

Climate catastrophe in Rio Grande do Sul: impact on sterile processing departments

Catástrofe climática no Rio Grande do Sul: impacto nos Centros de Materiais e Esterilização

Catástrofe climática en Rio Grande do Sul: impacto en los Centros de Materiales y Esterilización

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ABSTRACT: Objective: To report the experience of nurses in sterile processing departments in three large hospitals in Rio Grande do Sul, Brazil during a climate catastrophe. **Methods:** Experience report of nurses working in sterile processing departments regarding contingency measures for the operation of three class II sterile processing departments, designated institutions A, B and C, in Southern Brazil, during a climate catastrophe. **Results:** The three institutions adopted contingency measures to mitigate the impacts of the climate disaster. The activities of the hospitals remained restricted, with one of them temporarily closing. Power generators were used, and water supply and health product processing were outsourced. To ensure the well-being of employees, different working hours and transportation were adopted. All institutions mapped their employees carrying out solidarity actions. **Conclusion:** Similarities and differences were observed in the ways of managing three sterile processing departments under the deleterious effects caused by the climate catastrophe. It was evident that the three institutions shared a commitment to humanized care for personnel and safety, maintaining rigorous control standards to ensure excellence in service.

Keywords: Nursing. Hospitals. Sterile processing department. Natural disasters.

RESUMO: Objetivo: Relatar a experiência vivenciada por enfermeiras em Centros de Materiais e Esterilização em três hospitais de grande porte do Rio Grande do Sul durante a catástrofe climática. **Método:** Relato de experiência de enfermeiras atuantes nos Centros de Materiais e Esterilização acerca de medidas de contingência para o funcionamento de três Centros de Materiais e Esterilização Classe II, denominados como instituições A, B e C, do Sul do Brasil, durante uma catástrofe climática. **Resultados:** As três instituições adotaram medidas de contingência para amenizar impactos do desastre climático. As atividades das instituições hospitalares permaneceram restritas, com fechamento temporário de uma delas. Utilizou-se geradores de energia, terceirização do abastecimento de água e do Processamento de Produtos para a Saúde (PPS). Para assegurar o bem-estar dos colaboradores, adotou-se jornadas de trabalho diferenciadas e oferta de transporte. Todas as instituições mapearam seus colaboradores realizando ações de solidariedade. **Conclusão:** Observou-se semelhanças e diferenças nas formas de gerenciar três Centros de Materiais e Esterilização sob os efeitos deletérios causados pela catástrofe climática. Evidenciou-se que as três instituições compartilharam um compromisso do cuidado humanizado com o pessoal e a segurança, mantendo padrões rigorosos de controle para garantir a excelência no atendimento.

Palavras-chave: Enfermagem. Hospitais. Centro de material e esterilização. Desastres naturais.

RESUMEN: Objetivo: Relatar la experiencia vivida por enfermeras en Centros de Materiales y Esterilización en tres hospitales de gran tamaño de Rio Grande do Sul durante la catástrofe climática. **Método:** Relato de experiencia de enfermeras que trabajan en los Centros de Materiales y Esterilización sobre medidas de contingencia para el funcionamiento de tres Centros de Materiales y Esterilización de Clase II, denominados como instituciones A, B y C, en el sur de Brasil, durante una catástrofe climática. **Resultados:** Las tres instituciones adoptaron medidas de contingencia para mitigar los impactos del desastre climático. Las actividades de las instituciones hospitalarias se mantuvieron restringidas, con el cierre temporal de una de ellas. Se utilizaron generadores de energía, tercerización del suministro de agua y del Procesamiento de Productos para la Salud (PPS). Para garantizar el bienestar de los colaboradores, se implementaron jornadas de trabajo diferenciadas y se ofreció transporte. Todas las instituciones realizaron un mapeo de sus colaboradores y llevaron a cabo acciones de solidaridad. **Conclusión:** Se observaron similitudes y diferencias en las formas de gestionar tres Centros de Materiales y Esterilización bajo los efectos perjudiciales de la catástrofe climática. Se evidenció que las tres instituciones compartieron un compromiso con el cuidado humanizado del personal y la seguridad, manteniendo estrictos estándares de control para garantizar la excelencia en la atención.

Palabras clave: Enfermería. Hospitales. Centro de material y esterilización. Desastres naturales.

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INTRODUCTION

Climate change in the world has generated extreme situations, such as catastrophes, water shortages and new diseases, threatening life on Earth^{1,2}. In the last five years, Brazil has faced several climate catastrophes. In 2019, the collapse of a dam in Brumadinho, Minas Gerais (MG), caused an industrial, environmental and human disaster, resulting from the lack of urban planning and monitoring³. In 2022, heavy rains caused landslides in Petrópolis, Rio de Janeiro (RJ), destroying houses on steep slopes. These events highlight the need for preventive housing policies and urban planning to face natural disasters related to climate change^{4,5}.

