PREPARATION OF A SURGICAL CENTER IN NORTHEAST BRAZIL FOR SURGERIES DURING THE COVID-19 PANDEMIC

Preparação de um centro cirúrgico do Nordeste do Brasil para cirurgias durante a pandemia da COVID-19

Preparación de un centro quirúrgico de Noreste de Brasil para cirugías durante el pandemia de COVID-19

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ABSTRACT: Objective: To report the experience of preparing the operating room of a Brazilian university hospital for surgeries for patients suspected and confirmed for COVID-19. **Method**: Experience report of the operating room of a university hospital in Northeast Brazil, conducted in March and April 2020, for care during the COVID-19 pandemic. **Results**: The implementation of the care protocol for suspected and confirmed cases of COVID-19 was carried out through its elaboration by a team of professionals based on national and international guidelines, training and updates. Improvement cycles allowed the protocol to be refined over the two months reported. Barriers and facilitators to the process are discussed and strategies are drawn up for possible adjustments. **Conclusion**: There was an adaptation of care protocols related to the routine of patient flow and care in the operating room to better serve patients and reduce the risk of contamination of other patients and professionals.

Keywords: Surgicenters. Operating rooms. Perioperative nursing. Coronavirus infections.

RESUMO: Objetivo: Relatar a experiência da preparação do centro cirúrgico de um hospital universitário brasileiro para o atendimento de cirurgias em pacientes suspeitos e confirmados de COVID-19. **Método:** Relato da experiência do centro cirúrgico de um hospital universitário do Nordeste do Brasil, em março e abril de 2020, para o atendimento durante a pandemia da COVID-19. **Resultados:** A implementação do protocolo de atendimento a pacientes suspeitos e confirmados de COVID-19 foi realizada por meio da sua elaboração por um time de profissionais norteados por diretrizes nacionais e internacionais, treinamentos e atualizações. Os ciclos de aprimoramento permitiram que o protocolo fosse aperfeiçoado ao longo dos dois meses relatados. Barreiras e facilitadores para o processo são discutidos e estratégias são elaboradas para adequações possíveis. **Conclusão:** Houve adequação de protocolos assistenciais relacionados à rotina de fluxo de pacientes e da assistência em sala operatória no intuito de melhor atender os pacientes e reduzir os riscos de contaminação de outros pacientes e profissionais.

Palavras-chave: Centros cirúrgicos. Salas de cirurgia. Enfermagem perioperatória. Infecções por coronavírus.

RESUMO: Objetivo: Informar la experiencia de la preparación del centro quirúrgico de un hospital universitario brasileño para la atención de cirugías en pacientes sospechosos y confirmados de COVID-19. **Método:** Informe de la experiencia del centro quirúrgico de un hospital universitario del Noreste del Brasil, en marzo y abril de 2020, para la atención durante la pandemia de COVID-19. **Resultados:** La implementación del protocolo de la atención

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a los pacientes sospechosos y confirmados con COVID fue llevada a través de la elaboración por un equipo de profesionales guiados por las directrices nacionales e internacionales, entrenamientos y actualizaciones. Los ciclos de mejora permitieron mejorar el protocolo durante los dos meses informados. Las barreras y los facilitadores para el proceso se discuten, y las estrategias son elaboradas para los ajustes posibles. **Conclusión:** Se adecuaron protocolos asistenciales relacionados a la rutina del flujo de pacientes y de la asistencia en centro quirúrgico, con la intención de atender mejor a los pacientes y reducir los riesgos de la contaminación de otros pacientes y profesionales.

Palabras-clave: Centros quirúrgicos. Quirófanos. Enfermería perioperatoria. Infecciones por coronavirus.

INTRODUCTION

The COVID-19 pandemic (Coronavirus Disease, 2019) reached Brazil, with community transmission, at the end of March 2020[1]. Amidst many uncertainties, surgical center (SC) professionals had their tension levels increased in the face of exposure to the new virus.

Operating rooms (OR) are recognized, since the beginning of the pandemic, as places with great potential for contamination and dissemination of the virus[2]. The SC had to prepare for the protection of their professionals[3]. Initially, the greatest concern were patients with respiratory symptoms, considering that the confirmation of cases took days due to the scarcity of tests in the health network in Brazil in February and March. However, with the beginning of community transmission in the country and in the location of the hospital under study the capital of a state in the Northeast of Brazil—, any patient and all professionals working together could be sources of contamination. In this scenario, alerts for material rationing and the possibility of shortage of personal protective equipment (PPE) were also generators of stress[1,4-6].

