Article

Civil-Military Cooperation: Integrated Logistics in Response to the COVID-19 Crisis

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Abstract: *Background*: This article addresses the civil-military cooperation in response to the COVID-19 crisis. In early 2021, the number of daily infections and the growing number of COVID-19 hospitalizations in Portugal were dramatic, reaching the highest rates in the world. In response, the Armed Forces were engaged and played a significant role in helping the National Health Service (NHS). The NHS is just one of many existing examples which demonstrate the relevance of logistical support from the Armed Forces so that civil institutions can return to a sustainable and autonomous situation. *Methods*: In order to understand and describe this real-life phenomenon, a qualitative and exploratory case study was conducted. Several sources of data collection were used for triangulation and corroboration. *Results*: The results suggest that, in emergency situations, logistical operations of the Armed Forces in support of civil society are divided into four major areas: planning and organizational activities; priority setting; combat service support; and training and self-reliance. *Conclusions*: Once the four areas of action of the Armed Forces were identified, the response to the COVID-19 crisis became more evident, as civil entities were able to make requests suited to military capabilities.

Keywords: Armed Forces; civil society; COVID-19; logistic support; emergency situations; sustainability

1. Introduction

COVID-19 has provided a way for greater engagement between the Armed Forces and the civilian community. However, given the novelty of this phenomenon, there has been little attention from experts and professionals in the field of military logistics related to support for civil society.

In countries around the world, military response has been pivotal, from setting up field hospitals in Serbia, Russia or France to delivering protective equipment or applying blockades in South Africa, Spain or Italy [1]. Furthermore, as Gibson-Fall [1] points out, in some cases (such as the Philippines or Indonesia) the military led the entire response, which highlights the importance of the issue. Thus, examples of military commitment are found all over the world, starting with the fact that the role of the People's Liberation Army was central from the beginning, in part because the Central Military Commission's Joint Logistics Support Force is based in Wuhan, the first epicenter of COVID-19 [2].

The importance of the Armed Forces in the effort to limit the spread of SARS-CoV-2 is due to the fact that they are highly versatile organizations and because they are deployable in the short term. Therefore, as far as the subject of this article is concerned, military forces are trained to mount logistical operations on a large scale, having the appropriate equipment and personnel trained to operate in a variety of high-stress and short-notice contexts, skills that have been useful in combating COVID-19. Although the Armed Forces can provide crucial assistance in times of need, some considerations must be taken into account, such as the importance that civilian crisis organizations are not harmed, civilian control and civil rights are guaranteed, and the effects on other military operations are

considered and discussed [3]. However, civilian crisis organizations can only resume their normal activities when the most critical moment of the COVID-19 health crisis has stabilized and the needs of civil society are re-established.

Given the above, the intention of this article is to present original research that can offer additional contributions to scholars in the civil-military context, with more significant outcomes to the scarce existing literature on military logistical support in the context of COVID-19. That said, the research question (RQ) is presented as follows:

RQ: How is civil-military logistical cooperation conducted in the context of COVID-19?

The policy of this article is based on an empirical and theoretical examination between civil-military logistical cooperation, on the one hand, and social and organizational processes in the context of the COVID-19 pandemic, on the other. It is expected that the research policy of this article will produce results that have implications for management in general and for logistics in particular.

The next section of this article describes the main concepts more precisely in the context of military logistics; followed by the description of the methodological process, namely with regard to data collection and analysis; the results provide the answer to the research question, presenting an explanation of the phenomenon and real examples to better illustrate the description; finally, the conclusion discusses the theoretical and practical implications, research limitations and suggestions for future research.

2. Literature Review

Upon reviewing the literature, it was found that the theoretical research on civil-military cooperation relations in COVID-19 emergency situations is still limited, despite existing studies that have reinforced the potential of the military and the importance of parallel health systems that seek to increase the capacity of the civil health system in times of emergency. An example is the remarkable article by Gad et al. [4], who carried out a cross-sectional study in six European countries (i.e., United Kingdom, France, Spain, Italy, Belgium and Sweden), illustrating the impact of the military on the national responses of COVID-19, where, in some cases, there was extensive collaboration between the military and civilian health systems. In reality, the Armed Forces became involved in the response to COVID-19 for two reasons [3]: first, because the pandemic directly affected the Armed Forces' operational readiness and activities; second, because the Armed Forces had a political interest in engaging in the crisis response, showing taxpayers that they are efficient and important to society.

