Brazilian Army CBRN Defense Scientific Advisor Team Perspectives of lessons learned from COVID-19 crisis

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Abstract. The Brazilian Army is always improving its Chemical, Biological, Radiological and Nuclear Defense (DQBRN) preparedness to crisis response through the employment of Pharmacy officers among the technical staff of the Army Biology Institute (IBEx) and Army Institute for Chemical, Biological, Radiological and Nuclear Defense (IDQBRN). Operation Return to Brazil ("Regresso à Pátria Amada Brasil") conducted in Anápolis by the Brazilian Air Force Garrison, headquartered in the city of Anápolis, in the state of Goiás, in early February 2020, was an interministerial action aimed at repatriating 34 potentially contaminated Brazilians located in the city of Wuhan, China, due to the outbreak of the new coronavirus (2019-nCoV, SARS-CoV-2, COVID-19). The operation ended as a Brazilian victory, with no civilian or military personnel killed.

Keywords. CBRN Defense. Brazilian Army. COVID-19. Brazilian Repatriation.

1. Introduction

The Brazilian Army CBRN Defense scientific advisor team accomplished the technical support of actions carried out by the CBRN specialized teams formed by the 1st Brazilian Army CBRN Company from the Special Operations Command and the 1st Battalion for CBRN Defense related to the complete decontamination of the two VC-02 Embraer – 190 aircraft, baggage and facilities before and after the arrival of the Brazilians repatriated from the Wuhan area, the epicenter of the new Coronavirus (COVID-19) epidemic, located in the People's Republic of China, (Figure1).

Fig. 1 - 1. Brazilian Army 1st Battalion for CBRN Defense actions upon arrival of the 34 repatriated Brazilians from Wuhan, China

The VC-2 is a presidential transport aircraft, with a wingspan of 28.72 m, length of 36.25 m, maximum take-off weight of 51,800 kg, maximum speed of 531 kt (985km/h) and a service ceiling of 41,000 ft (12,496 m). Returnee transportation availability during Operation Return to Brazil comprised 30 passengers on each aircraft [1]. A total of 11 crew members and six Brazilian Air Force health professionals were on board each VC-2, in addition to a doctor from the Brazilian Ministry of Health. The health teams from the Brigadeiro Médico Roberto Teixeira Institute of Aerospace Medicine (IMAE) were previously trained to carry out DQBRN missions, which consist in employing Air Force means to displace personnel and material subjected to the action of Chemical, Biological, Radiological and/or Nuclear agents, and transporting specialized personnel and material in activities resulting from DQBRN events. The VC-02 airplane decontamination process is displayed in Figure 2.

Fig. 2 - Decontamination of VC-02 airplanes

After positioning themselves in the planned

decontamination location and authorized by the Brazilian Air Force, the decontamination team composed by the 1st Brazilian Army CBRN Company from the Special Operations Command and the 1st Battalion for CBRN Defense approached the VC-02 airplane to perform the pilot cabin, passenger cabins and luggage compartment decontamination, displayed in Figure 3.

Fig. 3 - Internal decontamination of VC-02 airplanes.

The same procedure was performed for the second VC-02 airplane after team replacement. After returning from the airplane decontamination task, technical decontamination of the involved military personnel was carried out. The Brazilian Army CBRN Defense scientific advisor team also supported the Operational Health Subdirectory of Brazilian Army Health Directory (Subdiretoria de Saúde Operacional da Diretoria de Saúde do Exército Brasileiro) and the Joint Health team from Joint Armed Forces Hospital (Hospital das Forças Armadas) in setting up a campaign hospital facility to provide assistance to quarantined Brazilians following precautions regarding biological risk [2].

