then how the selection process for the study was: Follow the flowchart following the PRISMA checklist (Figure 1)<sup>12</sup>.

The Boolean operators used between the synonymous descriptors were OR, and the AND was used between one descriptor and another. Although the practice dictates that three descriptors be chosen for the purpose of delimiting the relevant articles in the databases, the scarcity of relevant results after applying the filters made it necessary to carry out the delimitation using only two descriptors, combining them with each other.

Articles in Portuguese, English and Spanish that were available in full and belonging to the database in the period from March 2020, when the pandemic was declared in Brazil, to March 2021 were included from Health Descriptors mentioned above. Articles that preceded the year 2020, those belonging to other languages, books, abstracts, experience reports, dissertations and literature that did not respond to our problem were excluded.

Based on this question, the following elements were selected for the PICO strategy (Participant, Phenomenon of Interest and Context): P= Surgical center; I=

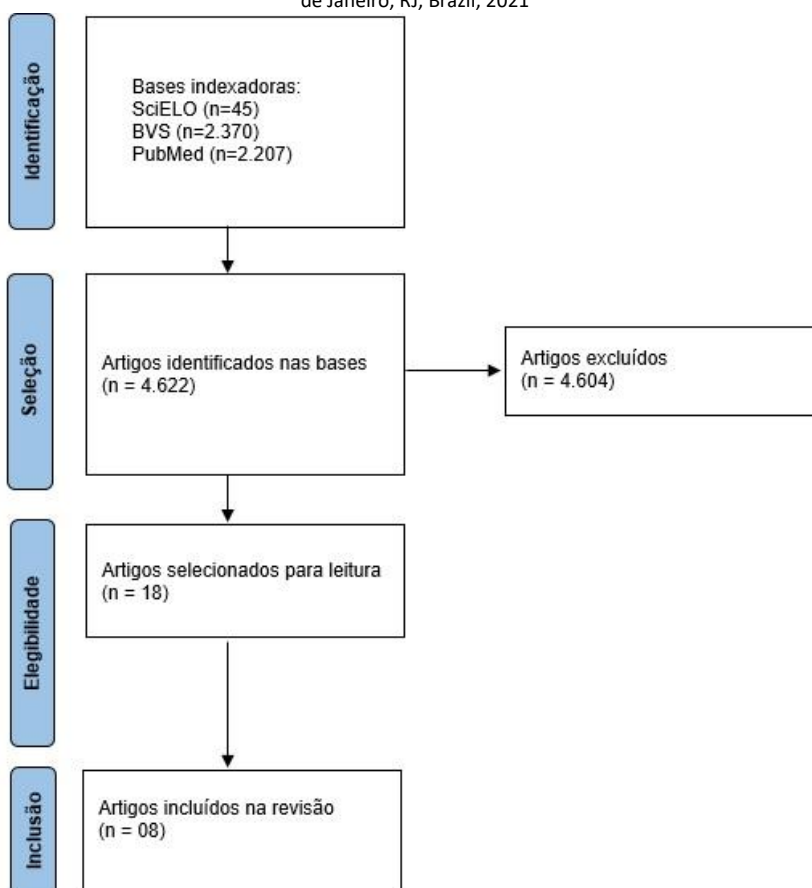


SARS-CoV-2; Co= Good Practice Recommendation. A chart with the elements of the strategy was prepared in Word (Chart 1)<sup>13</sup>.

Chart 1. Descrição da estratégia com vocabulários controlados. Rio de Janeiro, RJ, Brasil, 2021