Logistical operations are so complex and difficult that, for example, Secretary Rumsfeld's desire to minimize the US footprint and his insistence on continually re-examining the Time-Phased Force Deployment List that US (United States) forces sent to Command Central Iraq in 2003 took weeks of time for thousands of people in the Pentagon [5]. Thus, in military sciences, the doctrine of war is divided into three levels: strategic, operational and tactical [6–8]. Military logistics follows the same logic, being divided into–strategic logistics, operational logistics and tactical logistics [9], while referring to all activities of movement, equipping and sustaining the Armed Forces [10]. The distinction of the three levels of military logistics is not entirely clear, as the levels are not necessarily disjointed, so there are functional areas that interconnect and intersect two adjacent levels [11]. This argument is even more visible with the emergence of disruptive technologies (e.g., Internet of Things) that tend to aim at merging the three levels into a "seamless logistics system" that unites all levels in a network [12,13].

In the context of modern warfare, the tendency is to articulate integrated joint operations that require the use of the latest communication and information technologies [14]. It is in this regard that Tortonesi et al. [15] reported that widespread adoption of IoT technologies will significantly affect many aspects of military operations, with an increasing number of networked resources. In this context, the Logistics Internet-of-Things (L-IoT) has been attracting the attention of professionals and academics [16], from both civil and military communities. Despite the evolution of disruptive technologies, the traditional

concept of the three-level distinction is the most commonly accepted and will be used in this article because the L-IoT has not yet reached a stage of sufficient maturity in the military community to be able to be analyzed with due rigor and depth [16,17].

With regard to civil logistics and supply chain management, the hierarchy is performed at different levels of planning and time horizons, and is generally classified as strategic, tactical and operational [18,19]. There is, however, overlap between these levels, which emphasizes some similarity to military logistics. Taking into account the object of study of this article, the definition of logistics goes to the military; therefore, the definition presented by Kress [11] was followed, which is described below:

- Strategic logistics

The strategic level of logistics is very similar to decision making by a company's board of directors, where decisions have a lasting and far-reaching impact. For example, in times of peace, strategic logistics develop what military forces need; in wartime, with limited resources, headquarters may be involved in determining priorities for support between the inner zone and the theater of operations. Determining theater support priorities is often the mission of operational logistics.

- Operational logistics

Operational logistics (OpLog) is a set of means, resources, organizations and processes that share the common goal of sustaining large-scale military operations. Operational logistics aim to support operational activities and movements in the theater of operations, not necessarily to support combat units. Therefore, OpLog has a special importance in setting priorities in terms of time and space.

- Tactical logistics

At the tactical level, there is practically no systematic prediction. It is therefore important that logistics correctly assess the short-term consumption expected by combat forces; that is, the "here and now", which are essential to facilitate combat readiness and the impetus of combat units. It is also important to point out that advanced command and control systems, which work on the basis of disruptive information extraction technologies (also known as pull systems), can shorten the strategic-tactical logistics cycle, which shows the current trend of "seamless logistics".

While analysis of levels of war has application within the narrow field of military sciences, it may be useful to draw parallels with respect to the application of civil-military logistical support. It is essential to make clear that the intention of this research is not to create doctrine, but to encourage discussion and study of the use of military forces in logistical support of civil society in times of crisis.

3. Materials and Methods

This article uses a qualitative case study of an exploratory and descriptive nature. The case study is qualitative in that it is based on the analysis of textual data from several sources of data collection, which were used for triangulation and corroboration purposes. This article is also exploratory, as there is no knowledge of any similar work to date, so the empirical results have not been published in the literature. Finally, the article is descriptive, as it intends to understand and describe a particular phenomenon in real life.

