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Production of disposable gowns in a prison complex: nursing action in confronting COVID-19

Produção de aventais descartáveis em complexo prisional: ação de enfermagem no enfrentamento à COVID-19

Producción de batas desechables en complejo carcelario: acción de enfermería en el enfrentamiento a la COVID-19

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Abstract: Objective: to share the experience related to the production of disposable gowns conducted by nursing staff in a prison complex in the context of the COVID-19 pandemic. **Method**: experience report of project extension actions for the production of personal protective equipment carried out in a prison complex in the Center-West region of Brazil, from March to June, 2020. **Results**: a total of 6,000 gowns were produced, adopting the standards of the Brazilian Association of Technical Standards. In the process, there was learning about hygiene and cleaning measures to prevent COVID-19, with emphasis on hand hygiene, readjustment of flow and of the production environment. **Conclusion:** the experience was based on the social commitment of the public university and was a unique opportunity to develop knowledge and skills, as well as of re-education and re-socialization of this population. In addition, it strengthened the nursing role in dealing with public health problems.
Descritores: Equipamento de Proteção Individual; Infecções por Coronavírus; Pandemias; Relações Comunidade-Instituição; Pessoas Privadas de Liberdade

Resumo: Objetivo: compartilhar a experiência relacionada à produção de aventais descartáveis conduzida pela enfermagem em complexo prisional no contexto da pandemia da COVID-19. **Método:** relato de experiência das ações de extensão de projeto de produção de equipamentos de proteção individual realizadas em complexo prisional da região Centro-Oeste do Brasil, no período de março a junho de 2020. **Resultados:** foram produzidos

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6.000 aventais, adotando as normas da Associação Brasileira de Normas Técnicas. No processo, houve aprendizado das medidas de higiene e limpeza para prevenção da COVID-19, com destaque para a higienização das mãos, readequação de fluxo e do ambiente de produção. **Conclusão:** a experiência pautou-se no compromisso social da universidade pública e foi oportunidade ímpar de desenvolvimento de conhecimentos e habilidades, bem como de reeducação e ressocialização dessa população. Além disso, reforçou o papel da enfermagem no enfrentamento de agravos de saúde pública.
Descritores: Equipamento de Proteção Individual; Infecções por Coronavírus; Pandemias; Relações Comunidade-Instituição; Pessoas Privadas de Liberdade

Resumen: **Objetivo:** compartir la experiencia de producción de batas desechables, manejada por la enfermería en complejo carcelario en el contexto de la pandemia de COVID-19. **Método:** relato de experiencia de las acciones de extensión de proyecto de producción de equipos de protección individual realizadas en complejo carcelario de la región Centro-Oeste de Brasil, en el período de marzo a junio de 2020. **Resultados:** fueron producidas 6.000 batas, adoptando las normas de la Asociación Brasileña de Normas Técnicas. Durante el proceso, hubo aprendizaje de las medidas de higiene y limpieza para prevención de la COVID-19, con destaque para la higienización de las manos, readecuación del flujo y del ambiente de producción. **Conclusión:** la experiencia se basó en el compromiso social de la universidad pública y fue una gran oportunidad de desarrollo de conocimientos y habilidades, además, fomentó la reeducación y resocialización de esa población. Por fin, reforzó el rol de la enfermería en el enfrentamiento de situaciones graves de salud pública.
Descriptores: Equipo de Protección Personal; Infecciones por Coronavirus; Pandemias; Relaciones Comunidad-Institución; Personas Privadas de Libertad

Introduction

The report of a series of pneumonia cases of unknown origin in December 2019 in the city of Wuhan, China, drew worldwide attention. In January of the following year, the genetic mapping of the viral genome of the so-called SARS-CoV-2 revealed an epidemiological milestone to the world, with the increase in infections by this virus and the consequent Coronavirus Disease 2019 (COVID-19) pandemic, with onset in March de 2020.[1-2] The disease is a respiratory syndrome of either direct transmission and– propagation by the infected individual of droplets from coughing or sneezing, –or indirect transmission, through the contact with contaminated surfaces and objects.[2]

Health systems around the world, especially those in developing countries, have been challenged with the exponential increase in the number of cases, potentiated by social, economic, and political factors, proving to be one of the most serious pandemics faced by humanity.[3] The demand for vacancies in hospital institutions has increased significantly, which

involves the occupation of general and Intensive Care Unit (ICU) beds, use of technological equipment, and the work of health professionals.[4]

