Contingency plan development proposal for a Department of Orthopedics and Traumatology in the setting of the COVID-19 pandemic

Guillermo A. Ricciardi, Martín Pérez, Santiago Scalambro, Gustavo Ricciardi, Gabriel Carrioli, Fernando Locaso, Daniel Ricciardi

Department of Orthopedics and Traumatology, Hospital General de Agudos "Dr. Teodoro Álvarez"(Buenos Aires, Argentina)

ABSTRACT

Objective: To describe the writing and implementing process of a contingency plan for a public healthcare Department of Orthopedics and Traumatology in the setting of the COVID-19 pandemic. **Materials and Methods:** Descriptive study of the writing and implementing process of a COVID-19 contingency plan at a Department of Orthopedics and Traumatology of the Buenos Aires City Public Healthcare System, during the period between March 12 and April 20, 2020, when the public health emergency and yellow alert was declared in our environment amid the imminent possibility of a potentially exponential increase of COVID-19 cases. Under the Pandemic Committee of Orthopedics and Traumatology supervision, the process was divided into 3 instances: planning, implementation, and control. **Results:** Data source: federal regulations, 17 international articles, 13 scientific association guidelines, and 17 articles of recommendations from the World Health Organization (WHO) and the United States Center for Disease Control and Prevention (CDC). Seven sectors were defined: 1) Hospitalization room; 2) Operating room; 3) Outpatient clinic; 4) Emergency Department; 5) Supplies; 6) Healthcare personnel control; 7) Education and research. **Conclusion:** We provide a writing and implementing process for the development of a contingency plan in the setting of the COVID-19 pandemic. Organizing, training and protecting yourselves as a team constitutes the plan fundamental pillars.

Key words: Pandemic; COVID-19; contingency plan; Orthopedics; Traumatology.

Level of Evidence: IV

Propuesta para formular una estrategia de contingencia en Ortopedia y Traumatología frente a la pandemia de COVID-19

RESUMEN

Objetivo: Describir el proceso para la formulación e implementación de una estrategia de contingencia de un servicio público de Ortopedia y Traumatología frente a la pandemia de COVID-19. **Materiales y Métodos:** Estudio descriptivo del proceso para la formulación e implementación de una estrategia de contingencia de la pandemia de COVID-19 en un Servicio de Ortopedia y Traumatología del sistema público de salud de la Ciudad Autónoma de Buenos Aires, entre el 12 de marzo y el 20 de abril de 2020, período en el cual fue declarada la emergencia sanitaria y el alerta amarilla en nuestro medio frente a la posibilidad inminente de un potencial aumento exponencial de casos de COVID-19. A cargo de un Comité de Pandemia de Ortopedia y Traumatología, el proceso fue dividido en tres instancias: planificación, implementación y control. **Resultados:** Basados en la normativa nacional, 17 artículos internacionales, 13 guías de sociedades científicas y 17 artículos de recomendaciones de la Organización Mundial de la Salud y los Centros para el Control y la Prevención de Enfermedades de los Estados Unidos. Definimos 7 áreas de trabajo: 1) Sala de internación, 2) Quirófano, 3) Consultorios externos, 4) Servicio de Urgencias, 5) Insumos, 6) Cuidado del personal de salud, 7) Docencia e investigación. **Conclusión:** Nuestro trabajo aporta una propuesta para el proceso de desarrollo de una estrategia de contingencia frente a la pandemia de COVID-19. Organizarse, capacitarse y protegerse como equipo son sus pilares fundamentales.

Palabras clave: Pandemia; COVID-19; estrategia de contingencia; Ortopedia y Traumatología.

Nivel de Evidencia: IV

Received on April 23rd, 2019. Accepted after evaluation on May 6th, 2020 • G. A. RICCIARDI, MD • guillermoricciardi@gmail.com http://0000-0002-6959-9301

How to cite this paper: Ricciardi GA, Pérez M, Scalambro S, Ricciardi G, Carrioli G, Locaso F, Ricciardi D. Contingency plan development proposal for a Department of Orthopedics and Traumatology in the setting of the COVID-19 pandemic. *Rev Asoc Argent Ortop Traumatol* 2020;85(3):283-294. https://doi.org/10.15417/issn.1852-7434.2020.85.3.1106

INTRODUCTION

On March 11, 2020, WHO Director-General declared the COVID-19 a pandemic outbreak caused by a new coronavirus which originated in Wuhan, Hubei Province, China.[1-3] In Argentina, the first confirmed COVID-19 case was reported on March 5, 2020, and the public health emergency was declared a week later.[4-6] A yellow alert was activated in the Buenos Aires City hospitals, which required all healthcare providers to implement healthcare restructuring measures under the COVID-19 Preparedness and Response Operative Plan issued by the Argentinian Department of Health.[7]

We received directives and health care protocols from the Buenos Aires City Department of Health regulating the containment and management of COVID-19 suspected or confirmed patients.[8-12] However, these measures have proven inadequate to define guidelines within the scope of activities performed by the Department of Orthopedics and Traumatology.