During the emergency situation in Portugal, the military assumed a fundamental role in the response to COVID-19. The choice of the Portuguese Armed Forces as the unit of analysis is justified since the Armed Forces played a significant role in stabilizing the third wave of COVID-19, which placed hospitals across the country under severe pressure after recording more infections and deaths for its population than any other country in the world. At the end of January 2021, the 14-day cumulative incidence was well above the 1000 cases per 100,000 inhabitants in Portugal, reaching a worrying peak of SARS-CoV-2 infections (Figure 1) when compared to the previous peaks (April and November 2020). This situation forced Portugal to invite EU Member States to participate in stabilizing the situation in the country.
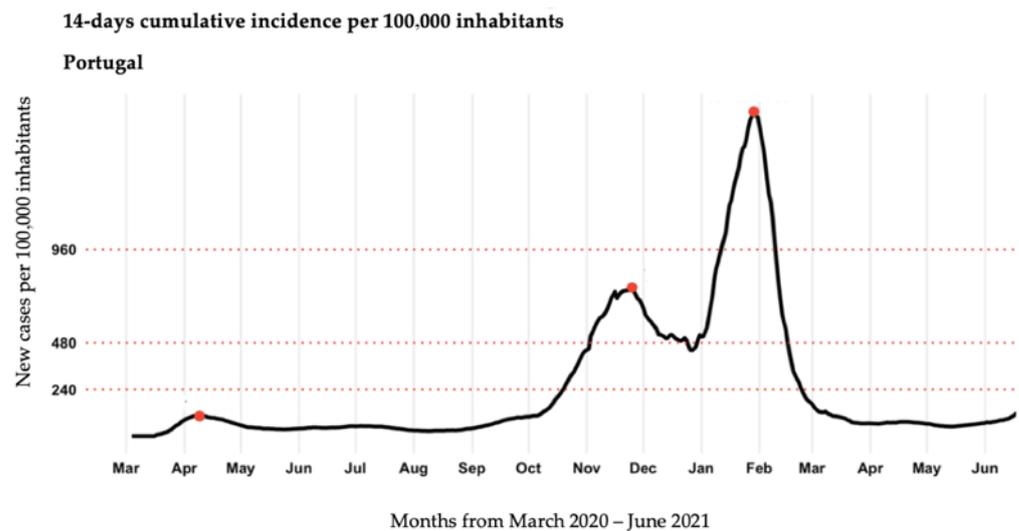
Figure 1. COVID-19 situational awareness—Information about Portugal as of June 2021 (Adapted from DGS [20]).

This research was carried out through several data collection techniques: (1) semi-structured interviews, (2) direct observation and (3) collection of official documentation.

The main source of data collection was interviews and, in this regard, respondents were selected for having participated in logistical activities in the area of civilian assistance. Respondents were selected according to different levels of responsibility (military rank), functional areas (assigned role) and knowledge (years of experience). In addition, an interview protocol was developed, which served to establish a consistent pattern among all participants, in order to identify discrepancies and similarities between them. After conducting the interviews, they were transcribed verbatim and sent to the interviewees, in order to avoid misinterpretations. The research was conducted under the Declaration of Helsinki; thus, all respondents gave their permission and signed an informed consent form before participation in the study.

Direct observation and document analysis were considered secondary sources, which essentially served to corroborate the primary source. With regard to direct observation, although it did not involve the researcher's participation in logistical activities, it focused on first-hand observation and recording of the phenomenon. To do so, a field diary was used, where all activities and informal discussions were registered. In addition, official documents of the institution were used, such as reports from (1) the Directorate General of Health (DGS), (2) the three branches of the Armed Forces and (3) the Ministry of National Defense. These documents helped to understand and clarify some of procedures and actions that were being carried out by the Portuguese Armed Forces.

Data analysis followed the content analysis technique; therefore, the following procedures were followed [21]: (1) Through the collection by different data collection sources, the integration of the text in a qualitative data analysis software (NVivo) was initiated. (2) Then, the entire text was read to identify the most interesting phrases and ideas (coding process). That is, words in the text that seemed to capture key thoughts or concepts were highlighted. (3) During this process, codes were identified and classified, defining subcategories and categories. (4) After immersion in the existing data, a tree diagram was generated to organize the categories in a hierarchical structure, providing an overview of the phenomenon. (5) Finally, definitions were developed for each category, subcategory and codes, in order to prepare the writing of the results.

Overall, the data analysis technique allowed for the analysis of a large volume of qualitative data in order to rank the categories so that emerging patterns and ideas could be identified [22]. Due to the sensitivity of military themes and the need for confidentiality of the interviewees' identities, as in other articles in the area [23], the data and information

from the interviews remains restricted. Furthermore, although NVivo software does issue an analysis report, it is extensive, so the information was summarized to topics presented in the results section. That is, the categories that emerged from the data analysis were identified and organized into four axes of action, which can be seen in Section 4.

4. Results and Discussion

The Portuguese Armed Forces intervened in four major areas of the logistical domain: planning and organizational; priority settings; combat service support; and training and self-reliance. Each of the key military logistical supports were divided into several practical actions which will be described in the following sections.