Given the lack of effective drug treatment, the most effective ways to combat COVID-19 are the vaccine and the rupture of its transmission chain. Therefore, prevention measures based on scientific evidence and oriented to the population in combating the disease have been, besides the vaccine, social distancing, hand hygiene, respiratory etiquette, and the use of Personal Protective Equipment (PPE), especially the use of masks.[2]

In the context of health care, PPEs are protective barriers that prevent the skin, airways, mucous membranes, and clothing exposure to infectious agents.[5] Therefore, they are essential in preventing the transmission of SARS-CoV-2 and other microorganisms, because when used in combination and associated with other standard precautions, provide protection to the health professional during care.[5-6]

Given the high demand for care in health services and the consequent increase in the use of PPE, the industry's difficulty in providing these resources in a timely manner, with the necessary quality and efficiency,[5,7] was highlighted, thus instituting an alert about the worldwide shortage of this protective equipment. Additionally, it is evident that such a disease can directly influence health care professionals, putting them at risk of infection by SARS-CoV-2, among other pathogens, in addition to impacting patient safety.[8]

Therefore, the World Health Organization (WHO) has guided the proper management of the use of PPE, through actions such as rational use for each procedure and profession, as well as monitoring of its quantity and distribution control.[5] This scenario is especially experienced in developing countries, which also face economic and social challenges that hinder the implementation of measures to prevent and combat COVID-19 and show lack of infrastructure at health services to serve the population.[3]

Regarding health care professionals, the global deficit in the provision of PPE is directly associated with occupational safety,[3,9] with high infection rates, ranging from 3% to 29%, being observed.[10] Thus, the safety of these professionals have to be preserved in the face of the high burden of exposure and transmissibility of the virus.[6-7]

Due to the new demand, the Ministry of Health and the Brazilian Health Regulatory Agency (Anvisa) extraordinarily and temporarily promulgated the Collegiate Board Resolution (RDC) no. 356, of March 23, 2020, which provides for the conditions of manufacture and purchase of hospital products for use by health institutions during the period of the pandemic, allowing the production of PPE, such as: surgical masks; protective goggles; face shields; disposable hospital clothing; caps; and shoe covers.[11]

From this landmark on, several public and private institutions and non-profit organizations have produced PPE, aiming at meeting the demands of health services and avoiding shortages.[12] Thus, this study aimed to share the experience related to the production of disposable gowns conducted by the nursing staff in a prison complex in the context of the COVID-19 pandemic.

Method

This is an experience report of the Project *EPI-UFG* extension actions carried out in a prison complex in the region of Goiânia, from March to June 2020, by the *Universidade Federal de Goiás* (UFG) in partnership with the General Board of Prison Management (*DGAP*) of the State of Goiás. Based on a robust structure with internal and external partnerships with the university community to fight COVID-19, UFG started the project under the leadership of the UFG Rectory and the academic units of the Nursing School and Visual Arts School.

The project consisted of structuring a center for the production and distribution of disposable nonwoven (NW) fabric masks and gowns to meet the demands of health services in the State of Goiás and of vulnerable populations during the pandemic. Moreover, it provided a

training period for volunteers (students, professors, individuals from the community, and inmates in reintegration process) on hygiene and safety measures for PPE production, in compliance with the basic conducts recommended by the Brazilian Association of Technical Standards (ABNT) regarding production and specifications.[13]

This report was restricted to the objective of producing disposable gowns for hospital use of the Project *EPI-UFG*, which followed the technical specifications described in Table 1.

Table 1 – Technical specifications of procedure gowns. Goiânia, GO, Brazil, 2020.

Product description	**Inputs**	
	Item	**Product**
Hospital procedure gown in 50 g/m2 and 60 g/m2 (100% polypropylene) NW*, straight cut, one-piece panel ½back/front/back, with long sleeves, belt and mandarin collar tied at the back. The gown is plain (closed) at the front and crossed 5.0 cm at the back with tie at the waist and collar. The cuff is adjusted with an elastic band.	Fabric	NW fabric 40 g/m^2, white color, 2 m
	Threads	POLLY PT05C 70 g overlock thread for Class 504 chain stitch, white color, 7.9 m
		Thread for Class 504 chain stitch and Class 301 stitch, white color, 16.45 m
	Notions	15 cm of 5-mm elastic band for size L, white, for cuffs
		13 cm of 5-mm elastic band for size M, white, for cuffs
		Stamp for composition and size label
		UFG brand label stamp

*Nonwoven fabric.