Therefore, Orthopedics and Traumatology specialists face an unprecedented challenge in our field: to develop a contingency plan for the setting of a pandemic. Fortunately, we can learn from the experience of countries from Asia, Europe and North America. Scientific association publications and guidelines are consistent in recommending as a priority to maintain orthopedic emergency surgery capabilities. Other key aspects that must be addressed include the procedures performed by our specialty in every area (hospitalization room, outpatient clinic, operating room, and Emergency Department) and the training in the use of personal protective equipment and in activities (other than those specific to our specialty) that may be required of us.[13-23]

How do we develop such a plan when faced with COVID-19 dynamics, stress, and uncertainty as well as the inexperience seen throughout the Department irrespective of job title or role?

In this paper, we present information on the writing and implementing process of a COVID-19 contingency plan at a Department of Orthopedics and Traumatology of the Buenos Aires City Public Healthcare System.

OBJECTIVE:

To describe the writing and implementing process of a contingency plan for a public healthcare Department of Orthopedics and Traumatology in the setting of the COVID-9 pandemic.

MATERIALS AND METHODS

We conducted a descriptive study of the writing and implementing process of a COVID-19 contingency plan at a Department of Orthopedics and Traumatology of the Buenos Aires City Public Healthcare System, during the period between March 12 and April 20, 2020, when the public health emergency and yellow alert were declared in our environment amid the imminent possibility of a potential exponential increase of COVID-19 cases.

General assessment: pandemic staging

By March 12, there were a total of 31 COVID-19 diagnosed cases (1 death), and local transmission was described as direct contact.[4-6] On March 20, 2020, the Argentinian Government imposed social, preventive and mandatory isolation.[24] The development of the contingency plan requires staging the pandemic in order to help in the decision-making process and in establishing periods of action.[13] In this setting, the sanitary containment capacity of our hospital and of the healthcare system remained adequate, and there had not been any positive cases at our hospital.

Particular assessment: our Department

Our Department of Orthopedics and Traumatology is part of a general hospital for acute diseases of the Buenos Aires City Public Healthcare System, which is located in the programmatic area 01, has a coverage area that includes parts of 5 out of the 15 Buenos Aires subdivisions, treats a significant number of patients coming from other areas and has a fluid interaction with other nearby hospitals. We have a bed capacity of 262, spread over several wards.[25] Our Department is organized in teams based on sub-specialties covering Trauma, Spine, Upper extremity, Lower extremity, Hip, Orthopedic Sports Medicine, and Arthroscopy. The more prevalent conditions include trauma, osteoporosis fractures, and degenerative joint diseases.

Directives from the Emergency Operation Center

Our contingency plan had to follow federal and local regulations requiring:[6-12]

- To organize ourselves to manage a potential emergency.
- To reduce the number of elective surgeries.
- To increase the number of available beds, especially for COVID-19 isolation wards.
- To evaluate the adaptation of the hospital sectors to address COVID-19 patient containment and patient redistribution measures.
- To extend resident and chief resident contracts.
- To grant leave of absence to any healthcare worker who has been to risk areas.

Pandemic Committee

The Pandemic Committee of Orthopedics and Traumatology was created to address the need for organization and based on international recommendations on how to adapt a healthcare department to the pandemic.[26] The committee is formed by a trauma specialist, a general practitioner, a Trauma resident, a nurse, and a surgical technologist. Two doctors were appointed to be exclusively in charge of data management and research protocols. The main purpose of the committee is to develop and implement a contingency plan that would provide clear guidelines for medical and surgical procedures during the pandemic, an adequate and effective administration of supplies, and the compliance of biosafety regulations. In addition, the committee works as a bridge for the communication between the hospital crisis committee and the department.

Process: Planning, Implementing and Controlling

We divided the process into three stages:

A. Planning: writing the plan

A.1. Stage 1: literature review and evidence classification

Data collection was to be focused on updated material, considering a wide range of data sources, and performed by committee members: 1) scientific online databases: Medline, Embase, Cochrane, LILACS; 2) non-indexed Argentinian and international journals; 3) guidelines from Argentinian and international Orthopedics and General Surgery associations; 4) WHO and CDC websites.

An updating program via Zoom video conferencing (©2020 Zoom Video Communications) was put forward to achieve adequate communication between the Department members. Meetings would be coordinated by the Pandemic Committee and the Department Chief, aiming at daily updating and reporting literature findings on level of evidence, problem definition, and other departments' plans.[27]

A.2. Stage 2: establishing sectors and teams

An internal assessment of the Department and of our human resources was to be conducted to establish:

- Sectors that enable the adequate functioning of the Department of Orthopedics and Traumatology.

- Health professionals in charge of each sector in order to analyze the literature and government regulations, describe problems particular to each sector and devise solution strategies.

In addition, sub-specialties chiefs were required to develop a diagnosis and treatment protocol for the most prevalent condition in our setting, thus updating algorithms for the COVID-19 situation and outlining each subspecialty emergencies.

A.3. Stage 3: writing the document

The Pandemic Committee was required to draw up the document, which was later to be reviewed and revised by the Department Chief, the Hospital Crisis Committee, and the Hospital Director.

B. Implementing the plan

The organization of the plan sectors was to be outlined by establishing: chiefs, objectives, and functions. The Pandemic Committee is responsible for the coordination of restructuring the sectors and updating their signage, and training the Department healthcare providers, including doctors, physical therapists, surgical technologists, nurses, clerks, and administrators.

C. Controlling

A reporting system was to be developed for the Pandemic Committee to be informed on issues or changes related to the applicable regulations during implementation.

