Promoting Compliance to COVID-19 Vaccination in Military Units

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ABSTRACT

Background:
On December 27th, 2020, the Israeli Defense Forces initiated a mass COVID-19 vaccination campaign aiming to vaccinate its personnel. This population upheld specific characteristics in terms of age and sex, lack of significant comorbidities, and a general scarcity of risk factors for sustaining a severe COVID-19 illness. We present the measures taken to increase vaccination compliance, and the vaccination rate that followed these actions. Our secondary goal was to compare between vaccination rates in frontline battalions and highly essential military units (group A) and rear administration and support military units (group B).

Methods:
This was a retrospective review that included 70 military units that were composed of 18,719 individuals of both sexes, mostly free of significant comorbidities. We divided the challenges of maximizing vaccination rates into two main categories: vaccine compliance (including communication and information) and logistical challenges. We compared the vaccination rates in groups A and B using a multivariable linear regression model. A *P*-value of .05 was considered significant.

Results:
The mean age in 70 military units was 22.77 ± 1.35 (range 18-50) years, 71.13% males. A total of 726 (3.88%) individuals have been found positive for SARS-CoV-2 between March 1st, 2020 and February 18th, 2021. On February 18th, 2021, 54 days after the vaccination campaign was launched, 15,871 (84.79%) of the study population have been vaccinated by the first dose of Pfizer COVID-19 vaccine, expressing an 88.21% compliance rate (excluding recovered COVID-19 cases who were not prioritized to be vaccinated at this stage). Vaccination compliance in military units from group A was found to be higher when compared to group B ($P < .001$), leading to a 90.02% of group A population being either previously SARS-CoV-2 positive or COVID-19 vaccinated.

Conclusions:
A designated army campaign led by a multidisciplinary team could rapidly achieve a high COVID-19 vaccination rate. The information presented can serve organizations worldwide with similar characteristics that plan a mass COVID-19 vaccination campaign.

INTRODUCTION

The COVID-19 pandemic posed a threat to military forces worldwide.[1–4] This highly infective disease spread in enclosed and crowded military camps and lead to both illness and high scales of quarantined personnel that could significantly harm the available and active manpower.[5–8] Between March 1, 2020 and February 18, 2021, thousands of the Israel defense force (IDF) personnel have been found positive for SARS-CoV-2 by a nasopharyngeal swab polymerase chain reaction (SARS-CoV-2 positive) and tens of thousands work days have been lost because of quarantines following exposures to positive SARS-CoV-2 cases. The pandemic significantly changed the crowded military camp daily life, including a shift to working in divided capsules, social distancing restrictions, and hygiene regulations.[1]

On December 11th, 2020, The U.S. FDA issued an emergency approval to use Pfizer COVID-19 vaccine.[9] This action launched a mass vaccination campaign: by February 18th, 2021, about 40% of the Israel population had been vaccinated by the first dose of the vaccine (out of two). On December 27th, 2020, the Israel Defense Forces initiated a mass COVID-19 vaccination campaign for its personnel. This population upheld specific characteristics in terms of age and sex distribution, lack of significant comorbidities, and a general scarcity of risk factors for sustaining a severe COVID-19 illness.[1,10] Many also lived in crowded surroundings, which increased the risk for COVID-19 spread.[11,12] The measures taken to promote vaccination adherence among soldiers were therefore tailored fit and included a combination of organizational efforts and local initiatives.

In this article, we present the measures taken to maximize vaccination compliance among military personnel. Since we suspected that military units of different nature, aim, and motivation levels differed in vaccination compliance,[13,14] our

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secondary goal was to compare vaccination rates in frontline battalions/highly essential military units (group A) and rear administration and support military units (group B). We find great importance in sharing our preliminary experience with medical organizations that are currently facing similar challenges.

METHODS

This was a retrospective review. The study granted an IDF institutional review board waiver. The study population included all 18,719 individuals who served in 70 military units that have been allocated to three vaccination stations and were representative of the IDF personnel. Since individuals with significant comorbidities (such as diabetes mellitus, various hereditary diseases, handicap, and other pathologies) have been released from the compulsory military draft, the study population was basically healthy. We collected the vaccination rates, cumulative rate of SARS-CoV-2 positive cases, and the distribution of age and sex in each military unit. We divided military units according to their orientation and missions to frontline combat units/highly essential military domains, and rear administration and support units.

