Experience Report
doi: https://doi.org/10.1590/1983-1447.2022.20200458.en

# Training of nursing in chemical, biological, radiological and nuclear defense for aeromedical evacuation in the pandemic

*Capacitação da enfermagem em defesa química, biológica, radiológica e nuclear para evacuação aeromédica na pandemia*

*Formación de enfermería en defensa química, biológica, radiológica y nuclear para la evacuación aeromédica en pandemia*

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**How to cite this article:**
Borges LL, Haberland DF, Guimarães CCV, Felipe LADF, Aguiar BGC. Training of nursing in chemical, biological, radiological, and nuclear defense for aeromedical evacuation in the pandemic. Rev Gaúcha Enferm. 2022;43:e20200458. doi: https://doi.org/10.1590/1983-1447.2022.20200458.en

## ABSTRACT

**Objective:** To describe the training of the military nursing team in chemical, biological, radiological, and nuclear defense to perform Aeromedical Evacuation in the coronavirus pandemic. This is an experience report about the training of the military nursing team in the Brazilian repatriation mission in China. Four members made up the aerospace nursing team. The period was from February to March 2020. Data analysis was carried out based on the survey of courses that each member of the nursing team had participated before the Operation.

**Results:** Training proved to be essential to meet the specificities of the mission.

**Conclusions:** It is extremely important to operationalize protocols to improve the aeromedical service and transport mechanism, increasing the level of proficiency in the execution of missions. The training of the team allows the construction of necessary knowledge and skills during an aeromedical evacuation, guaranteeing the performance excellence required in this type of mission.

**Keywords:** Coronavirus infections. Military nursing. Air ambulances.

## RESUMO

**Objetivo:** Descrever a capacitação da equipe de enfermagem militar na defesa química, biológica, radiológica e nuclear para realizar Evacuação Aeromédica na pandemia do coronavírus. Trata-se de um relato de experiência da capacitação da equipe de enfermagem militar na missão de repatriação dos brasileiros na China. Quatro membros compuseram a equipe de enfermagem aeroespacial. O período foi de fevereiro a março de 2020. A análise dos dados foi realizada a partir do levantamento dos cursos que cada integrante da equipe de enfermagem havia participado antes da Operação.

**Resultados:** A capacitação demonstrou-se fundamental para atender as especificidades da missão.

**Conclusões:** É de suma importância operacionalizar protocolos para aperfeiçoar o mecanismo de atendimento e transporte aeromédico, elevando o nível de proficiência na execução das missões. A capacitação da equipe, permite construir conhecimentos e habilidades necessários durante uma evacuação aeromédica, garantindo a excelência de desempenho requerida nesse tipo de missão.

**Palavras-chaves:** Infecções por coronavírus. Enfermagem militar. Resgate aéreo.

## RESUMEN

**Objetivo:** Describir la formación del equipo de enfermería militar en defensa química, biológica, radiológica y nuclear para realizar Evacuación Aeromédica en la pandemia de coronavirus. Es un relato de experiencia de la formación del equipo de enfermería militar en la misión de repatriación brasileña en China. Cuatro miembros conformaron el equipo de enfermería aeroespacial. El período fue de febrero a marzo de 2020. El análisis de datos se realizó a partir de la encuesta de cursos que cada integrante del equipo de enfermería había participado antes de la Operación.

**Resultados:** La formación resultó fundamental para cumplir con las especificidades de la misión.

**Conclusiones:** Es sumamente importante operacionalizar protocolos para mejorar el servicio aeromédico y el mecanismo de transporte, aumentando El nivel de competencia en la ejecución de misiones. La formación del equipo permite la construcción de conocimientos y habilidades necesarias durante una evacuación aeromédica, garantizando la excelencia de desempeño requerida en este tipo de misiones.

**Palabras clave:** Infecciones por coronavirus. Enfermería militar. Ambulancias aéreas.

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## INTRODUCTION

Since the beginning of the COVID-19 pandemic, there has been wide concern regarding the disease that has spread rapidly worldwide, causing different impacts[1]. Since then, the number of confirmed cases of COVID-19 has shown exponential growth in different countries, which has resulted in an overload on health systems around the world[2].

In this context, respiratory secretions were considered the main means of virus propagation. Human airway epithelial cell culture analysis, electron microscopy and complete genome sequencing of the culture supernatant were shared with the World Health Organization, intended for surveillance and detection of 2019-nCoV infection globally and in China[3].