RESULTS

A. Planning

A.1. Stage 1: literature review and evidence classification

We conducted a literature review using the PubMed and Google Scholar search engines and the following key words: "Coronavirus", "COVID-19", "Orthopedics", "Trauma", "Guidelines", "Pandemia", "Surgery", "Operating room", "Perioperative". The search produced 20 papers concerning our specialty, from which 3 were excluded because they were isolated descriptions or small case reports, leaving us with 17 papers.[13,14,16,21-23,27-37]

Our search through the websites of Orthopedics and General Surgery scientific associations produced 13 documents including recommendations and guidelines.[15,17-20,38-45]

Our search through the WHO and CDC websites produced 17 articles with recommendations on topics concerning our practice.[26,46-61]

Tables 1 and 2 show the study final Orthopedics literature material, which is classified by author or scientific association, nationality, design, topic and level of evidence.

Table 1. Selected literature articles

Authors	Date	Nationality	Design	Topic	Level of Evidence
Dunham *et al.*[28]	2020	United States	Standard review	Bioethical issues	IV
Greenland *et al.*[29]	3/10/2020	United States	Standard review	Perioperative and operating room management	IV
Tang *et al.*[23]	2020	China	Expert consensus	General recommendations	IV
Zheng *et al.*[30]	March, 2020	China, Italy, Austria	Expert consensus	Minimally invasive surgery	IV
Liang *et al.*[13]	6/3/2020	Singapur	Descriptive study	General recommendations	IV
Prada *et al.*[22]	4/12/2020	Canada	Expert consensus	Scoping review	IV
Kogan *et al.*[31]	2020	United States	Standard review	Education	IV
Massey *et al.*[21]	2020	United States	Standard review	Perioperative and operating room management	IV
Awad *et al.*[32]	2020	United States	Standard review	Operating room	IV
Dexter *et al.*[33]	3/24/2020	United States	Standard review	Perioperative and operating room management	IV
Vaccaro *et al.*[16]	March, 2020	United States	Standard review	General recommendations	IV
Wong *et al.*[34]	3/4/2020	Canada	Standard review	Operating room	IV
Parisien *et al.*[27]	2020	United States	Standard review	Telemedicine training	IV
Vannabouathong *et al.*[35]	4/1/2020	Canada	Standard review	General recommendations	IV
Ti *et al.*[36]	3/6/2020	Canada	Standard review	Operating room	IV
Rodriguez-Pinto *et al.*[14]	March, 2020	Portugal	Standard review	Operating room	IV
Brindle *et al.*[37]	2020	Estados Unidos	Revisión estándar	Manejo perioperatorio Quirófano	IV

Table 2. Selected literature guidelines

Association	Date	Nationality	Topic	Level of Evidence
AAOS[38]	3/31/2020	United States	Preoperative management	IV
ACS[19]	2020	United States	Elective surgery management	IV
RCS[20]	3/20/2020	United Kingdom and Ireland	General recommendations	IV
SECOT[18]	4/13/2020	Spain	General recommendations	IV
NHS[15]	3/16/2020	United Kingdom	Clinical-orthopedic management	IV
AAOS[39]	March, 2020	United States	General recommendations	IV
NHS[40]	3/26/2020	United Kingdom	General recommendations	IV
CMS[41]	4/7/2020	United States	Preoperative management Elective surgery	IV
AEC[42]	2020	Spain	General recommendations	IV
BOA[17]	April, 2020	United Kingdom	Urgent patient management	IV
ACS[43]	3/26/2020	Colombia	General recommendations	IV
NHS[44]	3/24/2020	United Kingdom	Preoperative management	IV
ACS[45]	3/13/2020	United States	Preoperative management	IV

AAOS = American Academy of Orthopedic Surgeons; ACS = American College of Surgeons; RCS = Surgical Royal Colleges of the United Kingdom and Ireland; SECOT = Spanish Society of Orthopedic Surgery and Traumatology; NHS = National Health System; CMS = Centers for Medicare and Medicaid Services; AEC = Spanish Surgery Association; BOA = British Orthopaedic Association; ACC = Colombian Surgery Association.

A.2. Stage 2: establishing sectors and teams

Seven sectors were established, each with a staff doctor as chief: 1) Hospitalization room; 2) Operating room; 3) Outpatient clinic; 4) Emergency Department; 5) Supplies; 6) Healthcare personnel control; 7) Education and research. Each sector chief developed a plan considering their sector-specific problems, the produced literature material, the government regulations, and our own structure and resources. Tables 3-9 show each sector plan.

Sub-specialties chiefs developed diagnosis and treatment algorithms for the most prevalent condition of our hospital, to be annexed to the relevant protocol.

A.3. Stage 3: writing the document

The Pandemic Committee produced a document, available both in digital and printed versions for the Department members, copies and access thereof were given to the Hospital Director and the hospital crisis committee.

A. Implementing

Implementation was achieved through conferences that included reading the plan, defining procedural regulations, and training healthcare providers. All conferences were held online via the video-conferencing application Zoom. Each sector healthcare providers organized teams, which included a resident physician, to produce the signage elements and restructure the sectors.

B. Controlling

Channels of communication with de Pandemic Committee were established: mobile phone video-calls, emails, and daily meetings via Zoom. In addition, weekly review sessions were agreed in order to address potential updates.