We divided the challenges of maximizing vaccination rates into two main categories: vaccine compliance (including communication and information) and logistic challenges of delivering the vaccine to those wishing to be vaccinated (Fig. 1). The first principle established was personal and commanders' responsibility. Carrying out the vaccination has been stated

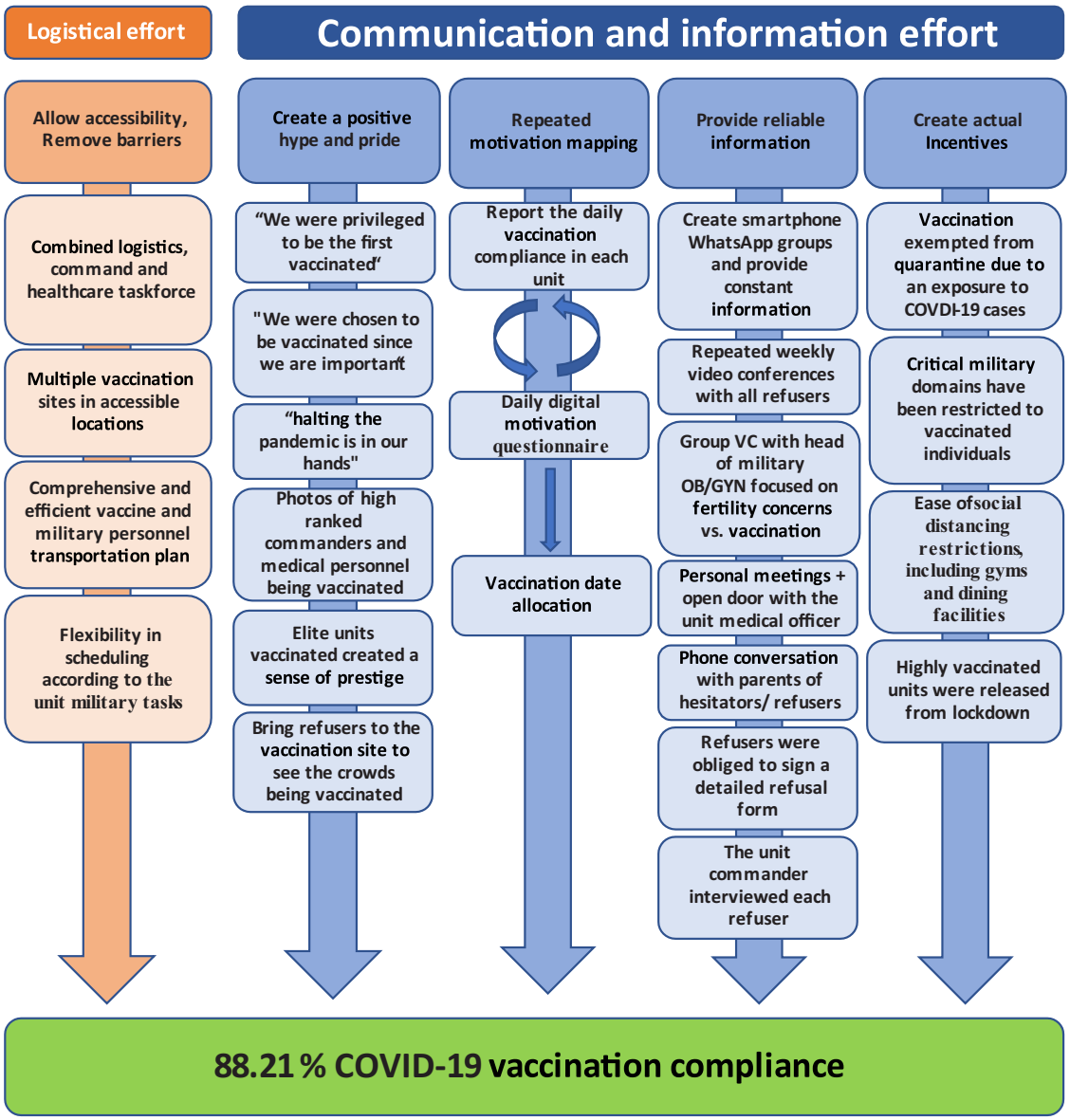

FIGURE 1. Actions taken to maximize COVID-19 vaccination rates among 70 military units ($n = 18,719$ individuals) in the Israeli defense force, and the vaccination rate achieved 54 days after the vaccination campaign was launched.

as an expression of a person's responsibility for their own health and for their human environment, and of the commanders' responsibility for their unit. The second principle was to manage the vaccination effort as any other military mission, mainly in terms of methodology and execution. The goal was to reach a 100% vaccination rate, and the missions and policies were all set in light of this target. Daily vaccination rate bars were set, and vaccination rates were controlled and reflected to medical officers and commanders.