Source: Project EPI-UFG manual [Ebook] (UFG, 2020).

The participants in this step of the project were: professors from the Undergraduate Nursing Course at UFG, who developed and implemented the biosafety protocol, and who ensured the PPE adequacy to ABNT standards (counseling) and their usability (relation of PPE produced with the activity to be performed); professors of the Undergraduate Courses of Design, Fashion, and Textile Engineering at UFG, who participated in the steps of raw material analysis, modeling, and production process organization; two nurses taking a graduate certificate course, who implemented the biosafety protocol and supervised on-site production; and the operational team, made up of 15 male inmates from the closed prison system, who were working in the prison complex industry and were granted by the DGAP, and actively

participated in the gown manufacturing. Inclusion criteria for participation in the project's actions were not established.

The project was carried out according to the following steps: 1. Establishment of a partnership with the DGAP for the production of gowns; 2. Adaptation of the good practices and safety protocol to the structure of the manufacturing site in the complex; 3. Training of the operational team on safety measures, protocol, and guidelines regarding the model and sewing process; 4. Organization and cleaning of the work environment carried out by the inmates and supervised by the project team; 5. Production process; 6. Folding and packaging process; and 7. Process of transportation and storage of the gowns in an exclusive area.

Aware of the risk of contamination by SARS-CoV-2 and the vulnerability of inmates in the prison context, measures to prevent COVID-19 were adopted nationally and internationally. In all steps, project team members (professors and nurses) were supervised, following the protocols defined for the production of gowns.[13]

The results of this study are linked to the activities of the Project *EPI-UFG* extension actions (PJ105-2020). As this is an experience report, there was no need for approval by the Research Ethics Committee; however, the institutions involved and the students were protected in their individuality.

Experience results

The experience in the prison complex resulted in the production of 6,000 gowns, helping to supply PPE to combat COVID-19. Accordingly, an analysis of the raw material for the production of gowns was initially carried out and the model followed the ABNT standards.[14]

Such actions corroborate international strategies adopted in view of the lack of PPE experienced during the pandemic.[9,15] Thus, new alternatives to the manufacture and distribution of such inputs emerge to meet the needs of health services with good cost-benefit that can be implemented especially in developing countries.[9,15-17]

In this context, the University has promoted positive impacts on society through scientific dissemination, several extension actions, development of technologies, direct intervention in society, dissemination of information, production of studies of international reach, and participation in the supply network,[12,18] as well as actions promoted by this reported experience that are important for maintaining the health system structure.

Training of the operational team, organization, process management, and work environment

The rapid mobilization for the implementation of the proposal, given the high demand for PPE, brought challenges inherent to the prison environment. Among the challenges experienced, the infrastructure of the manufacturing room and the difficulty to stimulate the inmates to know about the need for prevention measures were highlighted, as expected for a reality of production different from the usual one.[7,9,15]

In this regard, one of the important demands for the implementation of the project was to adapt the manufacturing room to the standards of the protocol of good practices for the production of PPE. Considering the need to keep the process clean, the adoption of standardized practices is essential for the product to have the appropriate technical specifications and act as a protective barrier.[5,14]

Moreover, given the enactment of RDC No. 356 of 2020, the manufacture of PPE in extraordinary environments led to the need to maintain product adequacy standards, a fact that fostered the restructuring of the production environment at the location provided. Although challenging, this action ensured the maintenance of production, and provided safety to the operational team in terms of social distance.[2,14]

Within the industrial structure of the prison complex, a manufacturing room with approximately 20 industrial sewing machines was provided for the production of gowns. The room was remodeled to promote physical distancing among the inmates; thus, the production operated at a little more than half of its maximum capacity, aiming at reducing the risk of

infection. In addition, the restructuring allowed for the creation of preparation, folding, packaging, and storage environments, as well as the installation of a physical barrier at the manufacturing room entrance and placement of banners with guidelines on the technique of hand hygiene and cleaning of the environment (Figure 1).