Table 3. Hospitalization room[15,16,18-20,22,31,38,44,45,48,49,55]

- Schedule regular sanitation, every 3 hours, of common areas, cleaning and disinfecting of high-contact surfaces following WHO guidelines.
- Promote and place signage promoting the washing of hands according to WHO guidelines.
- Establish the position "consulting doctor" (rotating duty roster), who will address problems, indications and consultations with other departments, as well as schedule surgeries, prioritizing the conservative treatment.
- Minimize the pre- and post-operative hospital staying periods.
- Establish hospital admission criteria prioritizing emergencies.
- Use Personal Protective Equipment in accordance with: type of patient (non-exposed, close contact, suspicious/confirmed case), asymptomatic carrier, and unreliable data from elderly and uncommunicative or unresponsive patients. For dressing changes and physical examination: contact gown, surgical mask, gloves, face shield or goggles. For aerosol generating procedures or suspicious/confirmed cases, N95 respirators and isolation gowns should be used.
- Observe inter-patient distancing measures within wards.
- Identify COVID-19 symptoms and establish an alarm and reference protocol.
- Limit the number of family members.
- Do not conduct face-to-face ward rounds and do not hold any type reunion in wards, hallways or nurse stations.
- Contact family members to inform on the patient condition through video call.
- Restructure the department pathways.

Table 4. Operating room[13,15,16,18-23,29,30,32-34,37,38,41,42]

- Stage surgical conditions into: urgent (surgeries within 24 h after admission), semi-urgent (surgeries at the earliest opportunity), and scheduled (elective surgeries). Do not perform elective surgeries.
- Minimize the movement and the number of people in the operating room.
- Build surgical teams with as few members as possible, prioritize time and experience, as long as possible.
- Consider the use of surgical techniques that have been proven significantly superior to the conservative treatment.
- Perform intubation procedures with the minimum required team members (aerosols).
- Consider surgical procedures involving standard supply requirements and same-day discharge.
- Designate on-duty and off-duty surgical teams with a fortnight rotation schedule.
- Use Personal Protective Equipment in accordance with: type of patient (non-exposed, close contact, suspicious/confirmed case), asymptomatic carrier, unreliable data from elderly and uncommunicative or unresponsive patients, and type of anesthesia and filters available. Wear isolation gown, surgical mask, gloves, face shield or goggles. N95 respirators should be used in cases of aerosol generation, COVID-19 suspicious/confirmed cases, uncommunicative or unresponsive patients, inadequate filtering devices for general anesthesia (humidification devices).

Table 5. Outpatient clinic[15,18-22,40-42,52]

- Classify outpatient appointments into: non-urgent (rescheduling the appointment will not result in sequelae; chronic and tolerable conditions) and urgent (delay may result in permanent sequelae). Reschedule non-urgent appointments.
- Minimize the number of patients per day and present in waiting room at any time.
- Minimize follow-up controls.
- Observe inter-patient distancing measures in the waiting room.
- Display distancing and mechanical barrier measures adopted in the admission desk.
- Screen for COVID-19 signs and symptoms before entering the sector.
- Wash hands thoroughly, following WHO guidelines.
- Observe distancing measures during clinical interviews.
- Use Personal Protective Equipment in accordance with: type of patient (non-exposed, close contact, suspicious/confirmed case), asymptomatic carrier, and unreliable data from elderly and uncommunicative or unresponsive patients. Wear contact gown, surgical mask, gloves, face shield or goggles. N95 respirators should be used in cases of aerosol generation, COVID-19 suspicious/confirmed cases, and uncommunicative or unresponsive patients.
- Observe the airing or ventilation of the sector and the cleaning and disinfecting of high-contact surfaces according to WHO guidelines.
- Minimize the number of people present during the consultation.
- Consider the use of telemedicine tools for controls and follow-up.
- Minimize the number of requested studies.

Table 6. Emergency Department[13-15,17-19,22]

- Organize work teams: on-duty and off-duty, with a rotation schedule based on the available resources.
- Do not hold any type reunion in common areas: rooms, doctors' station or nurse station.
- Conduct shift handover by regular phone calls or video calls.
- Classify trauma patients according to the hospital admission criteria and the possibility to conduct outpatient control.
- Prioritize surgical emergencies.
- Improve conservative treatments for orthopedic patients, especially, for fracture patients who may heal without surgery, pediatric patients, and comorbid patients.
- Minimize radiographic controls.
- Use absorbable sutures for incision wounds, whenever possible.
- Minimize outpatient controls after discharge.
- Wash hands thoroughly following WHO guidelines.
- Use Personal Protective Equipment in accordance with: type of patient (non-exposed, close contact, suspicious/confirmed case), asymptomatic carrier, and unreliable data from elderly and uncommunicative or unresponsive patients. Wear contact gown, surgical mask, gloves, face shield and goggles. N95 respirators and isolation gowns should be used in cases of aerosol generation, COVID-19 suspicious/confirmed cases, and uncommunicative or unresponsive patients, shock-room management of polytraumatized patients.

Table 7. Supplies[22,48,58-61]

- Count and keep record of all available Personal Protective Equipment.
- Evaluate the need of Personal Protective Equipment based on their demand and a permanent control.
- Do not dispense inadequately Personal Protective Equipment set aside for specific use or personnel.
- Prevent the unnecessary use of Personal Protective Equipment.
- Establish the type of Personal Protective Equipment to be used in each sector.
- Establish response strategies in the event of a supply shortage.
- Keep a record of all supplied N95 respirators and all personnel who undergo training on their reuse, maintenance and disposal.