In the midst of the epicenter of the epidemic, the performance of aeromedical evacuation (AMEV) of patients potentially contaminated by a biological agent, where the contamination route is by air, transformed Operation Return to the Beloved Homeland Brazil (*Operação Regresso à Pátria Amada Brasil*) into an unprecedented mission, delicate and full of meticulous details[4].

With the emergence of a new type of coronavirus in the province of Wuhan, China, the technical team of the *Instituto de Medicina Aeroespacial Brigadier Roberto Teixeira* – IMAE, identified the virus as a new biological threat. On January 27, 2020, it intensified the actions to update knowledge about COVID-19, aiming at a possible Chemical, Biological, Radiological and Nuclear Defense Aeromedical Evacuation (CBRND AMEV).

The Aeronautics Health Board (*Diretoria de Saúde da Aeronáutica* – DIRSA) called IMAE to start planning the transport of returnees. In February 2020, the Federal Government announced that Brazil would carry out Operation Return to the Beloved Homeland Brazil.

The planning of the entire mission was based on protocols to ensure the safety of passengers, crew, and the health team involved in the mission. The health teams involved in this mission have CBRND training to execute it, which ensured planning and safety during the mission.

The relevance of this report is the need to disseminate knowledge about the type of training that the military nursing team obtained to carry out the aeromedical transport of potentially contaminated patients, aiming to guarantee the safety of both the aeromedical team and the clients. The study also contributes to the visibility of the profession in aerospace nursing. Highlighting as a profession endorsed with diverse skills and active in areas still little explored, such as aeromedical transport in patients affected by CBRN agents.

Therefore, regarding the performance of nursing in Operation Return, a guiding question was raised: How does the training of the nursing team to perform the aeromedical evacuation in the COVID-19 pandemic occur?

To elucidate the research problem, the following objective was established: to describe the training of the military nursing team in chemical, biological, radiological, and nuclear defense.

## METHODS

This is an experience report on the training of the military nursing team, in Chemical, Biological, Radiological and Nuclear Defense (CBRND) and in Aeromedical Evacuation (AMEV), for the repatriation mission of Brazilians who were in Wuhan, China, after the outbreak of the new coronavirus (2019 – nCoV).

The documentary research was conducted in the files of the Teaching Section of the *Instituto de Medicina Aeroespacial Brigadeiro Médico Roberto Teixeira* (IMAE), from February to March 2020. Data were collected by surveying the nominal relationships of the military trained by the Institute. Military personnel who carried out courses and training events related to service and CBRND AMEV, participants of Operation Return were included.

IMAE is a Military Organization of the Brazilian Air Force, a reference in CBRND training and AMEV, located in the City of Rio de Janeiro (RJ), Brazil. The nursing team that participated in Operation Return was composed by 4 professionals, being 01 nurse and 3 nursing technicians.

It is noteworthy that, to ensure compliance with ethical issues, the study was referred to the Research Ethics Committee of the *Universidade Federal do Estado do Rio de Janeiro* and approved with Opinion 2.806.480 and CAAE 93054218.0.0000.5285.

### Experience Report

Since the creation of the Air Force Command Guideline (DCA 1-6), which established the doctrine of preparation and use of the FAB in transport missions in Chemical, Biological, Radiological and Nuclear Defense (CBRND) in 2014, the *Instituto de Medicina Aeroespacial Brigadeiro Médico Roberto Teixeira* (IMAE) became the reference body of the Military Air Force Command (*Comando Militar da Aeronáutica* – COMAER) for the preparation of personnel involved in CBRND actions.

The CBRND activities planned to be performed by the FAB are based on the provisions of DCA 1-6 for the Air Transport Action for Defense (CBRN):

> *"consists of employing Air Force Means to move personnel and material that have been subjected to the action of*

*Chemical, Biological, Radiological and/or Nuclear agents, and to transport personnel and supplies specialized in activities resulting from CBRN events"*[4].

Within the universe of missions performed by the Air Force, we can highlight the irrefutable urgency of obtaining a prompt and effective response to incidents that suddenly can affect us in terms of CBRN[5].

The execution of the Operation took place in four different moments. The pre-flight, with the definition of the aeromedical team, the preparation of the aircraft settings and the forecast of the necessary supplies. Screening in Wuhan, with health assessment of returnees. The flight, with the management of Personal Protective Equipment to minimize the risk of contamination by prolonged contact with potentially contaminated passengers. And, finally, the quarantine carried out in the city of Anápolis, with the isolation of returnees until confirmation of non-infection by 2019-nCoV.