Recently, Rio Grande do Sul (RS) faced the greatest climate catastrophe in its history. With a total area of 281,707.151 km², a population of 10,882,965 inhabitants and 497 municipalities^{6,7}, the state had 478 municipalities affected, causing serious damage and roadblocks, harming its economy⁷. On May 1, 2024, the state government declared a state of public calamity⁸, the federal government extended tax payment deadlines for victims, and Brazil mobilized to provide assistance to the people of Rio Grande do Sul⁹. The catastrophe had international repercussions, with reports of high rainfall, river flooding and the collapse of the state¹⁰. These events will become increasingly frequent, highlighting the need for urban planning and flood protection strategies¹¹. Many affected areas were already in a vulnerable situation, highlighting the need for greater attention to socioeconomic factors and inadequate infrastructure¹².

In the face of the catastrophe, hospitals were affected, having to operate at the limit of their capacities, even with limited resources, requiring the development of projects aimed at greater efficiency in the management of operations¹³. To meet the high demand, caused by the care of rescued patients and patients transferred from nine paralyzed hospitals, professionals working in hospitals that remained open had to adopt strategies similar to those used during the Covid-19 pandemic, restricting visits and setting up field hospitals. However, there were new challenges, such as water rationing, due to shortages and the scarcity of oxygen and supplies for care¹⁴, being a major challenge for managers¹⁵.

Affected by the catastrophe, health institutions suffered interruptions and logistical problems, such as lack of power and water. The sterile processing department (SPD) is essential for the safety of care, processing health products (HPs), following the steps: receiving contaminated materials used in care and cleaning them, to remove organic and inorganic

dirt through manual and/or mechanical/automated action using inputs such as enzymatic cleaners or detergents and brushes; performing intermediate-level disinfection (destroys vegetative forms, mycobacteria, viruses and fungi) and/or high-level disinfection (eliminates most microorganisms, but not many bacterial spores); and sterilization (destruction of all microorganisms) through a physical-chemical process, to then return the HP, safe for use, to the hospital sectors¹⁵.

SPDs are classified as class I and class II. Class I processes non-critical, semi-critical and critical HPs of non-complex conformation, which can be processed. Class II, in addition to performing the same processing as Class I, also processes those of complex conformation, i.e., items that are more difficult to clean. The team that works in this sector is made up of nursing technicians and trained nurses who carry out the activities regulated by their professional councils^{15,16}.

Several hospital sectors depend directly on the activities of the SPD, such as the surgical center, inpatient units, emergency units and others. The interruption or limitation of the activities of this sector can compromise the care of the entire hospital¹⁵, and can cause hospital-associated infections (HAIs), which are complications that occur when the patient is admitted with an infection during or after their stay in the hospital¹⁷, if there is no management that identifies the risks and adopts strategies based on good practices for processing HPs. Nurses, motivated by their experiences during the climate catastrophe, reported the impact on the SPDs of the hospitals where they work. This experience report is considered important in identifying the vulnerabilities of the health sector and the population's lack of preparation for disaster situations, allowing assistance in the development of contingency plans and public policies to act in precarious situations.

OBJECTIVE

To report the experience of nurses in SPDs in three large hospitals in Rio Grande do Sul during the climate catastrophe.

METHOD

Experience report of three nurses with the purpose of describing the functioning of three class II SPDs — selected because it is the field of activity of these professionals — located in three large, philanthropic and private hospitals in Rio Grande do Sul, Brazil, during the climate catastrophe

that hit the state in May 2024. To preserve the identity of the institutions, they were referred to as institutions “A”, “B” and “C”. The nurse at institution A holds the position of supervisor and those at institutions B and C are care institutions. The study did not need approval from the Research Ethics Committee, since it did not involve the collection of data from humans. The data presented were obtained from the authors’ reports and treated ethically, with confidentiality and privacy. Institution A, a philanthropic institution, performs approximately 4,500 surgeries per month, processing on average 75,000 items per month. The SPD has 97 employees (76 nursing technicians, 10 nurses, 2 administrative assistants, 8 transportation assistants and 1 supervisor) and serves multiple surgical and non-surgical centers and areas.

Institution B, in turn, is a private hospital and performs an average of 2,100 surgeries per month, processing approximately 46,000 items per month. The SPD has 74 employees (58 nursing technicians, 7 nurses, 7 production/transport assistants, 1 supervisor and 1 administrative assistant), and it meets demands from the hospital and outside units of the hospital network.

