



Adaptation of the Operating Room Nursing Staff to New Protocols During the Covid-19 Pandemic

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: The Covid-19 pandemic, declared by the WHO in March 2020, worsened global health, resulting in thousands of deaths and a hospital crisis due to the rapid spread of the virus. In the surgical context, operating rooms were identified as high-risk locations, requiring new biosafety protocols. The overload on the nursing team affected hospital care, highlighting the urgent need to understand the repercussions on surgical dynamics.

Objective: to analyze the adaptation process of the surgical center's nursing team through the implementation of new safety protocols during the COVID-19 pandemic in a reference hospital in Belém.

Methodology: This is a qualitative study with an exploratory approach, involving nursing staff at the Surgical Center of the Fundação Hospital de Clínicas Gaspar Vianna (FHCGV), which is a reference hospital for psychiatry, nephrology, and cardiology in the state of Pará. Data were collected via individual interviews, with the assistance of a voice recorder or manual responses to the questionnaire proposed in the study. Subsequently, the data was subjected to analysis in accordance with the methodology proposed by Laurence Bardin.

Results and Discussion: The findings demonstrated a series of adaptations that the nursing team had implemented in order to comply with the recently introduced biosafety protocols. The primary alterations observed include: The alteration in work routine, the difficulties encountered by the operating room nursing team, and the assistance provided for the implementation of the new protocols. The data obtained indicates that the nursing team's adaptation was effective in ensuring the continuity of surgical procedures in a safe and secure manner throughout the course of the pandemic. Furthermore, the nursing team demonstrated remarkable innovation in the provision of care for patients with positive covid-19 test results, as evidenced by their exemplary record-keeping practices. However, the adaptation process also revealed significant challenges, such as an increased workload, which necessitated the implementation of psychological support and well-being measures for professionals.

Conclusion: the study highlights the adaptability of the surgical center's nursing team in the face of an unprecedented crisis. The lessons learned and the strategies implemented will serve as a reference for future health emergency situations

Keywords: Surgical centers; nursing; Covid-19; protocols.

1. INTRODUCTION

In examining the historical origins of the SARS-CoV-2 virus, it becomes evident that this novel pathogen first emerged in Wuhan, Hubei Province, China, towards the end of 2019. Following its initial transmission, the virus rapidly disseminated across national borders, resulting in a global pandemic. In response to the accelerated spread of the virus, the World Health Organization (WHO) declared a pandemic in March 2020. By that point, the infection had reached over 381,000 individuals in 195 countries and regions, resulting in over 16,000 deaths [1].

The World Health Organization (WHO) has designated the term "Covid-19" as the official nomenclature for the disease caused by the novel coronavirus. The term "Covid-19" is a combination of the abbreviation "Corona Virus Disease," which translates into Portuguese as "Coronavirus Disease," and the number "19,"

which refers to the year 2019, when the first cases of the disease were reported [2].

The clinical manifestations of the SARS-CoV-2 virus, which causes the disease known as Coronavirus Disease 2019 (Covid-19), can be either symptomatic or asymptomatic. As reported by the World Health Organization (WHO), approximately 80% of carriers are asymptomatic, while the remaining 20% present with symptoms, typically severe and requiring hospitalization [3].

Although it shares some characteristics with the common cold and many individuals may not present any symptoms, the progression of SARS-CoV-2 infection can be rapid, particularly in elderly individuals or those with pre-existing autoimmune diseases and comorbidities. In severe cases, the infection can lead to severe pneumonia, acute respiratory distress syndrome (ARDS), and multi-organ dysfunction [4].

In the context of the ongoing Coronavirus Disease 2019 (Covid-19) pandemic, there has been a notable surge in the demand for hospital resources, necessitating the implementation of novel containment strategies to ensure the safe and effective care of patients suspected or diagnosed with the virus [5]. These containment measures are necessary to ensure the optimal quality of care for patients with covid-19 and to minimize the risk of viral infection and transmission to other patients or healthcare professionals [6].

At the onset of the pandemic, the operating theatre was identified as a site with great potential to increase the spread of the virus [7] because of the complex processes that occur in the operating theatre that manipulate the airways. These processes may involve direct anaesthetic-surgical support, theatre circulation or surgical instrumentation, and are intrinsically dependent on nursing, which is involved in both patient care management and team management, always working to promote the desired effectiveness [8].

Surgical nursing is consistently engaged in the advancement of knowledge and technology with the objective of minimizing the risks to patients [9]. In the context of patient safety, the Surgical Center (SC) was compelled to implement novel protocols during the pandemic to enhance biosafety and optimize infection control measures [10].