With this scenario, the team training proves to be of great importance. The Health Training Course in Chemical, Biological, Radiological and Nuclear Defense (HTC-CBRND), created in 2013, is intended for medical officers, nurse officers and nursing technician graduates, in order to train them for management, coordination and care for victims of attack with chemical, biological, radiological and nuclear substances and their respective aeromedical transport[6].

In its minimum curriculum, the course trains doctors, nurses, and nursing technicians to identify the main CBRN agents, to value the importance of the correct use of personal protective equipment (PPE), to know the pre-hospital care protocols for each type of agent and in addition to the necessary care for the aeromedical transport of this type of patient.

One of the biggest concerns of CBRND courses is to make the military understand that the correct use of PPE can save lives and minimize damage. A large part of the workload of the HTC-CBRND is taught with the military fully dressed, submitting them to adapt to the use of masks, impermeable coveralls, rubber boots, and all the necessary attire for the management of a patient contaminated or potentially contaminated by a CBRN agent.

Besides the HTC-CBRND, all members of the nursing team deployed for the mission in China had the Aeromedical Evacuation Course (AMEVC). This preparation brought security to the team in the planning of the mission, in the aircraft settings. Therefore, the aeromedical team had both aeromedical knowledge and knowledge of the management of patient victims of CBRND agents.

A study conducted with nurses working in aeromedical transport showed that management activities of the aerospace nurse are very present, highlighting the mission planning[7]. With a view to perform such activity, it is essential that the nurse has knowledge in addition to techniques, because, if there is no adequate management before the flight, the patient can be damaged by the lack of planning, adequate equipment and material, so patient safety requires a prior mission organization.

The AMEVC, a course taught by IMAE, and with the immersion strategy, is intended to train doctors and nursing team to work in aeromedical evacuation missions with the best possible performance, especially in operational and tactical environments. In its pedagogical structure, AMEVC allocates approximately 40 instruction periods of 50 minutes each.

Both the HTCCBRND and the AMEVC are training courses that lead to the immersion of students in the proposed theme, as they stimulate the performance of correlated theoretical and practical activities, through an intense, dynamic, and efficient contact. The courses last one week and have a total workload of 37 class times with 45 minutes each period, providing trained military personnel with the necessary security to act in real events.

In addition to conducting the courses mentioned above, the team defined to carry out the evacuation of Brazilians allegedly exposed to a new type of coronavirus in Wuhan, was tested several times in simulation events aimed at the practice of pre-hospital care and the aeromedical transport of CBRN victims.

The IMAE's nursing team and doctors acted directly in the simulations of the Assistance and Protection Exercise for Latin America and the Caribbean (*Exercício de Assistência e Proteção para a América Latina e Caribe* – EXBRALC). This exercise takes place annually and is managed by the Organisation for the Prohibition of Chemical Weapons (OPCW). Aimed at training members of institutions potentially employed in incidents involving chemical agents, EXBRALC has representatives from 18 countries in Latin America and the Caribbean. In its final exercise, IMAE is responsible for the aeromedical evacuation of simulated victims in rotary wing aircraft. Another event of great importance in the preparation of the team responsible for CBRND AMEV was the General Exercises of the Emergency Plan of the Almirante Álvaro Alberto Nuclear Power Plant (CNAAA), where the Angra I and Angra II Nuclear Power Plants are located. These exercises, carried out in odd-numbered years, aim to assess the security plan, identify possible vulnerabilities, and improve procedures.

FAB is responsible for the aeromedical evacuation of victims affected by radiation to the Marcílio Dias Naval Hospital and the IMAE military are part of the aeromedical teams in this training.

Although they are simulations for chemical and nuclear events, the Institute's participation for five years in a row in EXBRALC and in the General Exercises of Response to Nuclear Emergency in Angra, brought safety and maturity to carry out aeromedical transport of victims of biological agents, seen that there are many similarities in the approach to this type of patient.

After conducting the survey in the IMAE files, this study found that all members of the nursing team were trained by both HTCCBRND and AMEVC and had already participated in at least two events with CBRN Aeromedical Evacuation simulations.

It is considered that the present study has limitations as it is an unprecedented study with little description in the literature. It is believed that it contributes to innovate publications in the field of nursing and publicizing military action and possibilities for action.

All theoretical and practical knowledge, acquired over the years of training to an event of this nature, brought to the IMAE nursing team the necessary safety to act in a real event, which presented potential risks of contamination.

## FINAL CONSIDERATIONS

The main result of the study was the importance of qualification and training to promote the safety of all those involved in the event.