Institution C, a private entity, performs an average of 1,300 surgeries per month, processing approximately 35,000 items per month. Its SPD has 55 employees (45 nursing technicians, 5 nurses, 2 production assistants, 2 administrative assistants and 1 supervisor) and serves internal units (surgical and non-surgical) and two other hospital units of the same sponsor. The variables presented in this report refer to the SPD’s operation: impacted sectors, energy, drinking water, equipment (ultrasonic washers, thermal disinfectors, steam autoclaves and low-temperature sterilizers), HPs, supplies and human resources. For the SPD to operate, the following are necessary: an infrastructure of essential resources (water, energy and equipment necessary for HP processing); human resources (includes the impacts on employees, such as absenteeism and changes in working hours); management of supplies (considering adjustments made to stocks to optimize the use of materials, ensuring the continuity of processes); and contingency plan (emergency strategies adopted, including outsourcing of HP processing, transportation of materials and reorganization of care activities). The data used were obtained from nurses’ reports on their experiences. The adaptations and challenges faced in the SPDs of the three institutions were considered in the presentation of the data. The data from institutions A and B were organized in a table, and those from institution C were presented only in narrative format, since it remained closed. The results

are presented in a way that allows an understanding of the main impacts of the climate catastrophe on the SPDs, offering details of the organization and solutions implemented for the continuity of care.

RESULTS

The climate catastrophe caused significant changes in the activities of hospital institutions, especially in the SPDs. This sector, which is essential for processing HPs, had its routine impacted because of its dependence on human resources, energy-consuming equipment and large amounts of water. The following are reports from the three hospital institutions.

Institution A. Among the strategies adopted during the period, there was the restriction of operations, the implementation of power generators and the outsourced water supply, requiring strict control of water quality. It was necessary to maintain minimum stocks and optimize the use of inputs due to logistical difficulties. In addition, alternative transportation was made available to employees and those affected were mapped for solidarity measures.

Institution B. due to the interruption of the operation of the water treatment plants and raw water pumping stations that supply the area, it was necessary to hire water trucks to meet the water rationing, prioritizing sectors that directly assist patients, which impacted the processes of the SPD. The institution maintained the usual capacity of hospitalized patients and normalized care in the obstetrics center, but reduced surgical procedures, emergencies and urgent cases. The use of equipment per shift was limited to meet the demands of the care areas and the surgical center, making it necessary to adopt a contingency plan and outsource part of the HP processing. Another challenge was the reduction of professionals in the SPD (half of the staff), due to the direct or indirect impact of the catastrophe, preventing travel to the institution. Among the measures adopted to minimize absenteeism, the following stand out: provision of alternative transportation; temporary offer of the 12x36 workday; Offering early vacation, time bank and bonus for those employees with justification from the civil defense as being unable to return to work.

Institution C. It was severely affected, and it was necessary to temporarily close the entire institution. Initially, employees were contacted and received support to cope with the impacts of the disaster. Later, they were classified into five groups:

1. Directly affected by the flood, with bonus working hours;

2. Involved in rescues and assistance to shelters;
3. Transferred to partner units;
4. Transferred to another unit of the sponsoring institution;
5. On compulsory vacation.

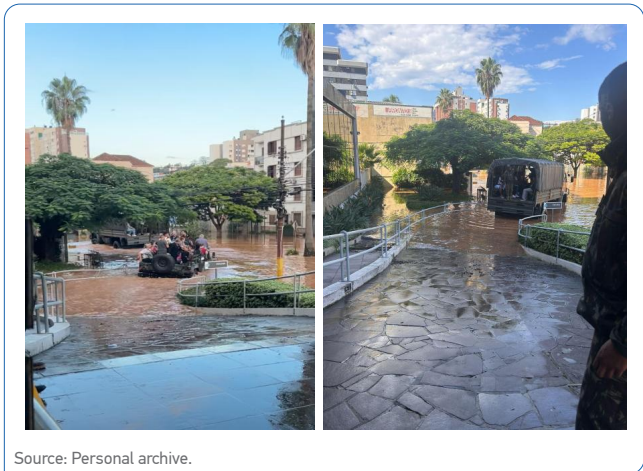
To maintain surgical services, the schedule was transferred to another institution belonging to the same sponsoring institution, and the processing of HPs was outsourced. This required careful analysis and logistics to ensure safety and quality. All material had to be reprocessed due to inadequate exposure to temperature and humidity. Transportation was done safely and fractionally, and the material was stored in a room with temperature and humidity control. Outsourcing the SPD involved creating flowcharts and training the SPD team involved in reprocessing the HPs to ensure quality.