PICO	DeCS AND MeSH TERMS
POPULATION	"Centro cirúrgico" OR "Centros Cirúrgicos" OR "Surgicenters" OR "Centros Quirúrgicos" OR "Centro Cirúrgico" OR "Centro de Cirurgia" OR "Centro de Cirurgias" OR "Centros de Cirurgia" OR "Centros de Cirurgias".
INTEREST	"Sars-CoV-2" OR "2019-nCoV" OR "Coronavírus 2 Causador de Síndrome Respiratória Aguda Grave" OR "Coronavírus 2 da Síndrome Respiratória Aguda Grave" OR "Coronavírus Causador da Síndrome Respiratória Aguda Grave 2" OR "Coronavírus da Síndrome Respiratória Aguda Grave 2" OR "Coronavírus de Wuhan" OR "Novo Coronavírus (2019-nCoV)" OR "Novo Coronavírus de 2019" OR "SARS Coronavirus 2" OR "Vírus SARS-CoV-2" OR "Vírus da COVID-19" OR "Vírus da Doença por Coronavírus de 2019" OR "Vírus da Pneumonia do Mercado de Frutos do Mar de Wuhan" OR "Wuhan coronavírus".
CONTEXT	"Recomendação de Boas Práticas" OR "Guia de Prática Clínica" OR "Practice Guideline" OR "Guía de Práctica Clínica" OR "Diretiva Prática" OR "Diretiva de Prática Clínica" OR "Diretiva de Prática Médica" OR "Diretriz para a Prática Clínica" OR "Diretriz para a Prática Médica" OR "Diretriz Prática" OR "Diretriz de Prática Clínica" OR "Diretriz de Prática Médica" OR "Diretriz para a Prática Clínica" OR "Diretriz para a Prática Médica" OR "Diretrizes Clínicas" OR "Guia de Boas Práticas" OR "Guia de Prática Médica" OR "Guia para a Prática Médica" OR "Recomendação de Boas Práticas".

Figure 1. Flowchart adapted from Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) of the article search and selection process. Rio de Janeiro, RJ, Brazil, 2021



## Results

A total of 45 articles were identified in the SciELO database, later, when applying the inclusion criteria, 32 articles were refined, but none of them responded to our problem. In the VHL, 2,370 articles were found, after applying the inclusion criteria, they were refined to 1,863 articles, and however, five articles answered our problem. Finally, in PubMed, 2,207 articles were found, later, when

applying the inclusion criteria, they were refined in 2,001, however, three articles answered our problem.

Therefore, through this search, eight scientific articles were selected, they were read in full and analyzed all their content and later the result, discussion and conclusion of the topic addressed were described. For a better understanding and analysis of the following scientific findings, of the eight selected articles, we built a spreadsheet, highlighting the topic addressed (Chart 2):



Chart 2. Grouping of selected articles. Rio de Janeiro, RJ, Brazil, 2021

Article Title	Author/Year Data base	Objective	Scientific Evidence
Centro cirúrgico: recomendações para o atendimento de pacientes com suspeita ou portadores de COVID-19	Trevilato., <i>et al.</i> 2020 BVS	Present recommendations for reorganization of the surgical center in the care of patients with suspected or confirmed COVID-19.	The management of human and material resources is essential to: meet the perioperative care demand; reorganize surgical procedures; ensure the safety of health professionals; organize the operating room with necessary materials; plan the patient's post-anesthetic recovery; and perform cleaning and disinfection of the operating room.
COVID-19 no cenário perioperatório: aplicando uma hierarquia de controles para prevenir a transmissão	Alvino; Caughell 2021 BVS	Discuss recommendations for healthcare delivery and COVID-19 infection prevention and control in the perioperative setting.	Using the Centers for Disease Control and Prevention's Hierarchy of Controls as a model, this article presents risk mitigation strategies to prevent the transmission of COVID-19 in the perioperative setting.
Recomendações para a gestão de pacientes com COVID-19 no perioperatório	Alvarez., <i>et al.</i> 2020 BVS	Recommend how to manage anesthetics a perioperative patient suspected or confirmed to be infected with COVID-19 in order to reduce the risk of infection to healthcare personnel, other patients and the community.	Recommendations for airway management of COVID-19 carriers in all types of procedures, not just orotracheal intubation. Whether for ventilatory support or in a perioperative setting.
Manejo cirúrgico de pacientes com infecção por COVID-19. Recomendações da Associação Espanhola de Cirurgiões	Balibrea., <i>et al.</i> 2020 BVS	Explain the main measures to be taken into account in case of care of patients with COVID-19 or suspected, both during their evaluation and in case of need for surgical treatment.	Patients with confirmed or suspected COVID-19 will require urgent or urgent elective surgical treatment. These situations require the adoption of special measures in order to minimize the possibility of contagion between patients, the exposure of health professionals and the development of postoperative complications.
Lista de verificação da equipe cirúrgica para procedimentos de geração de aerossol para minimizar a exposição dos profissionais de saúde ao SARS-CoV-2	Soma., <i>et al.</i> 2020 PUB MED	Explore a structured way for the surgical team to approach AGP to reduce aerosolization of secretions, decrease airway open time, and minimize staff exposure.	An operating team checklist can provide some framework for healthcare providers performing PGA (aerosol generating procedures) to reduce anxiety, maintain focus, prompt consideration of alternatives, and potentially reduce risk.
Pacientes com COVID - 19 submetendo-se a partos cesáreos: adaptação da sala de cirurgia e cuidados perioperatórios para prevenir a transmissão	Zou, Chen, Liu. 2020 PUB MED	Share new information for operating room preparation and disinfection, patient transport, staff assignments, use of PPE.	Perioperative nurses at Tongji Hospital in Wuhan retrospectively analyzed the perioperative nursing process, including operating room preparation, intraoperative care, and operating room cleaning, for women with COVID-19 undergoing cesarean deliveries.
A estratégia de precaução em relação à pandemia COVID-19 na sala de cirurgia de um hospital terciário em Taiwan	Hung., <i>et al.</i> 2021 PUB MED	Discuss care to be taken by operating room staff under the spread of COVID-19.	Applying a clear, integrated algorithm to operating room staff members assists in the effective facilitation of personal protective equipment to keep healthcare workers and patients safe, as well as to prevent hospital transmission of COVID-19.
Recomendações para cirurgia de emergência durante a pandemia do COVID-19	Lima., <i>et al.</i> 2020 BVS	Guiding medical care for non-traumatic surgical emergencies during the COVID-19 pandemic.	To reduce the risk of contamination of healthcare professionals, surgical techniques and decisions need to adapt to the COVID-19 pandemic scenario.