Table 8. Healthcare personnel control[13,19,20,22,28,37,39,50,53,55]

- Conduct an active control on the personnel risk of infection using a questionnaire provided by the WHO; define quarantine and self-isolation criteria.
- Organize healthcare personnel into teams: on-duty and off-duty teams with a weekly or fortnightly rotation schedule (based on the available resources).
- Keep record of: non-exposed, suspicious, infected and recovered healthcare providers.
- Consider reassigning healthcare providers functions in line with the following priorities: to maintain orthopedic emergency surgery capabilities, to protect the surgical team, to train the department personnel in surgical roles outside Orthopedics Surgery as well as in soles outside Surgery.
- Classify personnel by age and risk factors.
- Establish healthcare providers who perform key surgical roles.
- Prevent clusters of people in common areas: hallways, nurse stations, classrooms.
- Adapt resting areas to conform to distancing measures.
- Promote hand and surface hygiene.
- Monitor psychogenic stress in healthcare providers.
- Keep record of other institutions where the hospital healthcare providers may also work (other hospitals o healthcare centers).

Table 9. Education and research[31,39,41]

- Suspend all in-person activities related to specialist or undergraduate courses.
- Suspend all fellowship and scholarship beneficiary attendance.
- Develop a Resident training course using video conferencing.
- Appoint healthcare providers in charge of data management and research protocols during the pandemic.
- Develop a system to be up-to-date with guidelines, regulations and papers related to the pandemic.
- Develop a program to train the department personnel in roles outside orthopedics: fever clinic, sampling, mechanical ventilation notions, triage.

DISCUSSION

The study approach proved to be complex when searching for the description of shared experiences and evidence-based recommendations within the literature. The predominance of narrative reviews (standard) and expert consensus concerning this subject in the literature reflects how new this situation really is; thus, trying to establish recommendations through a rigorous methodological process and based on a high level of evidence becomes virtually impossible. Prada *et al*. address this issue on their scoping review, which yield that only 5.3 % of the published papers had been developed following an evidence-based methodology.[22]

Some authors were able to use the experience obtained from previous outbreaks, like Liang in Singapore, although they lack the level of spread and complexity posed by COVID-19.[13]

Several authors from different parts of the world agree on establishing similar priorities, such as keeping open the emergency admission, protecting both healthcare providers and patients, and training healthcare providers in roles outside their normal practice.[13-16,22]

Notwithstanding the available data statistical weight, we must recognize it represented a huge contribution in dealing with the urgent need for a plan to guide decision making. We acknowledge that the setting of this disease and its global impact (pandemic) are still unfolding, and therefore accept as natural to find more doubts than certainties.

We consider that although the contribution of the literature material was essential, it did not define "our plan." The development of our plan required: proposing a thorough general and particular assessment, defining our setting and our status, defining our Department strengths and weakness, defining the Department's main role within the hospital and the community, adapting our ways to communicate to the process, and staging the pandemic.

This situation poses the significant challenge of assessing the development of a plan formulated and implemented in real time concerning an extensive regional and global event, which nature prevents any standard follow-up procedure. We consider a good way to assess our performance "in the field" when new measures are implemented to be the level of cohesion displayed by the team vs. any chaotic behavior as compared with their normal or routine performance. We underline two elements that have proven to be key in this particular scenario: the horizontal division of labor, and the daily, effective communication between every health-care team member in order to update our understanding and issues of this situation, thus ensuring a competent decision making.

CONCLUSIONS

We provide a writing and implementing process for the development of a contingency plan in the setting of the COVID-19 pandemic. Organizing, training and protecting yourselves as a team constitutes the plan fundamental pillars. All available resources, including data up to the characteristic resourcefulness and strength of all orthopedist, are necessary, especially in the setting of a public hospital.

Conflict of interests: Authors claim they do not have any conflict of interests.

M. Pérez ORCID ID: https://orcid.org/0000-0002-2163-0680
S. Scalambro ORCID ID: https://orcid.org/0000-0002-7478-0041
G. Ricciardi ORCID ID: https://orcid.org/0000-0002-6952-7260
G. Carrioli ORCID ID: https://orcid.org/0000-0003-4160-9712
F. Locaso ORCID ID: https://orcid.org/0000-0003-2248-5582
D. Ricciardi ORCID ID: https://orcid.org/0000-0002-1396-9115

REFERENCES

1. World Health Organization Press Conference. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. Disponible en: https://www.who.int/es/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020. Consulta: 11 de marzo, 2020.
2. Tan WJ, Zhao X, Ma XJ, Wang W, Niu P, X W, et al. A novel coronavirus genome identified in a cluster of pneumonia cases—Wuhan, China 2019–2020. *China CDC Weekly* 2020;2(4):61-2. https://doi.org/10.46234/ccdcw2020.017

3. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med* 2020;382:727-33. https://doi.org/10.1056/NEJMoa2001017
4. Ministerio de Salud de la República Argentina. Nuevo Coronavirus (COVID19). Reporte Diario. Disponible en: https://www.argentina.gob.ar/sites/default/files/5-03-2020-nuevo-coronavirus-covid-19-reporte-diario_1.pdf. Consulta: 5 de marzo, 2020.
5. Ministerio de Salud de la República Argentina. Nuevo Coronavirus (COVID19). Reporte Diario. Disponible en: https://www.argentina.gob.ar/sites/default/files/12-03-20-nuevo-coronavirus-covid-19_reporte-diario_0.pdf. Consulta: 12 de marzo, 2020.
6. Decreto 260/2020. Emergencia Sanitaria - Coronavirus (COVID-19). Boletín Oficial de la República Argentina. DECNU-2020-260-APN-PTE. 12/03/2020. Disponible en: https://www.boletinoficial.gob.ar/suplementos/2020031201NS.pdf. Consulta: 12 de marzo, 2020.
7. Ministerio de Salud de la República Argentina. Plan Operativo de preparación y respuesta al COVID-19. Disponible en: https://www.argentina.gob.ar/salud/coronavirus-COVID-19/plan-operativo. Consulta: 12 de marzo, 2020.
8. Gobierno de la Ciudad Autónoma de Buenos Aires. Directivas Centro de Operaciones de Emergencia COVID19. ME-2020-09911443 GCABA-DGHOS. 18/03/2020. Disponible en: https://eaaf.org/wp-content/uploads/covid19-PDFs/Argentina/IF-2020-10223708-GCABA-DGHOSP.pdf. Consulta: 19 de marzo, 2020.
9. Gobierno de la Ciudad Autónoma de Buenos Aires. Proyecto de resolución. EE-2020-18074310-APN-DNCH#MS Prórroga Promoción. Poder Ejecutivo Nacional. República Argentina. Ciudad de Buenos Aires. 19/03/20.
10. Gobierno de la Ciudad Autónoma de Buenos Aires. DECAD-2020-371-APN-JGM - Licencia excepcional. Coronavirus (COVID-19). BO. Suplemento 12/03/2020. Disponible en: https://www.boletinoficial.gob.ar/suplementos/2020031201NS.pdf. Consulta: 16 de marzo, 2020.
11. Ministerio de Salud de la República Argentina. Contratación por emergencia COVID19 N° 2/20. EX-2020-21915903--APN-SSGA#MS. Poder Ejecutivo Nacional. 03/04/2020. Disponible en: https://www.argentina.gob.ar/salud/contratacion-por-emergencia-covid-19. Consulta: 4 de abril, 2020.
12. Gobierno de la Ciudad Autónoma de Buenos Aires. ME-2020-11683110-GCABA-DGHOS. Reasignación de funciones y redistribución del personal COVID-19. 16/04/2020. Disponible en: http://www.hdurandinfo.com/. Consulta: 17 de abril, 2020.
13. Liang ZC, Wang W, Murphy D, Hui JHP. Novel coronavirus and orthopaedic surgery: early experiences from Singapore. *J Bone Joint Surg Am* 2020;e000236. https://doi.org/10.2106/JBJS.20.00236
14. Rodriguez-Pinto R, Sousa R, Oliveira A. Preparing to perform trauma and orthopaedic surgery on patients with COVID-19. *J Bone Joint Surg Am* 2020;e20.00454. https://doi.org/10.2106/JBJS.20.00454
15. NHS England and NHS Improvement. Clinical guide for the management of trauma and orthopaedic patients during the coronavirus pandemic. Disponible en: https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/C0274-Specialty-guide-Orthopaedic-trauma-v2-14-April.pdf. Consulta: 14 de abril, 2020.
16. Vaccaro AR, Getz CL, Cohen BE, Cole BJ, Donnally CJ 3rd. Practice management during the COVID-19 pandemic. *J Am Acad Orthop Surg* 2020;28(11):464-70. https://doi.org/10.5435/JAAOS-D-20-00379
17. British Orthopaedic Association. Management of patients with urgent orthopaedic conditions and trauma during the coronavirus pandemic. Disponible en: https://www.boa.ac.uk/resources/covid-19-boasts-combined.htm. Consulta: 13 de abril, 2020.
18. SECOT. Recomendaciones Generales de la Sociedad Española de Cirugía Ortopédica y Traumatología frente al COVID-19. Disponible en: https://www.secot.es/media/docs/covid19/RecomendacionesSECOTGeneralesDeCOTFrenteAlCovid19.pdf. Consulta: 13 de abril, 2020.
19. COVID-19 Guidelines for Triage of Orthopaedic Patients. American College of Surgeons. Disponible en: https://www.facs.org/covid-19/clinical-guidance/elective-case/orthopaedics. Consulta: 4 de abril, 2020.
20. Guidance for surgeons working during the COVID-19 pandemic from the Surgical Royal Colleges of the United Kingdom and Ireland. Disponible en: https://www.rcseng.ac.uk/coronavirus/joint-guidance-for-surgeons-v1/. Consulta: 20 de marzo, 2020.
21. Massey PA, McClary K, Zhang AS, Savoie FH, Barton RS. Orthopaedic surgical selection and inpatient paradigms during the coronavirus COVID-19 pandemic. *J Am Acad Orthop Surg* 2020;28(11):436-50. https://doi.org/10.5435/JAAOS-D-20-00360
22. Prada C, Chang Y, Poolman R, Johal H, Bhandari M. Best Practices for Surgeons -COVID-19 Evidence-Based Scoping Review. A unifying report of global recommendations. Disponible en: https://aaot.org.ar/wp-content/uploads/2020/04/OE-Best-Practices-for-Surgeons-COVID-19-Evidence-Based-Scoping-Review.pdf_compressed1.pdf. Consulta: 4 de abril 2020.
23. Tang PF, Hou ZY, Wu XB, Zhang CQ, Wang JW, Xing X, et al. Expert consensus on management principles of orthopedic emergency in the epidemic of Corona Virus Disease 2019. *Chin Med J* 2020;133(9):1096-8. https://doi.org/10.1097/CM9.0000000000000810