Table 1 presents the contingency measures of the two SPDs that maintained their activities during the catastrophe.

Of the three SPDs mentioned, two (67%), identified as A and B, remained operating, although with high demand and rationed use of essential resources, such as water, materials, medicines and oxygen. This was due to the dependence on transportation for resupply, since access to the city was blocked. Institution C (33%) had to be closed, as it was severely affected by the flood. Patients, family members and professionals were evacuated with the help of army trucks and volunteers who were navigating the flood waters (Figure 1).

DISCUSSION

Given the shortage of human resources and basic supplies, nurses had to mobilize quickly to manage the situation, since even in critical conditions, the processing of HPs must be carried out without failures, ensuring safety in care^{15,16}. Adherence to protocols and current laws is essential, since failures in the processes can result in adverse events (AEs), directly affecting patients and increasing hospital costs and HAIs^{16,18}.



Source: Personal archive.

Figure 1. Team being evacuated at institution C.

Table 1. Changes in two class II sterile processing department during the climate catastrophe in Rio Grande do Sul, Brazil (May 2024).

Operation	Institution A	Institution B
	Restricted	Restricted
Impacted sectors	Surgery center – demand centralized in specific SCs	Surgery center
Energy	Outsourced generator	Own and outsourced generator
Drinking water	Outsourced – with two distinct supply sources: cleaning area; steam generation	Outsourced
SPD equipment: ultrasonic washers, thermal disinfectors, steam autoclaves and low-temperature sterilizers	Limitation on the use of large equipment, such as multi-chamber washers and car washes, centralizing the operation in low-consumption equipment: washer, ultrasonic thermal disinfectant, low-temperature sterilizer and steam autoclave	Limited use of equipment per shift, prioritizing those with lower water consumption per cycle: thermal disinfectant, ultrasonic washer, low-temperature sterilizer and steam autoclave
HPs	Disposable HP alternatives for replacing textile garments, dressings, bladder catheters and stitch removal kits	Partially outsourced
Inputs	Optimized use, utilizing non-approved suppliers	Optimized use and reduced supply
Human resources	Daily mapping of affected employees to plan solidarity actions, provision of transportation, flexible working hours	Reduced staff; provision of transportation; temporary 12x36 working hours; advance vacations, time bank and allowance for those affected

SC: Surgery center; SPD: sterile processing department; HP: health products.

The institutions demonstrated their commitment to health by adopting preventive measures and contingency plans for the catastrophic situation they experienced. Institution C, through its managers, coordinators and supervisors, created a flowchart (Figure 2) to be able to continue serving its branches using outsourced HP services and trained the team of nursing technicians and nurses to organize logistics with outsourced companies, checking materials at the stages of forwarding and receiving the materials and providing clear and visible instructions, since the traceability of processed material is crucial to avoid AEs, as it allows institutions to identify the origin of the problem, minimizing risks and implementing preventive solutions^{15,16,18}.

The lack of potable water, essential for processing HPs, was one of the reasons for the closure of the SPD of institution C and required institutions A and B to quickly implement alternatives such as the use of water trucks and rationing of equipment use, following the protocols for monitoring the quality of water supplied by a certified third-party company. Regarding HPs, institution A chose to use some disposable items, while B and C chose to outsource the service (partially by institution B and entirely by institution C). All stages of

HP processing must be organized and understood by the professionals involved, regardless of the processing location (in-house or outsourced^{16,19}), and all materials must be checked before being released for use in healthcare units¹⁵. Outsourcing, although a solution, brings challenges, such as compliance with regulations¹⁵; however, institutions were already using the services of the outsourced company, albeit on a smaller scale, with monitoring of the routines and quality of HP processing by this company — the only one in the metropolitan region — which also requires strict supervision of nurses when receiving the material to ensure quality and safety standards.

To mitigate the impacts on employees, human resources planning was necessary. The three institutions mapped their employees and offered 12x36 workdays, public transportation, vacations, time bank and bonuses. According to the Ministry of Health’s guide, it is essential that institutions develop contingency plans to deal with these situations, ensuring continuity of care for patients in addition to mitigating risks, allowing an effective response to challenges²⁰.