## Discussion

Among the new recommendations found in the scientific articles, the following were highlighted and described by topics the reorganization of surgical procedures, the safety of health professionals, the organization of the OR, postoperative recovery and the cleaning and disinfection of the OR. We emphasize that these searches were carried out at the beginning of the pandemic.

## Reorganization of surgical procedures

There was a need to reorganize elective surgical procedures to reduce the circulation of elective patients in the hospital, prioritizing beds for urgent, emergency and oncological patients.<sup>11</sup>.

The health supplies used, such as surgical and N95 masks, personal protective aprons and ventilatory assistance materials, must be reserved for the care of patients with COVID-19<sup>14</sup>.



The surgeon should evaluate the cost-benefit to the patient of performing surgical procedures via the laparoscopic route, since the use of artificial pneumoperitoneum, as it is possibly a risk for the team, due to the dispersion of these organisms through the expulsion gases<sup>14,15</sup>.

The following precautions should be considered for the use of laparoscopic procedures: the use of correct and complete PPE by the team; entry into the OR only after intubation and connection to mechanical ventilation; departure from the SO before extubation; the CO<sub>2</sub> insufflation system must be coupled to a filter; pneumoperitoneum should be performed with a veress needle; CO<sub>2</sub> pressure must be reduced; trendelenburg position must be reduced; aspiration of pneumoperitoneum via the trocar<sup>14</sup>.

The electric scalpel related to its smoke also generates aerosols. It is recommended to use it at lower power and the suction with filtration when removing smoke and aerosols<sup>14,15</sup>.

It is recommended that you use one of a surgical checklist, for all procedures, that explicitly includes the patient's COVID-19 status<sup>20</sup>.

### Safety of health professionals

We must consider that for the prompt care of suspected or confirmed COVID-19 patients, all employees belonging to risk groups (diabetes, hypertension and cardiovascular diseases, age over 60 years, chronic respiratory or renal diseases, carriers of tuberculosis and leprosy or other chronic infectious diseases, transplanted solid organs and bone marrow, immunosuppression due to diseases and/or drugs, carriers of chromosomal diseases and with states of immunological fragility, in addition to pregnant women<sup>14</sup>.

The team must be instructed on the correct use and removal of PPE (cap, disposable apron or cloak, N95 mask, goggles or face protection, gloves and closed and waterproof shoes). As well as, in the removal of all adornments (rings, earrings, watches)<sup>14,16,17</sup>.