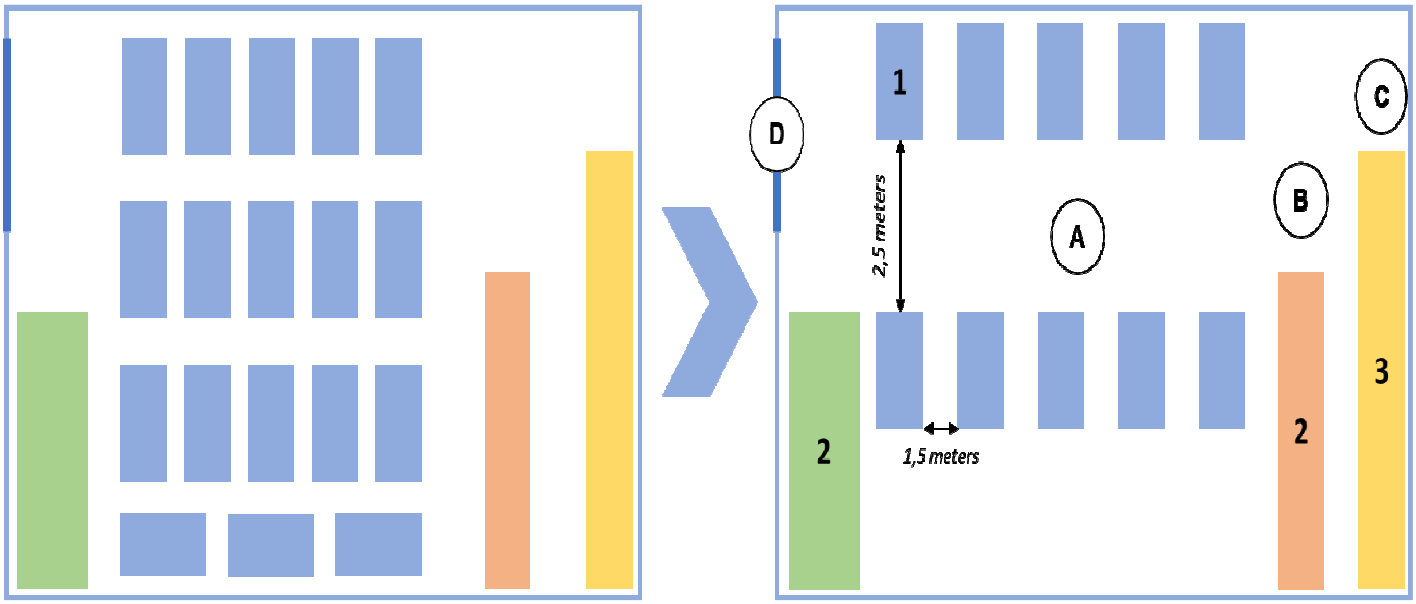

Figure 1 – Physical structure of the gown production pole at the Prison Complex before and after remodeling.
A: Manufacturing area; B: Preparation, folding, and sealing area; C: Storage and distribution area; D: Entrance/physical barrier; 1: Sewing machines; 2: Worktops for separating cuts (green), preparation, folding, and sealing (pink); 3: Cabinet for storage.

The processing of health products implies the adoption of measures to keep the process clean, ensuring, through adequate infrastructure and well-defined steps, the reduction of the risk of infection to the patient. Also, failures in this process result in final material impairment.[9,11,15]

Considering these assumptions, the impossibility of having a physical barrier between the preparation, folding, and sealing area and the storage and distribution area led to the need to reduce circulation in the room and implement a unidirectional production flow. This way, it was possible to adapt production to infrastructure limitations, while respecting current regulations, given the need for these inputs to fight the pandemic.[9,11,13]

In addition to the challenges imposed by structural resources, the need to work with adequate clothing and the adoption of constant hand hygiene measures resulted in a change in the work routine of the inmates. Due to the training and daily monitoring by the graduate students, there was adherence to the measures by the team in the work routine.

Naturally, the hand hygiene measure was more used by health care professionals and students before the pandemic;[19] however, the high transmissibility of SARS-CoV-2 prompted the adoption of this measure by the population, characterizing one of the main prevention measures to break the transmission chain.[20] Thus, considering the purpose of production, the adoption of good practices was essential to ensure a clean process and team safety.