It is established that these professionals require a foundation in scientific knowledge and technical skills to effectively manage their work [11]. Nevertheless, it has been observed that the increased workload on these professionals during the pandemic has resulted in a diminished level of care in the context of high demand. This has led to a reduction in the availability of beds, particularly for critically ill patients, which has subsequently impacted the quality of hospital care [12]. In the context of the pandemic, it became evident that the lack of adequate preparation to face the challenges posed by the crisis resulted in significant repercussions across various domains, including health, finance, and education [13].

The global burden of the SARS-CoV-2 virus, which causes the disease known as Coronavirus Disease 2019 (Covid-19), has been significantly reduced. This is due to the availability of masks, tests, vaccines and treatments in various

locations worldwide. Additionally, the transmission rate has decreased, and fewer individuals are developing the severe form of the disease. Even when they do, there is an effective treatment to treat patients. However, the virus continues to be responsible for deaths and the development of Long-Covid, a term used to describe the long-term effects of the virus on individuals who have recovered from the disease. Nevertheless, the overall mortality rates are significantly reduced compared to previous peaks [14].

On 5 May 2023, the World Health Organisation (WHO) announced the conclusion of the Public Health Emergency of International Concern (PHEIC) in relation to the novel coronavirus disease (Covid-19) at a meeting in Geneva, Switzerland. At that juncture, countries were obliged to transition to a new model for managing not only the ongoing pandemic but also other diseases, while simultaneously reinforcing their vaccination and surveillance programmes for the general population [15].

In light of the aforementioned scenario, the objective of this study was to examine the process of adaptation of the operating room nursing team through the implementation of novel safety protocols during the ongoing pandemic.

2. METHODOLOGY

This is a qualitative, exploratory study conducted in the operating room of a hospital situated in Belém-Pará, Brazil. The research was based on an exploratory study designed to gain familiarity with the study variable in its current manifestation.

The research was conducted at the Surgical Center of a hospital that serves as a reference for patients requiring treatment for psychiatric, nephrological, and cardiological conditions in the state of Pará. The Fundação Hospital de Clínicas Gaspar Vianna (FHCGV) plays an active role in the provision of care, offering consultations and hospitalizations for a range of specialties, including Medical Clinic, Surgical Clinic, Pediatric Clinic, and other sectors. These services are targeted towards patients who meet the criteria for referral.

The Fundação Hospital de Clínicas Gaspar Vianna was selected as the site for this qualitative research for two reasons. First, it is a

state-designated center of excellence in high-complexity care. Second, its nursing team has extensive experience in a range of specialties, particularly during the pandemic. The hospital was among the first to implement new safety protocols in the operating room at the state level, in accordance with national guidelines for addressing the pandemic. This makes it an optimal setting for investigating the perceptions of professionals regarding these changes and their impact on their daily lives.

Specific professionals comprising the nursing team (senior and mid-level) at the study hospital were invited to participate in the research project. The team, which works in the surgical center of the reference hospital, includes nine nurses and 30 licensed practical nurses. However, according to the criteria adopted for inclusion in the research, the sample design consisted of 12 health professionals, nine of whom are licensed practical nurses and three of whom are nurses. These professionals were divided between the shifts—morning, afternoon, and night—as illustrated in Table 1.

Table 1. The following table presents the work shifts of the survey participants

Participants	Nursing staff:
P1	Night
P2	Afternoon
P3	Afternoon
P4	Morning and Afternoon
P5	Afternoon
P6	Morning
P7	Morning
P8	Morning
P9	Afternoon
P10	Afternoon
P11	Night
P12	Night

**Source: Authored by the researchers (data collected through interviews with participants).*

The study population consisted of senior and licensed practical nurses staff (nurses and licensed practical nurses) who were employed directly in the SC during the pandemic, between the months of January 2020 and December 2021. In order to be eligible for inclusion in the study, participants had to be over the age of 18 and willing to participate in the research.

The exclusion criteria included senior and technical staff who are not part of the nursing team, nursing staff who did not work directly in

the SC during the pandemic between January 2020 and December 2021, nursing staff who retired or were on leave during the research period and who do not belong to the hospital staff, as well as those who did not consent to participate in the research.

Following the completion of the registration process on the Brazil Platform and the subsequent authorization from the Research Ethics Committee, data collection commenced at the FHCGV. Subsequently, potential participants were selected according to the established criteria for inclusion in the study. The participants were informed about the objectives of the study, the importance of their involvement, and their interest in taking part was ascertained. Once consent was obtained, the participants were presented with the Informed Consent Form (ICF) and the authorization form for the use of written reports, images, and voice sounds for research purposes. This was provided in two copies, one for the researchers' files and the other for the participant.

Data were collected through individual interviews with voice recordings for participants who consented to this method of data collection, and with written answers for those who refused to be recorded. The interviews were conducted in a secure and confidential setting, in accordance with all applicable health and safety protocols. Following transcription of the recordings, the audio was deleted, thus ensuring confidentiality. This method permitted a comprehensive documentation of perceptions, integrating the adaptability of the questionnaires with the depth of the recordings, thereby establishing a robust foundation for the research's content analysis.