4.1. Planning and Organizational Activities (Strategic Logistics)

In the planning and organization phase, the General Staff of the Portuguese Armed Forces (EMGFA) developed a recruitment program called the "military family". This program aimed to appeal to the recruitment of retired military personnel, military pensioners, military family members of the military, civilians and ex-military personnel to support the Armed Forces' efforts to strengthen the National Healthcare System (NHS). At least 85 volunteers were selected from among 8000 registered volunteers, as they have different skills in the healthcare areas (e.g., medicine, nursing, pharmacy) and were essential to help fight COVID-19.

In addition, a Permanent Crisis Cell was activated in the Joint Command for Military Operations, whose mission was to coordinate actions to support the fight against the COVID-19 pandemic by the three branches of the Armed Forces (Army, Navy and Air Force). The inter-institutional articulation of support civil society also enabled the activation of a Joint Logistics Center (JLC) and a Movement Control Center (MCC), which allowed for a sustainable articulation of the activities and capabilities of the Armed Forces, in accordance with the requests for support received through the National Authority of Emergency and Civil Protection (ANEPC). For a better control of military support activities, EMGFA developed data collection and analysis actions. These actions allowed the georeferencing of information, essential for monitoring the support of the Armed Forces to the civilian population, as well as for monitoring cases of COVID-19 in the Armed Forces and its impact on operational capacity [24]. At the same time, as part of the planning and logistics for the distribution of the vaccine against COVID-19, several soldiers joined the planning cells responsible for organizing the logistics operation at the Ministry for Health.

4.2. Priority Setting (Operational Logistics)

This section briefly considered the production levels, priority settings, transport coordination and distribution activities that were carried out by the Portuguese Armed Forces in the battle against COVID-19.

In that regard, the Military Laboratory of Chemical and Pharmaceutical Products (LMPQF), which was recently succeeded by the National Laboratory for Medicines (LM), provided remarkable assistance to the civil community and to all essential services of the Portuguese State (e.g., social and health institutions). Insofar as it produced material to combat COVID-19 (e.g., disinfectant gel, personal protective equipment), this production allowed it to respond to the difficulties of acquiring products that initially appeared on the world market.

The contribution of the Armed Forces went beyond the production of essential materials for public institutions, as the transport of medicines and drugs to their final destination was also guaranteed, thus ensuring the cycle of the supply chain. By way of example, the JLC ensured the priority settings, through the coordination of the Portuguese Air Force, the transport of COVID-19 patients and several tons of medical material between the Portuguese mainland and the islands, ensuring the continuity public hospitals operations.

On top of the previous activity, many other transport and distribution activities were coordinated by the JLC and carried out by the Army, Navy and Air Force, such as the

distribution of Personal Protective Equipment (PPE) and alcohol-based antiseptic solution to educational establishments all over the country. Also, within the scope of the COVID-19 pandemic, the Armed Forces provided very close support to the most vulnerable citizens, namely with regard to the distribution of meals to the homeless in Lisbon and logistical support to the Reception Centers with the distribution of PPEs.

4.3. Combat Service Support (Tactical Logistics)

In the military sciences, there is a clear distinction between logistics and military operations. Albeit the distinction of these concepts during the COVID-19 crisis was somewhat blurred, this is because the relationship between the delivery of supplies to civil institutions is often linked to the provision of services [25]; that is, the delivery of a product entails the provision of a service, especially in situations that require great technicality, as will be seen below. Thus, due to the inability of civilian agents (e.g., National Healthcare System or National Authority for Emergency and Civil Protection) to respond in a timely manner, either because of the high number of requests from the civilian population, or because of the high technicality that the fight against COVID-19 demanded in the first phase, the Portuguese Armed Forces were invited to work beyond the strict framework of logistical support. In other words, as the Armed Forces progressively incorporated operational missions of direct support to the civil society (Figure 2).

Figure 2. Combat service support in response to COVID-19 crisis (Adapted from HFAR [26] and the PRT Army [27]): (**a**) Decontamination team; (**b**) Hospitalization support; (**c**) Emergency Military Support Module; (**d**) Increased inpatient capacity.