Hand hygiene must be done with soap and water or 70% alcohol, before and after putting on PPE, as well as at the five times recommended by ANVISA (before touching the patient, before performing aseptic procedures, after contact with the patient, after risk of exposure to body fluids and after contact with areas close to the patient)<sup>14,18</sup>.

N95 masks are recommended for procedures that generate aerosolization in the environment. The professional should not remove it within a period of less than six hours, it should be changed after contamination. The patient should be referred directly to the OR. All professionals must be attired. The SO door must be closed, as well as identified warning due precaution. ANVISA recommends that undressing should be done as follows: while still inside the room: remove gloves, apron, wash hands; when leaving the room: sanitize hands, remove hat, goggles or face shield, sanitize hands, remove N95 mask, sanitize hands; at the end: sanitize the goggles or face shield<sup>14</sup>.

At the end of the anesthetic and surgical procedure, all professionals present in the SO must remove the PPE correctly, perform hand hygiene and bathe immediately, to continue their duties later<sup>14,19</sup>.

In terms of transportation, the professional must have all the necessary PPE and the patient must wear a surgical mask. In this pandemic scenario, it must be assumed that all patients are positive, regardless of the result of the routine test for COVID-19, the same protective measures must be taken to avoid unnecessary exposure of employees<sup>14,17,20</sup>.

Any professional who has had closer contact with a patient, whether positive or in investigation likely or proven by COVID-19, must notify the Occupational Risk Prevention service of their unit, for appropriate measures by the same, such as notification to the public health services<sup>20</sup>.

### OR organization

It is suggested that the same OR be used for suspected or confirmed COVID-19 patients throughout the pandemic. The interval between one procedure and another should be at least one hour, so that the hygiene team can carry out adequate cleaning<sup>14,20</sup>.

Until the end of the pandemic, the same OR, as well as the same anesthesia cart, should be used for these patients. When performing procedures that generate aerosolization, such as intubation, the pressure must be negative or the air conditioning turned off<sup>14</sup>.

In intubation, a closed suction circuit should be adopted and made with a bacterial filter greater than 99.5% HMEF (heat and humidity exchanger) barrier, connected between the patient tube and the ventilation circuit. If available, the videolaryngoscope, to maintain a certain distance from the patient's face. If it is necessary to change the fan, you must clamp the tube, so that it does not disperse aerosols. At the time of intubation, the other professionals on the team must withdraw from the OR or keep at least 1.5m away from each other.<sup>14,16,17,19</sup>

Prioritize that all supplies and equipment are disposable. Dispose of only the necessary material in OR, as they will later have to be discarded. Permanent materials (anesthesia cart and monitors) should be covered with disposable covers in order to reduce contamination, as well as facilitate cleaning<sup>14-16</sup>.

Non-essential equipment and materials in the operating room must be taken out of the OR for temporary storage<sup>17</sup>.

Reduce the number of professionals within the OR, as well as their movements to reduce the risk of contamination<sup>19</sup>. Every team must be attired. It is essential to have a nursing technician circulating internally in the OR and another externally, to reduce cross-contamination<sup>14</sup>.

The perioperative nurse is in charge of training the team on putting on and taking off PPE; for assisting in the preparation and delivery of all surgical supplies necessary for the procedures, especially the PPE used by the surgical team; for coordinating all the logistics of the procedure (eg time); communicate real-time needs within the OR, as well as monitor the environment (for example, if there is





contamination by blood or patient secretions near the operating table); Spray 1,000 mg/L chlorine solution on the outside of garbage bags containing infectious waste, as well as notify the team that they will receive hospital waste infected with "COVID-19"; responsible for sealing the surgical instruments in sealed packaging, identifying "COVID-19" and forwarding it to the Material and Sterilization Center (CME)<sup>21</sup>.

### Post-anesthetic recovery of the patient

Suspected or confirmed COVID-19 patients should be recovered in OR in order to avoid contact with other patients, as well as to optimize PPE. However, professionals will already be readily outfitted in OR. Patients who need to recover in a closed unit (ICU), should be referred immediately after the end of the surgery, wearing a surgical mask and, if necessary, oxygen support, this should be under the mask. After discharge from the SC, the gowns and gloves used by professionals must be removed and discarded inside the operating room<sup>14-16</sup>.