The data were analyzed using Bardin's [16] Thematic Content Analysis by Frequency method, which aims to obtain a systematic and objective description of the content of the messages, as well as evidence that allows for the inference of knowledge related to the conditions of production and reception of these messages.

The analysis was conducted in three stages: preliminary analysis, examination of the material, and data treatment and interpretation. In the initial stage of the analysis, a "floating" reading was conducted to gain insight into the context in which the reports were discovered, leading to the formulation of hypotheses. In the subsequent

stage, the material was subjected to a second round of analysis, during which codes were assigned with the objective of establishing the categories of analysis. In the final phase of the analysis, the primary analytical category of the research was defined.

2.1 Analysis of the Information

The interviews were conducted between May 20, 2024, and June 20, 2024. Data were collected through individual interviews conducted in a separate room at the hospital in a closed environment with the interviewers and the interviewees present. The interviews were limited to a maximum of 17 minutes, despite occurring outside of the interviewees' work shift. All current health and safety protocols were strictly adhered to and respected for the safety of all parties involved.

The survey questions and answers were recorded using an audio-recording device, specifically a REDMI NOTE 12S cell phone. Those who declined to be recorded provided their responses in written form on the questionnaires. Once the interviews were concluded, each participant's responses were transcribed in their entirety into a single file in text.doc format, containing the aggregate responses from all interviews, and saved on a USB stick for exclusive use in this study. Following transcription, the audio files of the interviews were deleted.

Following an analysis of the content of the interviews, four categories were identified with a view to answering the research objectives. These categories are based on the following topics: 1)

"An analysis of the adaptation process and perception of the surgical center nursing team"; 2) "Innovations in nursing and adaptations in health services during the Coronavirus Disease 2019 (Covid-19) pandemic"; 3) "The primary challenges faced by the surgical center nursing team"; 4) "The support provided at the FHCGV during the Coronavirus Disease 2019 (Covid-19) pandemic for the implementation of the new protocols in the SC".

3. RESULTS AND DISCUSSION

3.1 Profile of the Participants

The nursing team at the SC is composed of 9 registered nurses and 30 licensed practical nurses. However, in accordance with the established criteria for inclusion in the study, the sample design consisted of 12 health professionals, 9 of whom were licensed practical nurses and 3 nurses. Table 2 provides detailed information regarding the age, gender, profession, length of training (years), and whether they had more than one job of each participant.

The study considered the individual characteristics of all participants, including gender, in the construction of the profile. It is important to note, however, that these characteristics did not exert a significant influence on the results of the research. The analyses were conducted in an objective manner, ensuring that the data obtained reflected the reality of the practices and routines observed in the environment under study.

Table 2. Presents the sociodemographic data of the nursing staff who were interviewed

Code	Age	Sex	Profession	Length of training (Years)	Multi-jobholding
P1	35	FEM	Nurses	12	YES
P2	48	FEM	Licensed practical nurse	22	YES
P3	38	FEM	Licensed practical nurse	17	YES
P4	43	FEM	Nurses	18	NO
P5	43	FEM	Licensed practical nurse	14	YES
P6	36	FEM	Nurses	10	NO
P7	51	FEM	Licensed practical nurse	25	YES
P8	48	Male	Licensed practical nurse	17	NO
P9	57	FEM	Licensed practical nurse	27	YES
P10	37	Male	Licensed practical nurse	13	YES
P11	49	Fem	Licensed practical nurse	20	YES
P12	44	FEM	Licensed practical nurse	18	YES

**Source: Authored by the researchers (data collected through interviews with participants).*

To ensure the anonymity of the participants, they were identified by the letter "P" and numbered from 1 to 12. In order to facilitate the presentation of the data, it was categorised according to the following variables: (1) institutional support; (2) innovations in care; (3) changes in routine. For each category, a selection of responses was provided, which will be discussed in greater detail in the following sections.

3.2 Category 1: An Analysis of the Adaptation Process and Perception of the Operating Room Nursing Team

The global pandemic of the novel coronavirus (Covid-19) has resulted in significant changes to the daily lives of individuals worldwide. In order to prevent further spread of the virus, health authorities have imposed recommendations that have altered and restricted routines, affecting the biopsychosocial life of the population [17].

It is therefore estimated that the ongoing pandemic has introduced a number of challenges for public sector organisations [18]. In the context of the healthcare sector, professionals have been compelled to adapt their practices to accommodate new routines for the care of patients. This has entailed the implementation of novel protocols designed to enhance the safety of all individuals involved in the care process [19].

In the surgical sector, the situation has had a similarly profound impact, compelling these professionals to adapt to the changes in their work environment. These professionals were confronted with the challenge of performing their duties with limited information about the novel coronavirus. This lack of data and information contributed to feelings of uncertainty and insecurity, particularly in the absence of clear guidance on the appropriate actions to take in response to the novel virus [20].