In addition, many professionals had employment relationships with more than one health establishment, increasing their exposure and favoring the circulation of the virus. Even though surgeries were not performed in a service on suspected patients, asymptomatic patients started being considered potential sources, as well as professionals in the surgical team.

Many surgical departments reported how the pandemic impacted their surgery scheduling routines, changed their queues and their way of prioritizing. However, there are very few discussions on how the pandemic influenced the routines, within the OR, of garment management, assembly, disassembly and de-assembly[7-12].

OBJECTIVE

To report the experience of preparing the SC of a university hospital for surgeries in patients with suspected and confirmed infection by COVID-19, and the adequacy of such protocols to the OR routine.

METHOD

This is an experience report that took place in the SC of a university hospital located in the Northeast region of Brazil, in March and April 2020, for assistance in the COVID-19 pandemic. The service has ten medium and large ORs for high complexity surgeries and another four small ORs for outpatient surgeries. In this hospital, the obstetric center is separate from the SC. In addition, there are two post-anesthetic recovery rooms (PARR), one for each OR block. The process of implementation of measures followed the guidance of the PDCA cycle: plan, do, check, act.

This report was approved by the Institution's Research Ethics Committee.

RESULT: EXPERIENCE REPORT

At first, the unit temporarily suspended outpatient surgeries and started prioritizing larger and urgent surgeries, in view of the crisis of supply of materials and PPE. Besides that, over these two months (March and April 2020), several professionals were put on leave from their jobs because they were from risk groups or because they were infected by the virus, which prevented the functioning of the SC at its fullness.

Then, a team formed by the authors of this report began elaborating a protocol for the care of patients infected with the SARS-CoV-2 coronavirus. Professionals from the Hospital Infection Control Service (SCIH) and from the Assistance Risk Management Unit (UGRA) prepared guidelines and workflows for the hospital, especially hand hygiene and PPE use protocols. The use of PPE included equipment that was not yet used in SCs in Brazil, such as the face shield, in addition to the specific dressing routine.

The team of professionals, led by the head of the SC, started building a specific evidence-based protocol. After starting the process and completing the first version of the institutional protocol, guidelines were released by the bodies that guide the practice in ORs to be consulted and followed in the preparation of the document. The guidelines and recommendations adopted were those of the Brazilian Society of Surgical Nurses, Anesthetic Recovery and Material and Sterilization Center (SOBECC), the Brazilian Society of Anesthesiology (SBA), the Association of periOperative Registered Nurses (AORN), Surgical Infection Society, Centers for Disease Control and Prevention (CDC), and others mentioned in other reviews on the subject[13-18].

Figure 1 shows a scheme of the process as a PDCA cycle.

The planning stage (plan — P) included consulting sources and guidelines to preparing the protocol. The doing step (do — D) included all the training given. In all, 58 professionals participated in the training during their work shifts. The step of checking the protocol (check — C) occurred when the first patients were admitted, in April 2020. As the appointments took place and possible improvements to the protocol were suggested, the team evaluated and took action, making adjustments to the protocol and disseminating updates among the professional involved (act — A).

The protocol had two main versions as a result of changes that also affected the guidelines followed. Training began on the day before the completion of the second version. A training session was developed with a expository dialogue presentation, followed by a practical activity of dressing and undressing, then a simulation of assembly and disassembly

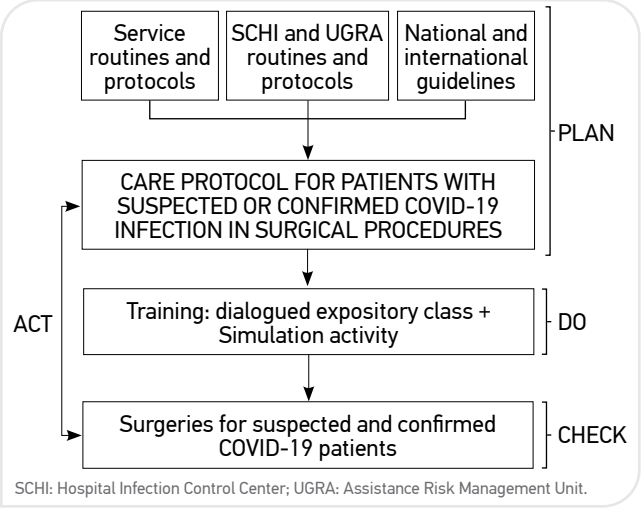

Figure 1. Implementation of care protocol for patients with suspected or confirmed infection by COVID-19 in surgical procedures.

of the OR according to the protocol. The professionals were trained in the sector and by the team who worked on the theoretical elaboration of the protocol, reaching the mark of 80% of professionals trained in the service, considering the absences in the period. The initial stage of training in dressing/undressing was also offered to anesthesiology professionals, surgeons, resident physicians, as well as cleaning service professionals. The intensive care unit (ICU) team provided orotracheal intubation and cardiopulmonary resuscitation training for the entire hospital, including the SC professionals.