The most serious scenario occurred at institution C, which had to be temporarily closed, transferring all hospital

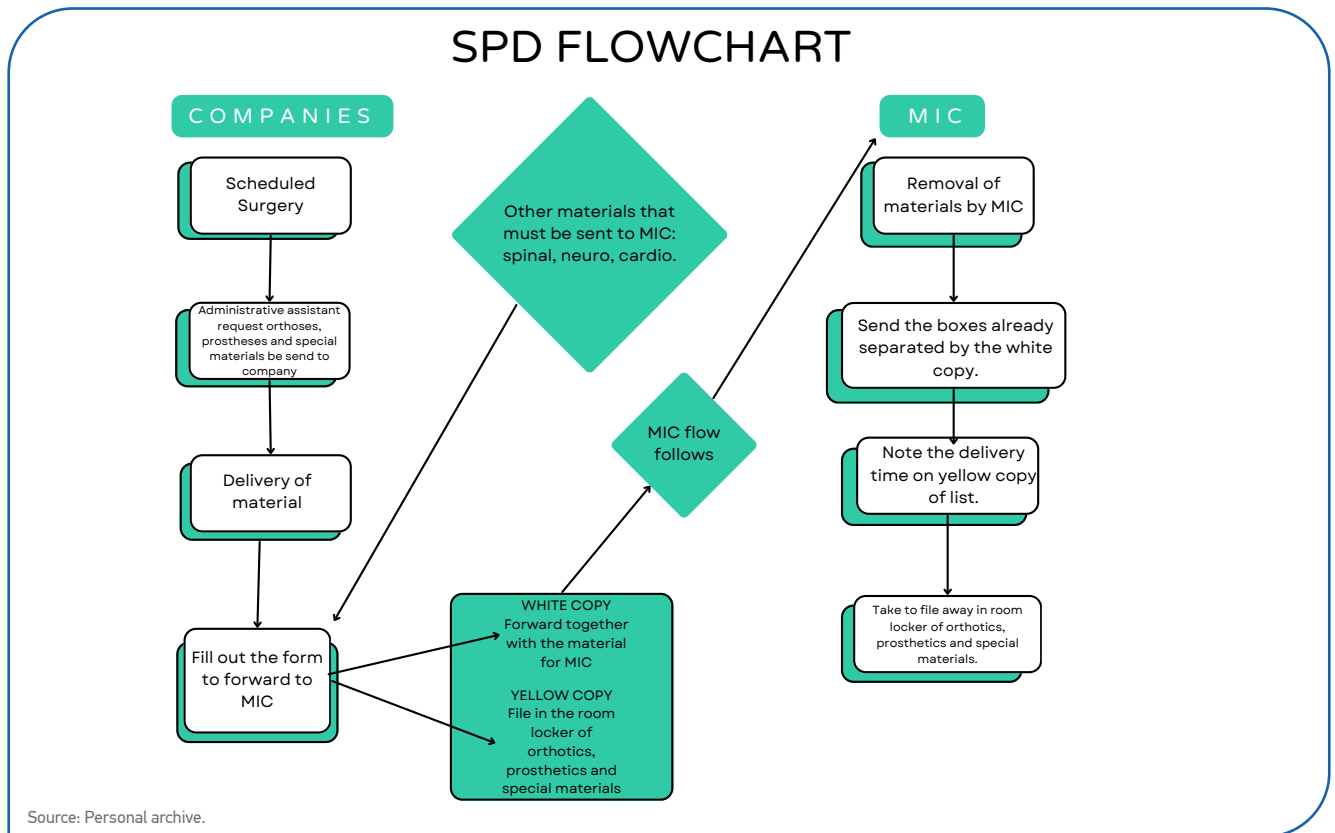


Figure 2. Flowchart.

operations to other institutions. A and B maintained care with emergency strategies and restricted operations. Despite the impacts, the three institutions minimized damage by adopting technical and human strategies. SPDs, essential for assistance, require strategies that guarantee the continuity of services even in catastrophes^{18,20}.

CONCLUSION

This report on the operation of three SPDs during the disaster in RS highlighted the challenges faced by the three institutions, which shared humanitarian care for employees, outsourcing of HP processing in the search for safety of care, and dedication to maintaining strict standards of control and monitoring, especially after the disaster. As a contingency plan, institutions A and B adopted strategies to operate with rationed use of essential resources, while institution C faced the need for total evacuation due to the severe impacts that compromised its operations, posing a risk to people's safety if they did not adopt this strategy for the safety of all.

These actions reflect the seriousness and commitment of the institutions to guarantee excellence in service and the protection of those involved, even in extreme situations.

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CONFLICT OF INTERESTS

The authors declare no conflicts of interest.

AUTHORS' CONTRIBUTIONS

PC: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. SVR: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft. FUCR: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft. SRCO: Formal analysis, Visualization, Writing – original draft. SCA: Formal analysis, Visualization, Writing – original draft. RCAC: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Supervision, Validation, Visualization, Writing – review & editing.

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