In this context, the findings demonstrate the diverse range of inquiries posed by professionals regarding the initial stages of the coronavirus outbreak. This was due to the evolving circumstances and the uncertainty caused by the frequent alterations to the established safety protocols.

p6: "[...] the disease itself, which was something unknown [...] first you have to do it like this, then it would change, then it would

come, no, let's do it like this [...] i think that for nursing the big challenge was for us to adapt to the disease, to get to know the disease".

As indicated by the survey respondents, in the context of this novel scenario, the necessity for protocol updates has become increasingly prevalent. As the disease progresses, it has become imperative to implement continuous updates to ensure the safety of both professionals and patients. This has led to the creation of a series of targeted measures designed to safeguard healthcare professionals [21].

p1: "yes, there was training, there were always updates. first training on how to put on appropriate personal protective equipment, right? dressing and undressing, then training on how to prepare the operating theatre for these isolation cases, what to ask for. and we also had training on medication, intubation, cardiac arrest."

p2: "how to put on the gloves, how to dress, how to take them off, how to put the face shield on during the surgery. a whole set-up. there was a lot of protocol and a lot of training too, like, a new protocol came along, it was time. there's a new protocol, let's train and all that".

p7: "how to use the equipment, when to put it on, how to take it off, asepsis, how long the mask lasts".

It is important to note, however, that the fundamental patient safety protocols were still employed, based on the safe surgery checklist and the safe surgery manual developed by the world health organisation (who) [22]. Similarly, the checklist categorises surgical procedures into three distinct phases. These procedures must be carried out before the induction of anaesthesia, before the surgical incision and before the patient leaves the operating theatre.

p6: "the protocols, in fact, were a protocol that we already followed for contact isolation. we just adapted it to be more faithful to the protocol. we had training on how to receive the patient until they entered the room and the rooms were practically empty, with only what was needed inside [...]"

In light of the necessity for robust protective measures, the screening of patients in the preoperative period has become a fundamental

aspect of surgical care. This approach is aimed at minimising the risk of postoperative complications from the novel coronavirus and the potential exposure of operating room staff to the pathological agent [23]. The rapid test represented an adaptation that enhanced the efficiency of care, a conclusion supported by the responses obtained when participants were asked about the changes implemented in the operating theatre work routine.

p1: "[...] it was the rapid test, it wasn't the operating room that did it, but it was a safety routine for the patient before he came down, he would have to do it in the surgical clinic or in the clinic where he was hospitalised [...]"

p3: "[...] the strategy was mainly the rapid covid test [...] because we had a way of preventing it from coming here [...] our main prevention method was the covid test."

Despite the ongoing refinement of safety protocols, the ongoing global pandemic of sars-cov-2 has resulted in a significant strain on the physical and managerial structures of various health sectors [24]. This has underscored the necessity for a unified approach by the multidisciplinary health team and all government agencies to ensure an immediate and effective response [25].

As in other contexts, the professionals in this study encountered significant challenges in their work environment. They observed that the workload was increasing in tandem with the progression of the disease.

p1: "[...] so we were left with a very small and overloaded team"

p7: "[...] the shifts became heavy due to the reduction in the team"

As the disease advanced, it became evident that a collapse in Brazilian public health was inevitable due to the overwhelming number of patients [26]. In response to the high demand for healthcare services, most hospitals and health services made themselves available to treat potential patients with coronavirus disease 2019 (covid-19), thereby limiting surgical care to emergency procedures only [27].

This measure was implemented within the institution's surgical schedule, whereby elective surgical procedures were temporarily halted, and

only urgent and emergency surgeries were conducted.

p4: "[...] only performed emergency surgery. our elective surgeries were suspended"

p5: "[...] only urgent and emergency surgeries were carried out in order to make beds available"

p9: "elective surgeries all suspended, with only emergencies taking place"

p11: "a they reduced the number of surgeries, right? only emergency surgeries came in"

p12: "[...] a decrease in surgeries, right? we didn't have as many surgeries as we used to, just emergencies, right?"

As evidenced by the minimal number of surgeries, many professionals working in the sc experienced a significant alteration in their work routines. This was due to the fact that in several hospitals, employees were redirected to various high-demand sectors [28]. As previously documented in the literature, the reduction in surgical procedures constituted a pivotal factor in the reassignment of numerous professionals from the FHCGV in order to accommodate the surge in patient demand.

p2: "[...] many of our colleagues have been reassigned to other sectors [...]"

p6: "[...] the hospital became overcrowded [...] the employees themselves became ill [...] we were transferred to other sectors, to cover other sectors, since the other sectors also had a shortage of employees [...]"

p12: "[...] the staff was much reduced, in fact they were dispersed to other areas [...] we hardly had an adequate number of staff to provide care"

The significance of nursing personnel was reiterated during the reassignment of the team to other hospital sectors. Santos [29] indicates that nurses were instrumental in the effective reallocation of the nursing team during the pandemic, playing a pivotal role in safeguarding the well-being of healthcare professionals and maintaining the quality of care provided to patients.