The Brazilian Army CBRN Defense scientific advisor team acted to ensure biosafety, aiding with Personal Protective Equipment (PPE) guidance which must be used by any civilian or military with the intention of entering, staying and leaving the areas set up as restricted to repatriated Brazilians, as well as guidelines during PPE use and disposal, in order to prevent the spread of biological contamination. Subsequently, the Brazilian Army CBRN Defense scientific advisor team also interacted with other military teams, such as the Brazilian Navy Nuclear, Biological, Chemical and Radiological Defense Center (CDefNBQR-MB), Brazilian Air Force Anápolis Health Squad (EA-AN) and civilian teams from the Goiás State Central Public Health Laboratory (Laboratório Central de Saúde Pública Dr. Giovanni Cysneiros - Secretaria de Estado da Saúde de Goiás) and the Epidemiology Training Program Team Applied to the Unified Health System Services – EpiSUS, from the Brazilian Ministry of Health (Epi-SUS).

2. Experience Report

Both the IBEx and IDQBRN were activated by the Command of Land Operations (COTER), the main body of the Brazilian Army's Chemical, Biological, Radiological and Nuclear Defense System (SisDQBRNEx), in order to provide a Scientific Advisory team in the Biological Defense area during the quarantine of the Brazilians repatriated from Wuhan, China, the first epicenter of the novel coronavirus (nCov-2019) epidemic. The IBEx and IDQBRN sent two Pharmacy officers to compose Brazilian Army CBRN Defense scientific advisor team to the Anápolis Air Base as early as February 6th. The quarantine was carried out in the city of Anapólis, with an initial forecast of eighteen days of duration, modified according to the mission progress. The Brazilian Army CBRN Defense scientific advisor team arrived at the HTS facilities and acted in support of the Operational Health Subdirectory of Brazilian Army Health Directory team to set up attendance rooms for the repatriated Brazilians and assisted the joint team of health professionals comprising the Brasília Air Force Hospital (HFAB), Brasília Military Area Hospital (HMAB) of Brazilian Army and Joint Armed Forces Hospital (HFA). In the context of Operation Return to Brazil, the Hotel of Transit of Officers (HTO) and Hotel of Traffic of Officers and Sergeants (HTS) facilities from the Anápolis Brazilian Air Force Garrison were restructured to receive the 34 repatriated Brazilians [3]. Thus, the HTO become a White Zone, an area where repatriated Brazilians remained confined, and the HTS was split into two to accommodate the Support Area, where female and male dormitories were placed, and the Yellow Zone, an area containing health equipment and personnel to attend eventual health demands from repatriated Brazilians with suspected SARS-CoV-2 infection. All guidelines established by Technical Note No. 04/2020 GVIMS/GGTES/ANVISA were followed. Table 1 presents the composition of the health team employed in the Yellow Zone.

Tab. 1 - Composition of health team at Yellow Zone.

Health team members at Yellow Zone
1 pediatrician
1 general pratictioner
1 nurse
1 licensed practical nurse
1 radiologic technologist
1 surgical technologist
1 ambulanceman

No dental officer or oral health technologists were assigned for readiness in the Yellow Zone. Upon activation by an on-call demand, a dental or pharmacist officer from the Anápolis Health Squadron could be requested if needed.

The Clinical Laboratory Analysis Room in the Yellow Zone was equipped with a centrifuge capable of centrifuging blood tubes, an optical microscope and a Reflotron® Plus hematological analyzer, but with none of the necessary reagents to perform any laboratory tests if needed . Special attention to the

particularities of the reagents required to perform laboratory tests is an important condition for safe patient handling. The Anápolis Health Squadron clinical laboratory was capable of providing adequate support if necessary in this regard.

This was an opportunity for perceived improvement in the context of Operation Return to Brazil, where inherent risks concerning the handling of biological samples from potentially SARS-CoV-2 infected patients must be carefully considered by decision-makers [4][5]. The HTS, originally made up of 34 double rooms, underwent restructuring to be used as a Campaign Hospital, furnished by hospital material from Campaign Hospitals from the Brazilian Army Northeast Command, and beds and other items previously available in the rooms were removed by the Brazilian Air Force general services team.