Summary of protocol adaptations for the care of suspected and confirmed cases of COVID-19 in the operating room

To achieve success at all stages of the protocol, communication is essential. Surgical teams must notify the SC in advance of patients' status in order for the protocol to be initiate

For a surgery, two ORs are used: one in which the dressing takes place before the surgery and the undressing afterwards; the other in which the surgery itself is performed, after adaptations in the assembly of the room. The ORs are identified on the door with identification signs of contact isolation, respiratory isolation, and COVID-19.

Some routines used to be already performed in infectious surgeries or for patients in contact isolation; for example, the team would remove as much material and furniture from the OR as possible. Furthermore, until anesthetic induction, the air conditioning would be turned off to prevent hypothermia, and the protocol kept this practice until after orotracheal intubation, an aerosol generating procedure[16,18-21].

The anesthesia workstation were prepared with a bacterial filter for the ventilatory circuit, and placement of a gripper for the orotracheal tube wrapped in plastic film[16,18-21]. The forceps should be used whenever there was an opening of the closed airway ventilation system[16,18-21]. The proximal route of the orotracheal tube should also be sealed, allowing only the passage of the bougie or guide, not allowing the scape of aerosols.

Plastic film was placed on all furniture, including scalpel consoles, infusion pumps and aspirators. When disassembling the OR, the routine is to disinfect the plastic film with a 70% alcohol solution, then remove it and disinfect the surface again.

The permanence of people in the OR was reduced, excluding, for example, undergraduate students. Nursing technicians, who circulate in the OR, are scheduled for surgery

always in pairs: one inside the OR and the other at the door to meet any needs, so that the one inside the room does not have to leave.

According to the protocol, all professionals in the OR must wear the N95 or PFF2 mask, a cap, shoe protectors, procedure gloves, waterproof aprons over private clothing (to be changed at the end of the procedure), in addition to a face shield. After undressing, all professionals are taken to the locker room, where they take a shower and change their private clothes.

Finally, the patient recovers from anesthesia in the OR, for later referral directly to their bed in the inpatient unit.

DISCUSSION

The COVID-19 pandemic changed the routine of healthcare facilities around the world. Practices that were previously not considered became essential for the prevention of contamination and cross-contamination[19]. OR usage rates decreased, waiting time increased along with the notification of incidents, both in the service of the institution of this study and in others[10,11].

The surgical center organized a crisis committee that was part of the hospital's general committee, just like in other services[2]. This favored the rapid implementation of the PDCA cycle and online adaptations aligned with new guidelines and with the experiences specific to each type of surgery.

The success in coping with the pandemic in SCs is mainly related to the ability of managers and professionals to anticipate, so that preparations and adaptations are carried out as early as possible and with the necessary training, as in this report[9-11,20]. One of the factors favoring the success of the experience is the fact that the surgical department does not assist emergency surgeries, in which the risk of contamination and protocol breach are even greater[10,11,20]. It is also worth emphasizing the role of the previous safe surgery checklist protocol, since the moment of completion of the checklist served to review the points of this specific protocol.

The guidelines of the main societies in the world used previous evidence for an extrapolation that would allow quick answers for the preparation of surgical centers, converging on the guidelines[16,18-21]. Routines for patients in respiratory and contact isolation were already widely used in the SC, however, for the care provided to COVID-19, patients and aerosol-generating procedures became even more relevant. However, the main focus of publications in the first semester of the pandemic was on how to deal with the cancellation of elective surgeries, how to prioritize the ones that should not be suspended, and how to manage waiting patients[7,10,11,21].

One of the concerns about performing surgeries for patients with COVID-19 is related to surgical smoke, produced mainly when electrocautery is used, and has been studied for over 40 years[22]. Some authors even suggested avoiding its use and reinforced that the bipolar scalpel generates less smoke than the monopolar one[13,23,24].

One of the challenges was the reduction of professionals inside the ORs. With the involvement of the teams and the awareness of the university, it was possible to keep undergraduate students out of these procedures, moving them to other outpatient activities and wards, as it happened in other services[7,10,11,24].