It is evident that nursing professionals have continued to play a pivotal role in the fight against the novel coronavirus disease (covid-19) and in the care of patients infected with the virus [30]. Therefore, it can be stated that despite the uncertainty that surrounded them, these professionals were able to adapt to the sudden changes in their work routines that occurred during the pandemic, ensuring their own safety and that of their patients.

3.3 Category 2: Innovations in Nursing and Adaptations in Health Services during the Coronavirus Disease 2019 (covid-19) Pandemic

The rapid pace of innovation within the scientific community has precipitated a necessity for significant reforms within the domain of health services [31]. A similar situation was observed at the SC, specifically at the reference hospital that was the subject of our research. The health team was taken aback by the constant stream of innovations pertaining to care processes. However, some of these distinctive innovations introduced by the hospital were particularly noteworthy, including the provision of supplementary care based on the medical records of patients diagnosed with Coronavirus Disease 2019 (Covid-19).

P11: "Other protocols I saw that they did was to take care of the medical records, for example, the patient is contaminated, covid, very contaminated, so everything came separately, the medical records they were careful to bag, to give to the team, everything bagged, no one took it there without paramentation, so as not to contaminate everything [...]"

This is a straightforward measure to implement, yet it is of paramount importance in the care provided at the FHCGV. The medical record is a document that contains the records of the patient's care by the entire multidisciplinary team. Regardless of whether the record is electronic or manual, it remains an invaluable repository of information pertaining to the patient's clinical condition [32].

Furthermore, two additional pertinent innovations were identified, although they had previously been implemented in other medical facilities. The initial measure pertains to the readjustment of the satellite pharmacy's distribution. This was necessitated by the increased demand for

medicines and materials, as observed by Fuzari et al. [33] in their case report. In the hospital's pharmaceutical sector, the creation and adaptation of a satellite pharmacy were implemented for the specific care of patients with Coronavirus Disease 2019 (Covid-19). This was done with the aim of improving the quality of care provided.

In this manner, a location was designated with a strategic positioning and convenient access to the units designated for the treatment of patients with the novel coronavirus. The responsibility for the provision of pharmaceuticals and medical and hospital supplies to these sectors was assumed by this facility.

The satellite pharmacy represents a discrete unit of the core pharmacy, situated within the sector that requires the assistance and essential care provided to patients. In this particular case, the satellite pharmacy is situated within the operating theatre. The centralisation of the service facilitates the effectiveness of the team, allowing nursing staff to dedicate themselves exclusively to direct patient care. In this way, a space was established with a strategic location and easy access to the units dedicated to the treatment of patients with the coronavirus [34]. The pharmacy was responsible for supplying medicines and medical and hospital materials to the aforementioned sectors.

P4: "[...] our satellite pharmacy, we had to open it to serve the pediatric intensive care unit pharmacy, which became the adult ICU. So we shared our satellite pharmacy with the adult ICU, where the pediatric intensive care unit is."

P5: "[...] the pharmacy inside the operating room was relocated to the recovery room to provide UR covid with technical support inside the pharmacy."

In addition to structural changes, such as the relocation of the satellite pharmacy, internal behavioral changes were also necessary. In addition to knowledge of care techniques, it was necessary to put into practice interpersonal relationships and teamwork, which were modified due to the present scenario.

In accordance with the Ministry of Health's 2020 guidelines, a minimum number of in-house professionals must be present in the operating room during surgical procedures. Additionally, all

personnel are required to wear the appropriate personal protective equipment (PPE) commensurate with their respective roles. As Trevilato et al. [35,36] recommend, the number of professionals providing a circulator in the external area to attend the operating room should be limited. This approach is designed to enhance adherence to the recommendations and ensure the availability of essential materials, equipment, and supplies inside the operating room.

Therefore, limiting the number of individuals in operating theaters and restricting their movement is of paramount importance during periods of heightened viral transmission, particularly during procedures involving airway access, such as intubation and orotracheal extubation. This is because, at the time of extubation, the patient is more susceptible to coughing, which can lead to the transmission of the virus [37].

P1: “[...] we had a routine of taking all the materials out of the room [...] only the essentials remained, and what would be needed [...] we divided the team between a circulator inside the room and a circulator outside, so as not to come into contact with what needed to be taken outside. The outside circulator stayed and we also separated the appropriate personal protective equipment (PPE) for the whole team [...] everything was already separated and there was also a kit for the team to shower after the positive patient’s surgery.”

P11: “[...] there was a team inside the operating room and another outside with all the material so as not to contaminate it, [...] all the sealed materials that we needed to open to use during surgery, were not kept inside the operating room, they were kept by a person outside the room [...] then what we needed, we talked about at the door, like this, with the colleague [...]”.