Aiming at training inmates to carry out production, respecting the recommendations of adequate hygiene and safety conditions in the work environment,[6] health education activities were carried out. They involved teaching the correct hand hygiene technique, at which times they should be performed during the production steps, physical distancing, the respiratory etiquette to be followed during production, proper clothing and undressing, cleaning and disinfection of surfaces in the area of production, correct handling of the NW and other behaviors to be adopted in the preparation, folding, packaging, and storage of the production. Such actions were developed with a focus on keeping the process clean and preventing material contamination.[21]

In this process, the formative and social role of the action in providing opportunities for inmates to know the infection control measures required to break the virus transmission chain is highlighted, considering the vulnerability already imposed on this population in the prison environment.[2,22] Therefore, to avoid contamination of the raw material and gowns during production, measures were adopted such as daily cleaning of the room and plastic protection of the floor before starting production. To avoid contact of the gowns with the ground during the sewing process, they were packed in rigid plastic boxes placed next to each sewing machine; the boxes underwent cleaning and disinfection with 70% alcohol on a daily basis.

The inmates' work routine took place in a systematic way as shown in Figure 2.

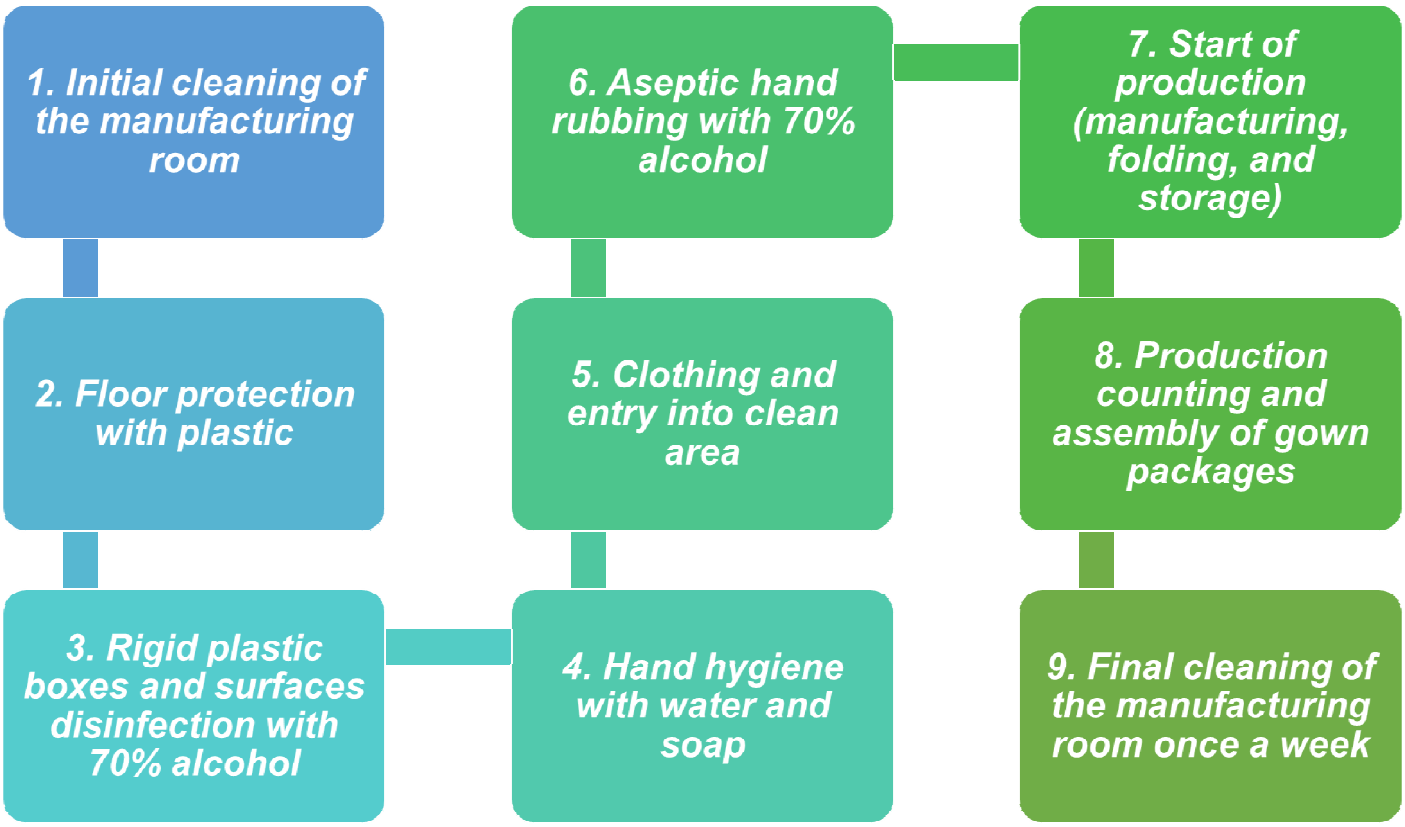

Figure 2 – Systematization of the work routine of inmates in the production of PPE. Goiânia, GO, Brazil, 2020.

At the end of the process, the gown was folded, packed in resistant plastic packaging, and transported safely in containers to an exclusive storage and distribution area at the Nursing School. Due to the small space for storing the production, transportation to the distribution center was carried out every two days. Following this work routine, the average production was 200 gowns/day. At the distribution center, the steps of product checking, packaging, labeling, storage, and distribution to public hospitals in the State of Goiás were carried out, according to the needs of each institution, in addition to the supply to vulnerable populations.

The sense of belonging of those involved associated with the possibility of contributing to saving lives at the time of the COVID-19 pandemic shows the social role of the project, the university, and the nursing in promoting communication among different sectors of society.[12,22]

Role of nursing in the development of actions to confront COVID-19 in the prison complex

Considering the goals pursued by the Nursing Now campaign for worldwide nursing and the historic milestone of Florence Nightingale's bicentennial, marking 2020 as the year of the profession,[23] the insertion of nurses in actions to combat the pandemic has reflected the leading role of the category in different spheres of health care and, beyond, it has shown the desire for professional valuation pointed out in their importance in the fight against the pandemic.[22,24]