At an early stage of the COVID-19 pandemic, both civil agents and private companies had difficulties in carrying out specialized disinfection activities. Besides the notable contribution of LM's supply support, the Portuguese Army's Defense Chemical, Biological, Radiological and Nuclear Center (DCBRNC) deployed a set of decontamination teams in critical State infrastructure (Figure 2a). At the request of ANEPC, the DCBRNC conducted national actions in the scope of decontamination of nursing homes to prevent the spread of Sars-CoV-2, protecting the elderly and the most vulnerable citizens.

The activity of DCBRNC was not limited to nursing homes, having carried out the decontamination of health units and emergency medical vehicles of the NHS, as well as in the military institutions themselves, namely in the Lisbon Hub of the Armed Forces Hospital (HFAR). Also, because this hospital frequently received patients with COVID-19

from the NHS, the decontamination of the DCBRNC guaranteed its normal functioning and continuity of the response to the health crisis. Early in 2021, the Lisbon Hub of HFAR doubled its capacity with 140 more hospital beds for patients with COVID-19 (130 hospitalized in the ward and 10 in intensive car), making a total of 274 infirmary beds of which 197 were for patients with COVID-19 (72%), and 20 beds for intensive care with 15 for patients with COVID-19 (75%) [28]. As can be easily recognized, the medical capacity installed both the ward and in the intensive care unit was prepared to receive up to 75% of patients with COVID-19, which implies a great logistical effort for the treatment of this disease.

Moreover, the HFAR was very relevant in transferring patients from civilian hospitals to more densely populated areas in Portugal (i.e., metropolitan area of Lisbon and Porto) as these hospitals were on their way to reaching their maximum capacity in intensive care (Figure 2b). Late in January 2021, the HFAR had 124 patients from COVID-19 hospitalized, with 101 from the NHS [28]. The increased installed capacity of the HFAR was only possible thanks to the reconversion of the existing spaces, as well as the support of the Army Field Hospital, both in terms of material resources and health professionals.

In addition to the HFAR, other back-end hospital support structures were created including the COVID-19 Military Support Center (CAM), which was designed to deal with clinical situations of mild or asymptomatic severity for people and which had the purpose of removing pressure from the overcrowding hospitals of the National Healthcare System. It is also worth noting the mobile logistic maneuvers in the context of Emergency Military Support (AME), namely the delivery of the Army's Emergency Military Support Module (EMSM) which was moved to the Armed Forces Hospital—Lisbon Hub (HFAR-PL) (Figure 2c). These MSMs are composed of six arc tents with a capacity for 32 inpatient beds in an air-conditioned environment, 15 medical ventilators and generators for energy production, which increased the HFAR response capacity.

Finally, at the request of ANEPC and NHS, the Armed Forces also made available about 6150 beds and 85 support tents (Figure 2d) to 656 public and private entities from 254 municipalities (e.g., hospitals, municipal councils and civil protection agents) throughout the National territory, as well as assisting in the distribution and storage of material to support the NHS.

4.4. Training and Self-Reliance

The Portuguese Armed Forces, within the scope of self-reliance of civil institutions, initiated a series of awareness-raising and training actions in the field of hygiene, cleanliness and self-protection. As an example, these actions were directed at schools, the awareness actions consisted of the correct execution of disinfection operations at school facilities and forms of mitigation in case of a case or suspicion of infection by COVID-19 during the period of in-person classes. Additionally, awareness-raising and training actions were also carried out on disinfection in fishing ports and prisons, in various parts of the country, in response to requests from the Ministry of Maritime Affairs and the Ministry of Justice. The Armed Forces' training actions generally contemplated the procedures for handling equipment, the circuits that must be installed within the institutions and the precautions to be taken in the contact between employees, among others.

4.5. Discussion (Contributions to Theory and Practice)

In military sciences there are three levels of logistical operations. In that regard, the Armed Forces intervened in four major areas, where the first three areas are related to the domain of the levels of logistical operations, namely: (1) planning and organization activities, which is equivalent to strategic logistics; (2) priority definitions, which is corresponds to operational logistics; and (3) combat service support, which is similar to tactical logistics. Training and self-reliance fall within the scope of transitioning capabilities to civilian institutions. Therefore, what is new in these results is that although some adaptations were made, it was found that there is a clear alignment of the results with the existing theory.

In other words, although the Portuguese Army's Chemical, Biological, Radiological and Nuclear Defense Center (DCBRNC) adapted it activities to the needs of civil organizations, this military unit continued to provide the necessary services within its mode of action, such as the decontamination of land, infrastructures, personnel and equipment [29].