It was of the utmost importance to have a professional, properly attired and equipped with the requisite supplies, situated outside the operating room to facilitate the provision of necessary materials during the preoperative period. This approach to care is consistent with that observed at the SC research site.

As previously noted by the participants, it is also essential to underscore the significance of the care provided in the postoperative period with

regard to the safety measures taken in the operating room. This care is aimed at preventing complications and ensuring the safety of patients and the healthcare team, which plays a pivotal role in this process [38,39].

3.4 Category 3: The primary Challenges Encountered by the Operating Room Nursing Team

Despite the fact that biosafety protocols were already a standard practice for operating room personnel, the advent of the Coronavirus Disease 2019 (Covid-19) pandemic has necessitated the implementation of stringent measures as a primary line of defence in the control of the disease. These measures include the mandatory use of personal protective equipment (PPE), comprising an N95 mask, face shield, gown or apron, in addition to frequent hand washing. The implementation of these measures has been instrumental in preventing the transmission of the virus [40].

As the pandemic proliferated, the nursing personnel were compelled to endure protracted, uninterrupted work periods, with an average duration of 12 hours per day [41]. It was observed that the majority of recommendations pertaining to the safeguarding of operating room professionals were primarily focused on precautionary measures, such as the utilisation of personal protective equipment (PPE), the avoidance of adornments, and the implementation of surgical bathing with a change of clothes during surgical procedures involving confirmed or suspected cases of coronavirus disease 2019 (Covid-19). Additionally, the importance of cell phone sanitization was highlighted [42]. As evidenced by the findings of our research, the team demonstrated compliance with the recommendations.

P1: “[...] The outside circulator stayed and we also separated the appropriate personal protective equipment for the whole team, which was the N95 mask, the disposable cloak. All that protection, the FACESHIELD, everything was already separated and the kit for the team to shower after the positive patient’s surgery”.

P4: “We were concerned about server protection routines. We started wearing N95 masks directly. We use protective equipment, goggles, that face shield in some situations. [...]”.

P10: "It's a question of wearing a continuous N95 mask, face shield, apron. Especially when it comes to intubation, right? Then, as I was in the pandemic, we wore it all the time, right? We didn't take it off"

P11: "[...] NR95, which is not to use props and ornaments in hospital, because you end up taking contamination home. So it's still very strong, in the old days, people, every hospital you came to, you saw it. The nursing staff, doctors and everyone wore a lot of props and nowadays we don't see that, it's very rare [...]"

The paucity of information regarding the disease constituted an additional challenge for the nursing team at the SC. The gravity of the infection placed these professionals in challenging circumstances, as they lacked definitive data regarding the virus. This reinforced the apprehension of contracting the disease and, subsequently, of transmitting it to their families, thereby intensifying the perceived threat [43].

P1: "[...] the difficulty of knowing how to deal with the unknown [...]"

P6: "I think the main challenges were knowing how to deal with the disease itself, which was something unknown, we didn't know [...] we didn't know how it would evolve [...]"

P12: "At the time, everything was new, everything was discovered little by little, right? It was a disease that came along that nobody knew how to deal with at the time [...]"

In the context of the ongoing pandemic, nursing professionals have demonstrated resilience and dedication to maintaining the highest standards of safety and planning in the care of patients and staff. As evidenced by the data collected, nursing encountered considerable challenges in providing care, underscoring the necessity for an effective checklist during the transoperative period to guarantee the safety of all involved [44].

P1: "[...] also changing some protocols for the safety of both the patient and us. So, how to get out, take the patient out of the block and send them on their way [...] [...]"

P4: "[...] we simulated several times how to care for this patient and the discipline of using personal protective equipment."

P6: "[...] the nursing team was more engaged in knowing what could be in the room, what couldn't, in really isolating the room, being dressed, taking all the precautions, we knew [...]"

As a consequence of these modifications, the dearth of qualified personnel constituted an additional challenge to be surmounted. Continuing the work with a reduced team was a challenging endeavour, given the exponential growth in demand, which placed significant strain on the remaining personnel. Consequently, as the pandemic persisted, nursing was compelled to operate on a 24-hour basis, despite a dearth of qualified personnel [45].

It is not uncommon for psychological fear to manifest in the context of crises such as the current pandemic. The intensification of this phenomenon may be attributed, at least in part, to the extensive media coverage that has accompanied the virus, with new developments being reported on a daily basis. The psychological impact of the Coronavirus Disease 2019 (Covid-19) pandemic on individuals has been profound. Even among those without pre-existing mental health conditions, fear of illness or mortality, anxiety, and feelings of helplessness or guilt in the event of a loved one becoming unwell have been reported [46].