### OR cleaning and disinfection

Cleaning of the OR will be performed after the patient leaves. When disassembling, the professional must use double glove, discarding the first glove whenever there is contact with contaminated material<sup>14</sup>.

All instruments must be in closed and identified containers so that they can be sent to the CME. It is also recommended that you replace the entire breathing circuit, soda lime, filters, and disinfect the anesthesia machine and soda lime canister. To clean the OR, the professional must be properly dressed to prevent contact and aerosols, thus keeping the negative pressure or air conditioning off<sup>14</sup>.

First, all surfaces and equipment are thoroughly cleaned, including those close to the patient (operating table, chairs, infusion pumps, monitors, screens, cables, switches, knobs, buttons, controls, with neutral detergent and then disinfection is carried out with 70% alcohol, sodium hypochlorite, quaternary ammonium or other disinfectant<sup>14</sup>.

Cleaning should proceed in a unidirectional flow and from the cleanest to the dirtiest. After cleaning equipment and surfaces, terminal cleaning of walls and floors will be carried out. You can use a checklist, type checklist to standardize the sequence and ensure that they were performed<sup>14</sup>.

Hydrogen peroxide vaporization is suggested to decontaminate the operating room. According to RDC No. 222 of ANVISA, all waste generated is considered category A1, that is, infectious, and must be disposed of in a specific bag for infectious agents. Before referring the patient to his/her unit of origin, notify the unit of the transfer of the patient, in order to confirm that he/she will be able to receive him/her, for proper post-operative care<sup>14,19,20</sup>.

### Controls hierarchy model

This strategy can be inserted into the SC, as a tool to identify, organize and plan strategies to sustain safe surgical care during a pandemic. These being: Elimination, Replacement, Administrative Controls, Engineering Controls and Personal Protective Equipment<sup>18</sup>.

In Elimination, the source patients must be identified through pre-surgical examinations, within a period of time before surgery to identify asymptomatic or pre-symptomatic. In Substitution, one should replace a surgical technique or approach with another technique in order to reduce aerosolization and exposure potential which reduces the risk of exposure for healthcare professionals. In Engineering Controls, engineering can include the management of heating, ventilation and air conditioning systems for operating rooms. In Administrative Control, the multidisciplinary team of perioperative infection prevention leaders may consider various strategies to design and implement such controls. And the correct use of PPE<sup>18</sup>.

### Conclusion

The concern that surgical team members must have is associated with the elimination of aerosols by the COVID-19 positive patient throughout the perioperative period.

With these new recommendations identified in the literature, it was possible to identify the adoption of new practices for the surgical environment, in the face of the COVID-19 pandemic. Among the new recommendations, the reorganization of surgical procedures, the safety of health professionals, the organization of the OR, postoperative recovery and the cleaning and disinfection of the OR are highlighted. The use of the hierarchy model is also recommended as a strategy to promote safe patient care.

With the construction of this, it is intended to contribute in some way to perioperative health professionals, always seeking adequate and safe care for the perioperative patient.

The study is relevant for health professionals working in the surgical center, especially in the perioperative period, due to the grounds for adequate and safe care for the patient, whether suspected or confirmed of COVID-19. In view of the changes in the cases of this strain and its variants discovered so far, to support a historical perspective of what science has advanced in this period.

Due to the searches having been carried out at the beginning of the pandemic, there were few articles, which reflected in the relevant discussions directed to the surgical center, and should not be the databases for the extraction of single sources for analysis of the entire pandemic context.