In this sequence, it is possible to observe that to perform this role, the nursing professional must be well trained, in addition to being constantly updated to perform their role together with the multiprofessional team. At the national level, such training is still conducted, almost exclusively, by military nursing.

The limitation found in this study was the fact that there are not many publications on the CBRN theme, therefore, it cannot be extended comparisons with training to act in previous events.

Disseminating this type of knowledge about the training that the military nursing team obtained to perform aeromedical transport of potentially contaminated patients, aims to intensify the safety protocols in AMEV of patients with infectious diseases.

Works like this can contribute to the visibility of nursing in yet another field, which also finds legal bases for its performance in this specialty in Ordinance GM 2.048/20028, which determines the specific training of aeromedical transport professionals. It also proposes to reflect on the relevance of training in CBRN AMEV and contributes to improving the quality of care in nursing and health to work in operations of this nature.

Nursing was committed to the planning and execution of all stages of this Operation, which became, without a doubt, one of the longest, most strenuous, and unprecedented missions in the history of aeromedical transport of potentially contaminated passengers to Brazil. The results of this study contribute to reflections within the profession about training in CBRND of nursing in AMEV, especially as it is a little explored area, with potential for expansion, requiring human resources properly trained and prepared for this demand.

## REFERENCES


1. Freitas ARR, Napimoga M, Donalisio MR. Assessing the severity of COVID-19. Epidemiol Serv Saúde. 2020;29(2):e2020119. doi: https://doi.org/10.5123/S1679-49742020000200008
2. Antunes BBP, Peres IT, Baião FA, Ranzani OT, Bastos LSL, Silva AAB, et al. Progression of confirmed COVID-19 cases after the implementation of control measures. Rev Bras Ter Intensiva. 2020;32(2): 13-23. doi: https://doi.org/10.5935/0103-507X.20200028
3. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel Coronavirus from patients with pneumonia in China, 2019. N Engl J Med 2020;382(8):727-33. doi: https://doi.org/10.1056/NEJMoa2001017
4. Camerini E. Defesa Química, Biológica, Nuclear e Radiológica: o preparo da Força Aérea Brasileira para Operações Conjuntas. [trabalho de conclusão de curso]. Rio de Janeiro: Escola Superior de Guerra; 2014 [cited 2020 Feb 25]. Available from: https://repositorio.esg.br/bitstream/123456789/1354/1/Eduardo%20Serra%20Negra%20Camerini%20-%20Defesa%20Quimica%2C%20Biologica%2C%20Nu.pdf
5. Medeiros APB. Trilha de capacitação para profissionais de saúde da Força Aérea [trabalho de conclusão de curso]. Rio de Janeiro: Escola Superior de Guerra; 2020 [cited 2020 Feb 25]. Available from: https://www.google.com/url?sa=t&source=web&rct=j&url=https://repositorio.esg.br/bitstream/123456789/1131/1/caepe.07%2520TCC%2520VF.pdf&ved=2ahUKEwjNmcbh0d_2AhUxmuAKHeNAAAYQFnoECBUQAQ&usg=AOvVaw1OEi9oOpeZBnagYJ8zFs49
6. Presidência da República (BR) [Internet]. Brasília; Gov.br: 2020 [cited 2020 Feb 19]. Operação Regresso é segura, garante Bolsonaro; [about 1 screen]. Available from: https://www.gov.br/planalto/pt-br/acompanhe-o-planalto/noticias/2020/02/operacao-regresso-e-segura-garante-bolsonaro
7. Scuissiato DR, Boffi LV, Rocha RR, Montezeli JH, Bordin MT, Peres AM. Compreensão de enfermeiros de bordo sobre seu papel na equipe multiprofissional de transporte aeromédico. Rev Bras Enferm. 2012;65(4): 614-20. doi: https://doi.org/10.1590/S0034-71672012000400010
8. Ministério da Saúde (BR). Gabinete do Ministro. Portaria n.º 2048 de 5 de novembro de 2002. Aprova o Regulamento do Sistema Único de Saúde (SUS). Diário Oficial União. 2002 nov 12 [cited 2020 Feb 25];139(219 Seção 1):32-54. Available from: https://pesquisa.in.gov.br/imprensa/jsp/visualiza/index.jsp?data=12/11/2002&jornal=1&pagina=32&totalArquivos=88

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The authors declare that there is no conflict of interest.

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**Associate editor:**
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Received: 12.16.2020
Approved: 02.09.2022

**Editor-in-chief:**
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