The global population was collectively confronted with the adverse effects of this crisis, which resulted in widespread suffering. The professionals who were present also experienced the same emotional responses, potentially to a greater extent, given their continued involvement in the provision of care and prevention efforts [47]. In this context, the research demonstrated that nurses frequently encountered fear as a consequence of the SARS-CoV-2 pandemic.

P2: "O Fear. It's the fear of catching it, contracting it, taking it home, right? [...] I don't think we were afraid of contracting it. We were more afraid of passing it on to others."

P9: "The main challenges were the fear of becoming infected and taking it to our family."

P11: "The challenge was fear, the fear of becoming infected. A lot of fear, a lot of fear."

P12: "Oh, fear, right? The first challenge is to face the fear, right? Because we went through several situations, there were colleagues who even died because of the pandemic, they got Covid, right? And it was kind of scary, a lot of people getting sick, and it was like that, one after the other when it started, right?"

It is not uncommon for health teams to experience psychological difficulties when confronted with circumstances that are both high-pressure and high-risk. Therefore, it is essential to conduct psychological assessments to ensure the well-being of these teams. The aforementioned psychological assessment is of significant importance as a preventative tool for the control of disasters and, most notably, for the rapid social recovery process [48].

Given its historical context, nursing has consistently demonstrated effectiveness in healthcare and health promotion. Despite the profound impact of the Coronavirus Disease 2019 (Covid-19) pandemic on individuals and communities, the nursing team has exhibited remarkable resilience and managerial proficiency in navigating these challenging circumstances [49].

3.5 Category 4: The Assistance Furnished by the FHCGV during the Pandemic for the Introduction of the New Protocols at the SC.

In response to the emergence of the novel coronavirus disease (Covid-19), teaching hospitals undertook a comprehensive reorganisation of their departments to enhance their capacity to care for patients with this previously unidentified illness. This reorganisation entailed training staff, updating service charters, adapting structural and operational protocols, and seeking to provide specialised care for patients [50].

The literature indicates that nursing has the function of organising work, promoting communication between workers, and providing continuing education [51]. Nurses are responsible for ensuring patient safety and planning strategies to reduce errors and increase good care practices [52]. At the SC level, nursing leadership requires skills that guarantee good

working conditions and qualified patient care [53]. Our research findings support the importance of efficient nursing management.

P3: "Our manager was exemplary, promptly imparting the requisite knowledge."

P3: "Our manager has consistently demonstrated a proclivity for decisive action, consistently seeking guidance and innovations for our benefit."

There is a pressing need to expand the number of nurses who are adequately trained to provide the essential care for patients with Coronavirus Disease 2019 (Covid-19) [54]. The delivery of specialised nursing services has a direct impact on in-hospital mortality, adverse event rates, the avoidance of hospital complications, and the enhancement of the patient's general well-being [55]. Consequently, the ongoing education and training of health professionals is regarded as an effective solution [56].

When asked about training for the team, all participants confirmed that there had been training to make the team feel safer:

P2: "There was a considerable amount of protocol and training involved. For instance, a new protocol was introduced on an ad hoc basis, and the team was required to undergo training in order to implement it effectively."

P4: "Training was provided, during which we were instructed in the care of this patient and the importance of personal protective equipment."

P7: "Training and guidance were provided by the Hospital Infection Control Commission (HICC)."

This result allows for an examination of the prompt actions undertaken by nurses in response to the challenges posed by the pandemic. Information was scarce and the scenario was frightening, yet the nursing team was able to maintain the stability and quality of the services offered. These findings reinforce the importance of maintaining up-to-date training, as a lack of training can affect the quality of care provided. Training is essential to prepare professionals for care that is based on processes, protocols, and guidelines [57].

Given the unpredictable nature of the novel coronavirus (Covid-19), the outbreak was initially perceived as a significant public health

emergency, comparable to a natural disaster. The subsequent development of the outbreak was largely influenced by the actions of global governments, which were aimed at reducing the spread of the virus through the implementation of social distancing measures and other strategies to limit business activities and population transmission [58].

In response to the inquiry, it was evident that the institution offered training for the implementation of the new protocols and provided the requisite support to its employees, as evidenced by the statements of several participants:

P1: "The necessary support was provided to us in a timely and effective manner."

P4: "We employed all available measures to ensure our own safety and continued to provide care for the patient when necessary."

P5: "The implementation of the protocols was a collaborative effort involving all stakeholders. The objective was to ensure the safety of both staff and patients. Information and training were disseminated online, allowing for a comprehensive and accessible knowledge base for all."

P9: "How might we ensure the availability of psychologists and nurses, including SAT nurses, to provide monitoring services[...]"

The participants indicated that they have experienced a sense of unity and an enhanced team spirit during the pandemic. The servers have endured shared losses and have navigated this challenging period collectively, providing mutual support.