## References

1. Singhal T. A review of coronavirus disease-2019 (COVID-19). *The Indian Journal of Pediatrics*. 2020;87(4):281-286. Disponível em: <https://link.springer.com/article/10.1007/s12098-020-03263-6>.
2. Tay MZ, Poh CM, Rénia L, MacAry PA, Ng LF. The trinity of COVID-19: immunity, inflammation and intervention. *Nature Reviews Immunology*. 2020;20(6):363-374. Disponível em: <https://www.nature.com/articles/s41577-020-0311-8?fbclid=IwAR006BPp8mRx8nAxiOljiN8dlyJjNncQ4zj4N8mvi1VN9gMFrSRulpnTWk>.
3. Ali I, Alharbi OM. COVID-19: Disease, management, treatment, and social impact. *Science of the Total Environment*. 2020;728:138861. Disponível em: <https://www.sciencedirect.com/science/article/pii/S0048969720323780>
4. Barbosa PS, Rodrigues WCM, Moreira TR, Basei MF, Arnhold OT, Souza AS, Lazzaretti C. Pandemia de COVID-19 por SARS-CoV-2: o que sabemos até agora? *Revista Perspectiva: Ciência e Saúde*. 2020;5(2). Disponível em: <http://sys.facos.edu.br/ojs/index.php/perspectiva/article/view/513>
5. Parreira PCL, Oliveira Jr HA, Medeiros FC, Brito GV, Matuoka JY, Marra LP, Bagattini AM, Pachito DV, Riera R. Uso de máscaras no contexto da COVID-19 Revisão sistemática rápida. *Oxford Brazil*. 2020. Disponível em: <https://oxfordbrasilbm.com/index.php/2020/05/08/uso-de-mascaras-no-contexto-da-covid-19-revisao-sistemática-rápida/>
6. Soares SSS, Souza NVDO, Silva KG, César MP, Souto JDSS, Abrantes Pereira JCR. Pandemia de COVID-19 e o uso racional de equipamentos de proteção individual. *Rev enferm UERJ*. 2020;28:50360. Disponível em: <https://www.e-publicacoes.uerj.br/index.php/enfermagemuerj/article/view/50360>
7. Oliveira AC, Magalhães NCV, Silva PAAA, Barja PR, Viriato A. Gestão hospitalar de equipamentos de proteção individual no enfrentamento à pandemia COVID-19. *Brazilian Journal of Development*. 2021;7(3):23814-23831. Disponível em: <https://www.brazilianjournals.com/index.php/BRJD/article/view/26030>
8. Mano GBC, Mano GBC, Oliveira GD, Mano RBC, Sardenberg RS. A. Emergências cirúrgicas durante a pandemia de COVID-19. *Ulakes Journal of Medicine*. 2020;1. Disponível em: <http://189.112.117.16/index.php/ulakes/article/view/266>
9. Novo CDIP. Nota Técnica GVIMS/GGTES/ANVISA n.º 06/2020 Orientações para a Prevenção e o Controle das Infecções pelo novo Coronavírus (SARS-CoV-2) em Procedimentos Cirúrgicos-Revisão: 30/03/2021. Disponível em: [https://ameci.org.br/wp-content/uploads/2021/04/NOTA-TECNICA-06\\_2020-CIRURGIAS-30.03.2021-para-o-site.pdf](https://ameci.org.br/wp-content/uploads/2021/04/NOTA-TECNICA-06_2020-CIRURGIAS-30.03.2021-para-o-site.pdf)
10. Silva Medeiros A, Oliveira Novaes C, Cabanas ABF, Conceição MMB, Gomes RS, Ferreira LM, Marta CB. Caminhos e vertentes: os sentimentos reprimidos pelos profissionais de saúde da linha de frente da pandemia pela COVID-19. *Glob Acad Nurs*. 2021;2(Spe. 2):e113. <https://doi.org/10.5935/2675-5602.20200113>
11. Mendes KDS, Silveira RCDPC, Galvão CM. Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. *Text context enferm*. 2008;17:758-764. Disponível em: <https://www.scielo.br/j/tce/a/XzFkq6tjWs4wHNqNjKlKXQ/?lang=pt&format=html>
12. Galvão TF, Pansani TDSA, Harrad D. Principais itens para relatar Revisões sistemáticas e Meta-análises: A recomendação PRISMA. *Epidemiologia e Serviços de Saúde*. 2015;24:335-342. Disponível em: [https://www.scielosp.org/article/ssm/content/raw/?resource\\_ssm\\_path=/media/assets/ress/v24n2/2237-9622-ress-24-02-00335.pdf](https://www.scielosp.org/article/ssm/content/raw/?resource_ssm_path=/media/assets/ress/v24n2/2237-9622-ress-24-02-00335.pdf)