24. Decreto 297/2020. Aislamiento Social Preventivo y Obligatorio. Boletín Oficial de la República Argentina. DECNU-2020-297-APN-PTE - Disposiciones. 19/03/2020. Disponible en: https://www.boletinoficial.gob.ar/detalleAviso/primera/227042/20200320. Consulta: 20 de marzo, 2020.
25. Gobierno de la Ciudad Autónoma de Buenos Aires. Áreas programáticas de la Salud. 2016. Disponible en: https://www.estadisticaciudad.gob.ar/eyc/wp-content/uploads/2016/08/SA071602.pdf. Consulta: 20 de marzo, 2020.
26. Center for Disease Control and Prevention (CDC). Steps Healthcare Facilities Can Take Now to Prepare for COVID-19. Disponible en: https://www.cdc.gov/coronavirus/2019-ncov/hcp/steps-to-prepare.html. Consulta: 20 de marzo, 2020.
27. Parisien RL, Shin M, Constant M, Saltzman BM, Li X, Levine WN, et al. Telehealth utilization in response to the novel coronavirus (COVID-19) pandemic in orthopaedic surgery. *J Am Acad Orthop Surg* 2020. https://doi.org/10.5435/JAAOS-D-20-00339
28. Dunham AM, Rieder TN, Humbyrd CJ. A bioethical perspective for navigating moral dilemmas amidst the COVID-19 pandemic. *J Am Acad Orthop Surg* 2020;28(11):471-6. https://doi.org/10.5435/JAAOS-D-20-00371
29. Greenland JR, Michelow MD, Wang L, London MJ. COVID-19 Infection implications for perioperative and critical care physicians. *Anesthesiology* 2020;132(6):1346-61. https://doi.org/10.1097/ALN.0000000000003303
30. Zheng MH, Boni L, Fingerhut A. Minimally invasive surgery and the novel coronavirus outbreak: lessons learned in China and Italy. *Ann Surg* 2020. https://doi.org/10.1097/SLA.0000000000003924
31. Kogan M, Klein SE, Hannon CP, Nolte MT. Orthopaedic education during the COVID-19 pandemic. *J Am Acad Orthop Surg* 2020;28(11):e456-e464. https://doi.org/10.5435/JAAOS-D-20-00292
32. Awad ME, Rumley JC, Vazquez JA, Devine JG. Peri-operative considerations in urgent surgical care of suspected and confirmed COVID-19 orthopedic patients: operating rooms protocols and recommendations in the current COVID-19 pandemic. *J Am Acad Orthop Surg* 2020;28(11):451-63. https://doi.org/10.5435/JAAOS-D-20-00227
33. Dexter F, Parra MC, Brown JR, Loftus RW. Perioperative COVID-19 defense: an evidence-based approach for optimization of infection control and operating room management. Anesth Analg 2020. https://doi.org/10.1213/ANE.0000000000004829
34. Wong J, Goh QY, Tan Z, Lie SA, Tay YC, Ng SY, et al. Preparing for a COVID-19 pandemic: a review of operating room outbreak response measures in a large tertiary hospital in Singapore. *Can J Anesth/J Can Anesth* 2020;67:732-45. https://doi.org/10.1007/s12630-020-01620-9
35. Vannabouathong C, Devji T, Ekhtiari S, Chang Y, Phillips SA, Zhu M, et al. Novel coronavirus COVID-19: current evidence and evolving strategies. *J Bone Joint Surg Am* 2020. https://doi.org/10.2106/JBJS.20.00396
36. Ti LK, Ang LS, Foong TW, Ng BSW. What we do when a COVID-19 patient needs an operation: operating room preparation and guidance. *Can J Anaesth* 2020;67(6):756-8. https://doi.org/10.1007/s12630-020-01617-4
37. Brindle M, Gawande A. Managing COVID-19 in surgical systems. *Ann Surg* 2020. https://doi.org/10.1097/SLA.0000000000003923
38. Guy DK, Bosco JA, Savoie FH. AAOS Guidelines on Elective Surgery during the COVID-19 Pandemic: March 31. COVID-19: Member Resource Center. Disponible en: https://www.aaos.org/globalassets/about/covid-19/aaos-guidelines-on-electivesurge.pdf. Consulta: 3 de abril, 2020.
39. American Academy of Orthopaedic Surgeons. Clinical considerations during COVID19. Disponible en: https://www.aaos.org/globalassets/about/covid-19/aaos-clinical-considerations-during-covid-19.pdf. Consulta: 12 de abril, 2020.
40. NHS England and NHS Improvement. Redeploying your secondary care medical workforce safely. Disponible en: https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/Redeploying-your-secondary-care-medical-workforce-safely_26-March.pdf. Consulta: 26 de marzo, 2020.
41. CMS's recommendations for adult elective surgery and procedures. Disponible en: https://www.aaos.org/about/covid-19-information-for-our-members/aaos-guidelines-for-elective-surgery/. Consulta: 26 de marzo, 2020.
42. Documentos de posicionamiento y recomendaciones de la AEC en relación con la cirugía y COVID-19. Disponible en: https://www.aecirujanos.es/Documentos-de-posicionamiento-y-recomendaciones-de-la-AEC-en-relacion-con-la-cirugia-y-COVID19_es_1_152.html. Consulta: 26 de marzo, 2020.
43. Guidelines on Delaying Cancer Surgery during COVID-19. Disponible en: https://www.medscape.com/viewarticle/927568_print. Consulta: 26 de marzo, 2020.
44. NHS England and NHS Improvement. Clinical guide for the perioperative care of people with fragility fractures during the Coronavirus pandemic. Disponible en: https://www.boa.ac.uk/uploads/assets/3e2ef4d7-6788-4fcd-8a17196fca00f63e/NHSE-Fragility-Fractures-and-Coronavirus-VBOA10-24032020docx.pdf. Consulta: 23 de marzo, 2020.
45. American College of Surgeons. COVID-19: Recommendations for Management of Elective Surgical Procedures. Disponible en: https://www.facs.org/-/media/files/covid19/recommendations_for_management_of_elective_surgical_procedures.ashx. Consulta: 23 de marzo, 2020.