P2: "The team exhibited increased levels of cohesion. When a member required assistance, the entire team provided support, including the medical professionals. Each individual contributed to the collective effort. When I was indisposed, a colleague delivered food to my residence."

P8: "Therefore, in order to maintain the union with all relevant parties, it is necessary to..."

P9: "[...], I believe that we became more unified as a group. It was evident that we were all concerned about each other's well-being[...]"

In light of the aforementioned findings, it can be concluded that the support provided by the institution to nursing professionals is effective. Furthermore, it can be stated that the pursuit of new concepts and the exploration of innovative practices are indispensable elements in the preparation of qualified professionals.

4. CONCLUSION

The data collected and subsequent analysis indicate that the operating room nursing team has encountered considerable challenges during the ongoing pandemic. These challenges have resulted in substantial alterations to the work routine and the implementation of new protocols.

The primary challenges encountered included adapting to the revised biosafety protocols, the dearth of transparent information regarding the virus, and grappling with fear and uncertainty. The team demonstrated remarkable resilience in the face of demanding work schedules, adapting to novel procedures and the consistent utilisation of personal protective equipment (PPE). Leadership and institutional support proved instrumental in guiding the team, providing training, and ensuring the requisite psychological support.

Furthermore, it was evident that team spirit and unity were reinforced during the period under review. This was achieved by professionals supporting each other and facing adversity together. In addition to implementing new safety protocols, the institution also provided emotional support to the professionals, thus promoting a safer and more collaborative working environment.

In light of the challenges encountered and the strategies employed, it is evident that the operating room nursing team has not only demonstrated resilience but also reinforced its capabilities, exemplifying an unwavering dedication to patient safety and the quality of care provided, even in the context of a global health crisis.

5. RECOMMENDATIONS

It is therefore imperative that future studies analyse the impact of the ongoing pandemic on other professionals, the consequences it has had on the composition of other employees and how they have responded to the changes that have occurred. This will enable an assessment of

whether there have been changes in the perception of this principle and how it will affect those professionals who will still be part of the team in the future.

6. LIMITATIONS

It should be noted that the research is not without limitations. Firstly, the sample size was relatively small, comprising only nurses from the FHCGV. Secondly, the research did not include other members of the operating room team, despite their important contribution to nursing care.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

The authors declare that generative AI technologies were used during the process of writing and editing this manuscript. The technologies used were:

Details of the AI usage are given below:

DeepL Translator (online version): AI-based machine translation tool used to translate parts of the text from Portuguese into English. The large-scale language model used is the property of DeepL GmbH.

DeepL Write (online version): Generative AI tool used to review and improve the wording of translated text. This tool offers suggestions for rewording and linguistic improvement, also developed by DeepL GmbH.

The input instructions provided to the aforementioned AI technologies included fragments of text in Portuguese related to safety protocols in the operating theatre during the COVID-19 pandemic, with the aim of obtaining translations and linguistic suggestions in English for international publication.

1. Version 24.10

CONSENT

All requisite consent from the participant was duly obtained, and the appropriate institutional forms were duly filed.

ETHICAL APPROVAL

This research was conducted in accordance with the guidelines and regulatory standards for research involving human subjects, approved by the Research Ethics Committee (CEP) under

opinion no. 6.835.470 and Certificate of Presentation and Ethical Appreciation (CAAE) no. 78912324.9.0000.0016.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

APPENDIX I - DATA COLLECTION INSTRUMENT

Field Research Questionnaire

Identification Pseudonym: P_____

1. Data on the profile of the survey participant:

1.1 - Date the questionnaire was completed: ___/___/___ time: ___: ___

1.2- Team: morning afternoon night

1.3- Sex: male female age: _____

1.4- profession: nurse Licensed Practical Nurses

1.5- how long have you worked in your current position? _____

1.6- do you have more than one job?

Yes NO If Yes, How Many? _____

1.7- were you part of the CC team during the covid-19 pandemic?

YES NO

2. Data on the work of the nursing team in the CC during the pandemic:

2.1- During the covid-19 pandemic, what changes were implemented in the work routine at the CC?

2.2- After the start of the pandemic, how long did it take for these changes to be implemented?

2.3- In your view, what are the main challenges facing the CC during the pandemic?

2.4- What strategies were adopted to overcome these challenges?

2.5- What is your perception of how your team dealt with the implementation of new safety protocols in the CC during the COVID-19 pandemic?

2.6- With the changes that have taken place during this period, would you consider that they have had a significant impact on you and your team?

YES NO

If so, what were the positive and negative impacts?

2.7- Assessing the whole scenario today, what measures would you say have not been taken but would have helped many people?

2.8- Has there been training on the security protocols implemented?

YES NO If yes, which ones?

2.9- Has there been any refusal or resistance from any of the professionals in terms of adhering to any of the changes?

3. Which of these changes do you consider to be of the utmost importance to continue to follow in the CC's safety protocols?

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