Thus, corroborating other initiatives,[12,18] the participation of professors, students, and volunteers was critical for the execution of the project. The experience reported had the participation of nurses, students of graduate certificate courses who collaborated in the supervision of production, from the training of inmates to the delivery of the material produced.

The social impact of the actions carried out in an integrated way among the different actors of the project reflected in the strengthening of nursing as a profession, given the visibility, reach, and integration of the extension action with the spheres of society. Considering the global goal of offering health to all by 2030 and the significant deficit of nursing professionals in the Americas,[25] actions such as this one promote the recognition and strengthening of nursing, contributing to the achievement of the Nursing Now campaign goals of professional development and in all levels of leadership, integral performance, and dissemination of effective and innovative nursing practices.[23]

Furthermore, the adoption of hygiene measures and the implementation of protocols for the production of PPE, as well as the adoption of biosafety measures regarding COVID-19, corroborated the discussion raised by Florence Nightingale's bicentennial about their role in the implementation of protocols for reducing the risk of infection, still so up-to-date in the 21st century.[23]

Challenges in developing the experience

In light of the experience, the challenges faced in implementing biosafety measures were important limiting factors. Because the space used for the production has as its primary purpose

the manufacture of clothes, its adaptation to meet biosafety measures resulted in difficulties in delimiting individual spaces for each step of the process.

Thus, the team was limited to the minimum necessary, in view of the production process and the implementation of COVID-19's prevention and control measures. It should be noted that there was no sink for hand hygiene in the production room, nor adequate space for storing raw materials and finished products, which required logistics for the delivery of raw materials and dispensing at the distribution center. From the perspective of the study design, the nature of experience report limited the presentation of the perception of the inmates involved in the project, which can be a source of future investigations. However, the authors recognize the social role of the activities performed, with emphasis on the actors involved, and the importance of nursing in the conduction of the extension action.

Conclusion

The experience of producing disposable gowns in a prison complex to combat COVID-19 highlighted the contribution of nursing in leading health actions with an important impact on society. Given the community's need for the production of PPE for health professionals, the action was of great relevance for professors, students, and volunteer professionals involved in the project. In addition, it was a unique opportunity in the context of graduate studies, in the development of knowledge, skills, and attitudes, in terms of management, leadership, communication, health education, and teamwork.