The implementation of an evidence-based protocol brought to the team, in addition to more security, a greater sense of confidence for professionals when carrying out their activities. The change in institutional climate is notorious in terms of promoting unity and partnership, in which professionals help each other, especially in dressing and undressing procedures, and in all the work. Several references report that, elective surgeries during the pandemic period require preparation of the team and availability of PPE, being strictly necessary[11,19,24,25]. In addition, proper training helps to prevent the spread of the virus from the surgical department into the rest of the hospital[24].

In this center, elective surgeries have been performed only according to a prioritization specific to each specialty, as in other places, with general considerations regarding the preoperative status of the underlying disease, clinical conditions, presence or absence of suspected or confirmed coronavirus contamination[7,10,11,21,26]. The next step is the reopening of activities for all elective surgeries, awaiting national and international guidelines and following safe references for prioritizing cases and reorganizing the procedures' queue[7,8,10,11].

The execution of the OR assembly and disassembly protocol, with the covering of equipment with plastic film and all adaptations, in addition to dressing and undressing schema, increased the use of the room by approximately one hour—not considering the post-anesthetic recovery time[19].

Finally, we still need to reflect on aspects of the protocol that were not subject to intervention. The limitations

were mainly in structural, as the ORs had a conventional exhaust system, without negative pressure or high-efficiency particulate air filter (HEPA)[19]. Also, it was not possible to cover the entire team because some left the service early. Therefore, a professional from the training team continued to supervise the dressing/undressing steps for all professionals[19]. Another structural limitation is the fact that printed tools are still used in the surgical department for room records; even though they remained outside the OR, there was a high risk of being fomites for the dissemination of the SARS-CoV-2 virus[19].

CONCLUSION

The elaboration and implementation of the care protocol for suspected and confirmed cases of COVID-19 was carried out by a team of professionals guided by national and international guidelines, training and updates. The PDCA cycle allowed t improve the protocol over the two months of this report. Barriers and facilitators to the process were identified and strategies were drawn up for possible adjustments. Many gains in terms of protocols and procedures are expected to remain and be used after the pandemic.

REFERENCES

1. Oliveira AC, Lucas TC, Iquiapaza RA. O que a pandemia da COVID-19tem nos ensinado sobre adoção de medidas de precaução? Texto Contexto Enferm. 2020;29:e20200106. https://doi.org/10.1590/1980-265x-tce-2020-0106

2. Peloso A, Moeckli B, Oldani G, Triponez F, Toso C. Response of a European surgical department to the COVID-19 crisis. Swiss Med Wkly. 2020;150:w20241. https://doi.org/10.4414/smw.2020.20241

3. The Lancet. COVID-19: protecting health-care workers. The Lancet. 2020;395(10228):922. https://doi.org/10.1016/S0140-6736(20)30644-9

4. Hussain K, Dewan V, Ali T, Al Shakarchi J. The impact of the COVID-19 pandemic on the provision of surgical care. J Surg Case Rep. 2020;2020(4):rjaa087. https://doi.org/10.1093/jscr/rjaa087

5. Satomi E, Souza PMR, Thomé BC, Reingenheim C, Werebe E, Troster EJ, et al. Alocação justa de recursos de saúde escassos diante da pandemia de COVID-19: considerações éticas. Einstein (São Paulo). 2020;18:eAE5775. https://doi.org/10.31744/einstein_journal/2020ae5775

6. Medeiros EAS. A luta dos profissionais de saúde no enfrentamento da COVID-19. Acta Paul Enferm. 2020;33:e-EDT20200003. https://doi.org/10.37689/acta-ape/2020edt0003

7. Al-Jabir A, Kerwan A, Nicola M, Alsafi Z, Khan M, Sohrabi C, et al. Impact of the Coronavirus (COVID-19) pandemic on surgical practice – Part 1. Int J Surg. 2020;79:168-79. https://doi.org/10.1016/j.ijsu.2020.05.022

8. Covid Surg Collaborative. Elective surgery cancellations due to the COVID-19 pandemic: global predictive modelling to inform surgical recovery plans. Brit J Surg. 2020;107(11):1440-9. https://doi.org/10.1002/bjs.11746

9. Gilat R, Haunschild ED, Tauro T, Cole BJ. Recommendation to optimize safety of elective surgical care while limiting the spread of COVID-19: primum non nocere. Arthrosc Sports Med Rehabil. 2020;2(3):e177-e183. https://doi.org/10.1016/j.asmr.2020.04.008

10. Low TY, Hartman M, Chee CYJ, Mohankumar B, Ang SBL, San MT, et al. Restructuring the surgical service during the COVID-19 pandemic: experience from a tertiary institution in Singapore. Am J Surg. 2020:220(3):553-5. https://doi.org/10.1016/j.amjsurg.2020.05.021