46. World Health Organization. Critical preparedness, readiness and response actions for COVID-19. Interim guidance, 22 March 2020. Disponible en: https://www.who.int/publications-detail/critical-preparedness-readiness-and-response-actions-for-covid-19. Consulta: 26 de marzo, 2020.
47. World Health Organization. Rational use of personal protective equipment for coronavirus disease (COVID-19): interim guidance, 27 February 2020. Disponible en: https://apps.who.int/iris/handle/10665/331215. Consulta: 12 de marzo, 2020.
48. World Health Organization. Rational use of personal protective equipment for coronavirus disease ("COVID-19)" and considerations during severe shortages: interim guidance, 6 April 2020. Disponible en: https://www.who.int/publications-detail/rational-use-of-personal-protective-equipment-for-coronavirus-disease-(covid-19)-and-considerations-during-severe-shortages. Consulta: 12 de abril, 2020.
49. World Health Organization. Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected: interim guidance, 19 March 2020. Disponible en: https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125. Consulta: 20 de marzo, 2020.
50. World Health Organization. Health workers exposure risk assessment and management in the context of COVID-19 virus: interim guidance, 4 March 2020. Disponible en: https://apps.who.int/iris/handle/10665/331340. Consulta: 20 de marzo, 2020.
51. Centers for Disease Control and Prevention (CDC). Use Personal Protective Equipment (PPE). Disponible en: https://www.cdc.gov/coronavirus/2019-ncov/hcp/using-ppe.html. Consulta: 3 de abril, 2020.
52. Centers for Disease Control and Prevention (CDC). Outpatient and Ambulatory Care Settings: Responding to Community Transmission of COVID-19 in the United States. Disponible en: https://www.cdc.gov/coronavirus/2019-ncov/hcp/ambulatory-care-settings.html. Consulta: 7 de abril, 2020.
53. Centers for Disease Control and Prevention (CDC). Healthcare Infection Prevention and Control FAQs for COVID-19. Operational Considerations for the Identification of Healthcare Workers and Inpatients with Suspected COVID-19 in non-US Healthcare Settings. Disponible en: https://www.cdc.gov/coronavirus/2019-ncov/hcp/non-us-settings/guidance-identify-hcw-patients.html. Consulta: 6 de abril, 2020.
54. Centers for Disease Control and Prevention (CDC). Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings. Disponible en: https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html. Consulta: 12 de abril, 2020.
55. Centers for Disease Control and Prevention (CDC). Interim U.S. Guidance for Risk Assessment and Public Health Management of Healthcare Personnel with Potential Exposure in a Healthcare Setting to Patients with Coronavirus Disease 2019 (COVID-19). Disponible en: https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-risk-assesment-hcp.html. Consulta: 12 de abril, 2020.
56. Centers for Disease Control and Prevention (CDC). Strategies for Optimizing the Supply of N95 Respirators during the COVID-19 Response. Disponible en: https://www.cdc.gov/coronavirus/2019-ncov/hcp/respirators-strategy/index.html. Consulta: 12 de abril, 2020.
57. Centers for Disease Control and Prevention (CDC). Steps Healthcare Facilities Can Take Now to Prepare for COVID-19. Disponible en: https://www.cdc.gov/coronavirus/2019-ncov/hcp/steps-to-prepare.html. Consulta: 20 de marzo, 2020.
58. Centers for Disease Control and Prevention (CDC). Strategies for Optimizing the Supply of Eye Protection. Disponible en: https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/eye-protection.html. Consulta: 17 de marzo, 2020.
59. Centers for Disease Control and Prevention (CDC). Strategies for Optimizing the Supply of Facemasks. Disponible en: https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/face-masks.html. Consulta: 17 de marzo, 2020.
60. Centers for Disease Control and Prevention (CDC). Strategies for Optimizing the Supply of Isolation Gowns. Disponible en: https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/isolation-gowns.html. Consulta: 17 de marzo, 2020.
61. Centers for Disease Control and Prevention (CDC). Strategies to Mitigate Healthcare Personnel Stang Shortages. Disponible en: https://www.cdc.gov/coronavirus/2019-ncov/hcp/mitigating-staff-shortages.html. Consulta: 13 de abril, 2020.