The dormitory reserved for health care and hospital management staff in the support area was composed of rooms with beds and air conditioning systems, with four rooms designated as male accommodations and three as female accommodations. The support area also comprised accommodations for the Brazilian Air Force military personnel employed in the architecture and supervision of the building adaptation works, and a further two rooms were used as accommodations by the Brazilian Air Force Campaign Group of Logistic Support.

The Yellow Zone support area reception used the previous architecture already available as the HTS reception and served as central operation point for all those designated to enter the White and Yellow areas, used as a meeting point for the military and civilian management teams of Operation Return to Brazil. Located near the entrance to the Support Area Reception, the intensive therapy unit ambulances and an administrative HFA vehicle, which aided in medical material transportation from the HFA to the Yellow Zone when needed, remained parked and ready for use [7].

The telephone Help Desk system was also installed in the support area reception, as a landline to serve as the main means of communication used by the White Area teams installed to communicate with the Yellow Zone Support Area and other installations. After the first 12 hours at the homeland, respecting sleeping time, on February 9th, at 7 pm, the first health team entered the White Zone to measure and keep records concerning vital signs, pulmonary auscultation, initial perception of possible signs and symptoms related to infection by the new Coronavirus variant and post-traumatic stress investigations by the Epi-SUS team. Issues concerning specific setbacks in CBRN safety assurance and their implications to non-trained CBRN Brazilian Army military personnel merit careful analysis but which are not in the scope of this study. Although biosafety and PPE presentations and training were given by ANVISA and Brazilian Health Ministry teams to all civilian and military involved in Operation Return to Brazil, a common problem comprised mistakes and insecurity from people not used to PPE and biosafety measures. The Yellow Zone health material deposit was the main area where Brazilian Army CBRN Defense scientific advisor team assisted dozens of teams or single persons, both civilian and military, allowed or designated access the White Area, who were welcomed and guided on the appropriate level of PPE to be used [6].

The Brazilian Army CBRN Defense scientific advisor team served as a full-time focal point in the Yellow Zone for the dissemination of biosafety education and assurances in a supposed COVID-19 pandemic risk with full application of Ministry of Health and ANVISA recommendations for Operation Return to Brazil, as displayed in Table 2.

Tab. 2 - Guidelines on the use of PPE on Operation Return to Brazil quarantine area (White Zone)

Guidelines
When entering the external area of the place defined for quarantine, professionals must wear a surgical mask.
Professionals should be instructed on the placement and removal of PPE, hand hygiene, respiratory etiquette and on the specific activities they develop.
Perform N95 / PFF2 mask change whenever it is dirty or sweaty.

When entering the external area of the quarantine area, professionals are required to wear a surgical mask. Every person who enters the room (health professional, health and cleaning staff) must wear PPE to prevent aerosol transmission (N95/PFF2 masks, procedure gloves, waterproof aprons, goggles or face shields and surgical caps). Professionals should be instructed on PPE placement and removal, hand hygiene, respiratory etiquette and on the specific activities they develop.

They are instructed to change their N95/PFF2 masks whenever they are dirty or sweaty. To accomplish effective health material and PPE control, the Brazilian Army CBRN Defense scientific advisor team helped the HFA and Anápolis Health Squadron to organize and manage health material and PPE distribution to all Yellow Zone and White Zone personnel, which was composed by medical teams, food service teams, room maid service teams, security teams and Brazilian Air Force Campaign Group of Logistic Support teams.

3. Conclusions

This paper is not an official history but an analysis of some lessons that can be learned from Operation Return to Brazil and applied to future DQBRN operations. It is a scientific report aimed at being accurate, insightful and as useful as possible. This

paper's intent is not to criticize, but instead to offer observations for joint operations and CBRN incidents in Brazilian settings. Although all Brazilian forces accomplished their tasks adequately during Operation Return to Brazil, scientific setbacks did occur. Operation Return to Brazil was a departure from way that the Brazilian forces were intending to deal with biological incidents and success followed as all participants learned and adapted to an interagency cooperation situation.

4. Acknowledgement

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