13. Santos CMD, Pimenta CADM, Nobre MRC. A estratégia PICO para a construção da pergunta de pesquisa e busca de evidências. *Revista Latino-Americana de Enfermagem*; 2007;15:508-511. Disponível em: <https://www.scielo.br/j/rlae/a/CfKNnz8mvSqVjZ37Z77pFsy/?lang=pt>
14. Trevilato DD, Jost MT, Araujo BR, Martins FZ, Magalhães AMMD, Caregnato RCA. Centro cirúrgico: recomendações para o atendimento de pacientes com suspeita ou portadores de COVID-19. *Rev. SOBECC*. 2020;187-193. Disponível em: <https://revista.sobecc.org.br/sobecc/article/view/646/pdf>
15. Lima DS, Leite Filho JAD, Gurgel MVSA, Aguiar Neto AF, Costa EDFM, Maia Filho FXF, Junior MAFR. Recomendações para cirurgia de emergência durante a pandemia do COVID-19. *Journal of Health & Biological Sciences*. 2020;8(1):1-3. Disponível em: <https://periodicos.unichristus.edu.br/jhbs/article/view/3176>
16. Alvarez JP, Bernucci F, Cabrera MC, Carrasco E, De La Fuente R. Recomendaciones para el manejo de pacientes con COVID-19 en el perioperatorio. *Rev Chil Anest*. 2020;49:196-202. Disponível em: [https://www.researchgate.net/profile/Fernando-Altrematt/publication/340342624\\_Recomendaciones\\_para\\_el\\_manejo\\_de\\_pacientes\\_con\\_COVID19\\_en\\_el\\_perioperatorio/links/5e847ec7299bf130796debd0/Recomendaciones-para-el-manejo-de-pacientes-con-COVID19-en-el-perioperatorio.pdf](https://www.researchgate.net/profile/Fernando-Altrematt/publication/340342624_Recomendaciones_para_el_manejo_de_pacientes_con_COVID19_en_el_perioperatorio/links/5e847ec7299bf130796debd0/Recomendaciones-para-el-manejo-de-pacientes-con-COVID19-en-el-perioperatorio.pdf)
17. Hung JJ, Wang FD, Ma H, Tsou MY, Dai HD, Lin YH, Liu CS. The precaution strategy toward the COVID-19 pandemic in the operating room of a tertiary hospital in Taiwan. *Journal of the Chinese Medical Association*. 2021;84(2):171-176. Disponível em: [https://journals.lww.com/jcma/Fulltext/2021/02000/The\\_precaution\\_strategy\\_toward\\_the\\_COVID\\_19.10.aspx](https://journals.lww.com/jcma/Fulltext/2021/02000/The_precaution_strategy_toward_the_COVID_19.10.aspx)
18. Alvino RT, Caughell CM. COVID-19 in the Perioperative Setting: Applying a Hierarchy of Controls to Prevent Transmission. *Aorn Journal*. 2021;113(2):147-164. Disponível em: <https://aornjournal.onlinelibrary.wiley.com/doi/full/10.1002/aorn.13301>
19. Soma M, Jacobson I, Brewer J, Blondin A, Davidson G, Singham S. Operative team checklist for aerosol generating procedures to minimize exposure of healthcare workers to SARS-CoV-2. *International journal of pediatric otorhinolaryngology*. 2020;134:110075. Disponível em: <https://www.sciencedirect.com/science/article/pii/S0165587620302184>
20. Balibrea JM, Badia JM, Pérez IR, Antona EM, Peña EÁ, Botella SG, Morales-Conde S. Manejo quirúrgico de pacientes con infección por COVID-19. *Recomendaciones de la Asociación Española de Cirujanos. Cirugía Española*. 2020;98(5):251-259. Disponível em: <https://www.elsevier.es/es-revista-cirurgia-espanola-36-articulo-manejo-quirurgico-pacientes-con-infeccion-S0009739X20300695>
21. Zou K, Chen H, Liu Y. Patients With COVID-19 Undergoing Cesarean Deliveries: Adapting the OR Suite and Perioperative Care to Prevent Transmission. *Aorn Journal*,112(3), 217-224. 2020. Disponível em: <https://aornjournal.onlinelibrary.wiley.com/doi/full/10.1002/aorn.13145>