With regard to practical contributions, this article provides the necessary guidance for civilian entities about the capabilities of Armed Forces in supporting and providing services in the context of pandemic crisis response. At first, the support of the Armed Forces was somewhat diffuse. As the triparty coordination with the National Emergency and Civil Protection Authority, the General Directorate of Health and the National Health System increased, the capabilities of the Armed Forces became clearer. In other words, once the four areas of action of the Armed Forces were identified, the response to the crisis became more evident, and civil entities were able to make requests suited to military capabilities. There are also opportunities that can be explored to enable and strengthen coordination, such as L-IoT, a concept that is discussed in Section 2. However, IoT technologies were not identified in civil-military cooperation in Portugal. The use of L-IoT could be carried out within the scope of real-time data demand management, in order to respond to sudden and highly personalized requests depending on the evolution of the disease and the new variants of SARS-CoV-2. Thus, from a practical and logistical management perspective, L-IoT could be used by Permanent Crisis Cell, JLC and MCC.

5. Conclusions

With the present research it was possible to ascertain that the civil-military logistical cooperation within the scope of COVID-19 takes place in the four main logistical domains mentioned above.

The identified phases followed a logical sequence, starting with strategic logistics, where the planning and organization of the Armed Forces fulfilled the logistical mission of supporting civil entities, for which is highlighted: (1) the Armed Forces recruitment program; (2) the permanent crisis cell, which had the objective to coordinate the support actions of the three branches of the Armed Forces; and the (3) Joint Logistics Center (JLC) and the Movement Control Center (MCC), which allowed adequate response to all the requests from the civilian entities in the context of COVID-19 pandemic.

At the operational level, priority, coordination and distribution activities were defined. To this end, support was provided in terms of personal protective materials and alcohol gel, which made it possible to respond to the needs of Portuguese institutions at a time when these products were scarce. Additionally, the Armed Forces also ensured the distribution of products in accordance with the priorities defined by the JLC.

At the tactical level, the Portuguese Armed Forces started to incorporate operational missions of direct support to society, within the scope of specialized activities of disinfection and capacity to hospitalize patients. Finally, and with the objective of guaranteeing the self-sustainability of civil institutions, the Armed Forces also developed a set of awareness and training actions in the field of hygiene, cleaning and self-protection.

In my understanding, the Armed Forces logistical support in every member-state of the European Union (EU) is very similar. Notwithstanding, it was considered necessary to carry out in-depth research that would make it possible to analyze the measures across all member states.

Thus, due to the exploratory nature of this research, the generalization perspective is still limited. The issue of generalization can be addressed with more comprehensive research that allows us to understand how civil society is supported by the Armed Forces in crisis situations not directly related to SARS-CoV-2. In other words, it may be useful to compare past health crises, assessing the type of logistical support provided by the military and its degree of innovation.

The Armed Forces of Southern European countries became unpopular due to budgetary restrictions imposed by the troika, which forced society to think about restructuring the Armed Forces. My opinion is that the acceptance of the Armed Forces has been strength-

ened during the COVID-19 crisis, largely due to its high contribution to society. Therefore, it may be useful to carry out further research into the impact of the pandemic on the acceptance of the Portuguese Armed Forces. As this article has several abbreviations, acronyms, initials or symbols, it was decided to add an appendix (Appendix A) that improves the readability of the article.

Appendix A

Table A1. List of Abbreviations, Acronyms, Initials and Symbols.

Abbreviation, Acronym, Initial or Symbols	Meaning	Page Where It Appears for the First Time
NHS	National Healthcare System	1
RQ	Research Questions	2
US	United States	2
OpLog	Operational Logistics	3
DGS	Directorate General of Health	4
ANEPC	National Authority of Emergency and Civil Protection	5
EMGFA	General Staff of the Portuguese Armed Forces	5
JLC	Joint Logistics Center	5
LM	National Laboratory for Medicines	5
LMPQF	Military Laboratory of Chemical and Pharmaceutical Products	5
MCC	Movement Control Center	5
PPE	Personal Protective Equipment	7
DCBRNC	Defense Chemical, Biological, Radiological and Nuclear Center	7
CAM	COVID-19 Military Support Center	7
EMSM	Emergency Military Support Module	7
HFAR	Armed Forces Hospital	7
HFAR-PL	Armed Forces Hospital—Lisbon Hub	7
EU	European Union	9

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