Despite the challenges, it was possible to understand the role of work in resocialization within the prison context, reinforcing this activity as essential for the system maintenance. The work of inmates points to a window of opportunity regarding the articulation between the university and government spheres, as well as the possibility of the social commitment of those who are being

reintegrated in society. In this alternative, the possibility of improving employability and resumption of the roles of citizens and active actors in society can be glimpsed.

It is challenging to face a pandemic scenario that directly and indirectly interferes in the social, economic, political, personal, and health aspects of the entire population. However, it is the role of the public university to give back to society the trust invested in it by solving everyday issues to promote beneficence, avoiding maleficence, reinforcing the role of community-institution relations.

It contributes to the nursing work in the social sphere by promoting health, and professionalization and improvement opportunities to the population deprived of liberty, and also by recognizing the ability of pandemic management, given the lack of PPE to promote safety and quality of life to the health professionals who were on the frontlines, and by contributing to the reduction of bottlenecks produced by the scarcity of such supplies in the pandemic context, strengthening the view of the profession as a leadership in the fight against public health problems.

References

1. Spinelli A, Pellino G. COVID-19 pandemic: perspectives on an unfolding crisis. Br J Surg. 2020 Jun;107(7):785-7. doi: 10.1002/bjs.11627

2. World Health Organization (WHO). Transmission of SARS-CoV-2: implications for infection prevention precautions: scientific brief, 09 July 2020 [Internet]. Geneva: World Health Organization; 2020 [cited 2020 Aug 15]. Available from: https://apps.who.int/iris/handle/10665/333114

3. Bong C-L, Brasher C, Chikumba E, McDougall R, Mellin-Olsen J, Enright A. The COVID-19 Pandemic: effects on low- and middle-income countries. Anesth Analg. 2020;131(1):86-92. doi: 10.1213/ANE.0000000000004846

4. Noronha KVMS, Guedes GR, Turra CM, Andrade MV, Botega L, Nogueira D, et al. Pandemia por COVID-19 no Brasil: análise da demanda e da oferta de leitos hospitalares e equipamentos de ventilação assistida segundo diferentes cenários. Cad Saúde Pública. 2020;36(6):e00115320. doi: 10.1590/0102-311x00115320

5. World Health Organization (WHO). Rational use of personal protective equipment for coronavirus

disease (COVID-19) and considerations during severe shortages: interim guidance, 6 April 2020 [Internet]. Geneva: World Health Organization; 2020 [cited 2020 Aug 19]. Available from: https://apps.who.int/iris/handle/10665/331695

6. World Health Organization (WHO). Considerations for public health and social measures in the workplace in the context of COVID-19: annex to considerations in adjusting public health and social measures in the context of COVID-19, 10 May 2020 [Internet]. Geneva: World Health Organization; 2020 [cited 2020 Aug 19]. Available from: https://apps.who.int/iris/handle/10665/332050

7. Ranney ML, Griffeth V, Jha AK. Critical supply shortages - the need for ventilators and personal protective equipment during the Covid-19 pandemic. N Engl J Med. 2020;382(18):e41. doi: 10.1056/NEJMp2006141

8. Almeida IM. Proteção da saúde dos trabalhadores da saúde em tempos de COVID-19 e respostas à pandemia. Rev Bras Saúde Ocup. 2020;45:e17. doi: 10.1590/scielopreprints.140

9. Park C-Y, Kim K, Roth S, Beck S, Kang JW, Tayag MC, et al. Global shortage of personal protective equipment amid COVID-19: supply chains, bottlenecks, and policy implications. 2020;130:1-10. doi: 10.22617/BRF200128-2

10. Sommerstein R, Fux CA, Vuichard-Gysin D, Abbas M, Marschall J, Balmelli C, et al. Risk of SARS-CoV-2 transmission by aerosols, the rational use of masks, and protection of healthcare workers from COVID-19. Antimicrob Resist Infect Control. 2020;9(1):100. doi: 10.1186/s13756-020-00763-0

11. BRASIL. Agência Nacional de Vigilância Sanitária. Resolução de Diretoria Colegiada (RDC) nº 356, de 23 de março de 2020. Dispõe, de forma extraordinária e temporária, sobre os requisitos para a fabricação, importação e aquisição de dispositivos médicos identificados como prioritários para uso em serviços de saúde, em virtude da emergência de saúde pública internacional relacionada ao SARS-CoV-2. Diário Oficial da União: Edição 56-C, seção 1-Extra, Brasília, DF, p. 5, 23 mar. 2020. Available from: https://www.in.gov.br/en/web/dou/-/resolucao-rdc-n-356-de-23-de-marco-de-2020-249317437. Access on: 16 ago. 2020.