11. Mariani NM, Pisani Ceretti A, Fedele V, Barabino M, Nicastro V, Giovenzana M, et al. Surgical strategy during the COVID-19 pandemic in a University Metropolitan Hospital in Milan, Italy. W J Surg. 2020;44:2471-6. https://doi.org/10.1007/s00268-020-05595-y

12. Rana RE, Ather MH, Enam SA. Change in surgical practice amidst COVID 19: example from a tertiary care centre in Pakistan. Ann Med Surg (London). 2020;54:79-81. https://doi.org/10.1016/j.amsu.2020.04.035

13. American College of Surgeons (ACS). COVID-19 and surgery. COVID-19: elective case triage guidelines for surgical care [Internet]. ACS; 2020 [accessed on Dec 1, 2020]. Available at: https://www.facs.org/covid-19/clinical-guidance/elective-case

14. Brat GA, Hersey S, Chhabra K, Gupta A, Scott J. Protecting surgical teams during the COVID-19 outbreak: a narrative review and clinical considerations. An Sug. 2020;10.1097/SLA.0000000000003926. https://doi.org/10.1097/SLA.0000000000003926

15. Center for Diseases 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 (COVID-19) [Internet]. CDC; 2020 [accessed on Dec 1, 2020]. Available at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-risk-assesment-hcp.html

16. American College of Surgeons (ACS). COVID-19: considerations for optimum surgeon protection before, during, and after operation [Internet]. ACS; 2020. [accessed on Dec 15, 2020]. Available at: https://www.facs.org/-/media/files/covid19/considerations_optimum_surgeon_protection.ashx

17. Forrester JD, Nassar AK, Maggio PM, Hawn MT. Precautions for operating room team members during the COVID-19 pandemic. J Am Coll Surg. 2020;230(6):1098-101. https://doi.org/10.1016/j.jamcollsurg.2020.03.03

18. Wick EC, Pierce L, Conte MC, Sosa JA. Operationalizing the operating room: ensuring appropriate surgical care in the era of COVID-19. An Surg. 2020;272(2):e165-e167. https://doi.org/10.1097/sla.0000000000004003

19. Heffernan DS, Evans HL, Huston JM, Claridge JA, Blake DP, May AK, et al. Surgical Infection Society Guidance for Operative and Peri-Operative Care of Adult Patients Infected by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2). Surg Infec (Larchmt). 2020;21(4):301-8. https://doi.org/10.1089/sur.2020.101

20. COVID Surg Collaborative. Global guidance for surgical care during the COVID-19 pandemic. Brit J Surg. 2020;107(9):1097-103. https://doi.org/10.1002/bjs.11646

21. Moletta L, Pierobon ES, Capovilla G, Constantini M, Salvador R, Merigliano S, et al. International Guidelines and Recommendations for Surgery During Covid-19 Pandemic: a systematic review. Int J Surg. 2020;79:180-8. https://doi.org/10.1016/j.ijsu.2020.05.061

22. Vourtzoumis P, Alkhamesi N, Elnahas A, Hawel JE, Schlachta C. Operating during COVID-19: is there a risk of viral transmission from surgical smoke during surgery? Can J Surg. 2020;63(3):E299-E301. https://doi.org/10.1503/cjs.007020

23. Hojaij FC, Chinelatto LA, Boog GHP, Kasmirski JA, Lopes JVZ, Sacramento FM. Surgical practice in the current COVID-19 pandemic: a rapid systematic review. Clinics (Sao Paulo). 2020;75:e1923. https://doi.org/10.6061/clinics/2020/e1923

24. Spolverato G, Capelli G, Restivo A, Bao QC, Pucciarelli S, Pawlik TM, et al. The management of surgical patients during the coronavirus dieases 2019 (COVID-19) pandemic. Surgery. 2020;168(1):4-10. https://doi.org/10.1016/j.surg.2020.04.036

25. Goh SSN, Yeo DXW, Kaushal SA, Yeong HK, Tan GWL. Surgical and endoscopy protocols for general surgeons during the COVID-19 pandemic: an institutional experience in Singapore. Br J Surg. 2020;107(8):e249. https://doi.org/10.1002/bjs.11696

26. Presl J, Weitzendorfer M, Varga M, Borhanian K, Ciftci S, Emmanuel H, et al. Surgical strategies during the COVID-19 crisis: the Salzburg concept. Am J Surg. 2020;220(3):550-2. https://doi.org/10.1016/j.amjsurg.2020.05.006