12. Silva MRF, Mascarenhas ALLD, Dutra MCFSG, Silva CAF, Dias NS. Reflections on extensionist and research actions in the fight against COVID-19 at the university of the state of Rio Grande do Norte. Braz J Health Rev. 2020;3(2):3622-46. doi: 10.34119/bjhrv3n2-191

13. Universidade Federal de Goiás (UFG). Projeto EPI-UFG: manual [Internet]. Goiânia: Cegraf UFG; 2020 [Access on 2020 ago 15]. 74 p. Available from: https://files.cercomp.ufg.br/weby/up/1/o/Manual_ficha_catalografica_final.pdf

14. Associação Brasileira de Normas Técnicas (ABNT). NBR ISO 16693:2018 - Produtos têxteis para saúde - Aventais e roupas privativas para procedimento não cirúrgico utilizados por profissionais de saúde e pacientes - Requisitos e métodos de ensaio. Rio de Janeiro: ABNT; 2018. 9 p.

15. Sinha MS, Bourgeois FT, Sorger PK. Personal Protective Equipment for COVID-19: distributed fabrication and additive manufacturing. Am J Public Health. 2020 Aug;110(8):1162-4. doi: 10.2105/AJPH.2020.305753

16. Khan MM, Parab SR. Simple economical solution for Personal Protection Equipment (face mask/shield) for health care staff during COVID 19. Indian J Otolaryngol Head Neck Surg. 2020 Apr 27:1-5. doi: 10.1007/s12070-020-01863-4

17. Shokrani A, Loukaides EG, Elias E, Lunt AJG. Exploration of alternative supply chains and distributed manufacturing in response to COVID-19; a case study of medical face shields. Mater Des. 2020;192:108749. doi: 10.1016/j.matdes.2020.108749

18. Panizzon M, Costa CF, Medeiros IBO. Práticas das universidades federais no combate à COVID-19: a relação entre investimento público e capacidade de implementação. Rev Adm Pública. 2020;54(4):635-49. doi: 10.1590/0034-761220200378

19. Zottele C, Magnago TSBS, Dullius AIS, Kolankiewicz ACB, Ongaro JD. Hand hygiene compliance of healthcare professionals in an emergency department. Rev Esc Enferm USP. 2017;51:e03242. doi: 10.1590/s1980-220x2016027303242

20. Centers for Disease Control and Prevention (CDC). Interim infection prevention and control recommendations for healthcare personnel during the coronavirus disease 2019 (COVID-19) pandemic [Internet]. Atlanta (GA): CDC; 2020 [cited 2020 Aug 30]. Available from: https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html

21. Tipple AFV, Santos JEM, Costa DM, Bouwman BE, Goulart DMM. Reusable medical devices storage area: rethinking the shelves decontamination frequency. Ciênc Cuid Saúde [Internet]. 2020 May 4 [cited 2020 Sept 30];19:e48223. Available from: https://periodicos.uem.br/ojs/index.php/CiencCuidSaude/article/view/48223/751375150010

22. Choi KR, Jeffers KS, Logsdon MC. Nursing and the novel coronavirus: risks and responsibilities in a global outbreak. J Adv Nurs. 2020 Jul;76(7):1486-7. doi: 10.1111/jan.14369

23. Crisp N, Iro E. Nursing Now Campaign: raising the status of nurses. Lancet. 2018 Mar 10;391(10124):920-1. doi: 10.1016/S0140-6736(18)30494-X

24. Oliveira KKD, Freitas RJM, Araújo JL, Gomes JGN. Nursing Now e o papel da enfermagem no contexto da pandemia e do trabalho atual. Rev Gaúcha Enferm. 2020;42(Spec No). doi: 10.1590/1983-1447.2021.20200120

25. Pan American Health Organization (PAHO). Strategic directions for nursing in the Region of the Americas [Internet]. Washington (DC): PAHO; 2019 [cited 2020 Sept 30]. Available from: http://iris.paho.org/xmlui/bitstream/handle/123456789/50956/9789275120729_eng.pdf?sequence=1&amp

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