Communication and Information

Before the vaccination campaign initiation, a designated commanders WhatsApp group was launched in each military unit. On this group, medical officers transferred reliable information about the vaccine and created expectations toward it. The information ranged from academic articles to concise text messages, which allowed commanders to confer the information to their subordinates.

Group counseling meetings were led by medical officers and commanders. These sessions were aimed to offer information about the vaccine and address questions and concerns. The unit medical officers (mostly military surgeons) led the meetings along with the unit commander so that soldiers could feel comfortable and assured while speaking with a familiar professional who they trusted. Medical officers were instructed to recognize concerns, and act in an acceptable manner. They addressed concerns while keeping a positive approach toward being vaccinated.[15] These meetings were held approximately once a week and were mandatory for all individuals who refused vaccination.

When refusal rates became scarce, medical officers conducted personal meetings with soldiers who refused vaccination in order to address specific concerns. When found suitable, commanders and medical officers also talked with soldiers' families and tried to address concerns that might have originated from the families. When a military unit was taken to the vaccination site, soldiers who refused vaccination accompanied their fellows. Peer pressure and a sense of brotherhood were expected, driving a few more individuals to be vaccinated. Although efforts were made to promote vaccination, soldiers were never ordered or forced to be vaccinated. This action would have been illegal, unethical, and unwise as it would have devastated the established sense of trust between surgeons, commanders, and soldiers, and would badly influence the civilian population as well.

High-ranked commanders, medical personnel, and elite military units were the first to be vaccinated. This policy was set to protect essential military personnel from being disabled because of COVID-19 and also to promote vaccination compliance by setting an example. Commanders and medical officers proactively made their vaccination public, leading the way for their subordinates and expressing their sense of trust in the vaccine. The fact that elite units were vaccinated first added to the sense of prestige for the vaccination process.

Since the vaccination campaign had been launched at the midst of a national surge of COVID-19, frontline units were put under lockdown. Only soldiers in units that reached a vaccination rate of 85% and above were allowed to leave the units and take a home vacation, assuming that even if exposed to a SARS-CoV-2 positive person, they were less likely to be ill or to cause a disease outbreak when returning to their units. Moreover, social distancing restrictions that influenced daily living were eased in highly vaccinated units. This included opening of dining facilities and gyms and allowing assemblies in meeting rooms. Highly essential domains, like operational rooms, were restricted to vaccinated personnel only. These benefits were assumed to act as incentives for both being vaccinated and promoting vaccination by commanders.

The Logistical Challenge

The logistical effort was carried out under the leadership of a superior administrative assistance commander. A few vaccination sites were established in accessible locations, and a vaccination schedule that distributed specific units to their closest vaccination sites was assorted. These sites were under the direct responsibility of the relevant local command, which allowed perfect coordination. A comprehensive transportation plan was designed to carry soldiers from their units to the vaccination sites and back, allowing a maximal vaccination productivity on those sites while accommodating to the regular military tasks. The operation was designed under the principle of removing any logistical barriers and maximizing accessibility.

The human resource (HR) officers tracked the vaccination rates and compliance in each unit. A designated digital platform was used to collect data: each soldier completed a questionnaire regarding their motivation to be vaccinated. The HR officers collected this information and allocated specific vaccination dates for each unit accordingly. In addition, they published a daily report that included the vaccination rate for each unit. On top of allowing a real-time management tool for commanders, it facilitated a competition atmosphere between units. Individuals who have been found positive for SARS-CoV-2 at any stage of the pandemic were considered comparably immune against the disease.[16,17] Therefore, they were underprioritized and not vaccinated at the first stage of the vaccination campaign.

Statistical Analysis

Data collection and analysis was conducted with SPSS 27.0 software (Chicago IL). Descriptive statistics were used to present raw data. We calculated the weighted average for age and sex distribution in groups A and B, accounting for each unit size. These were presented as the mean of means in each unit, pointing at the unit level rather than individual subjects. The vaccination rate was calculated as the number of individuals who have been vaccinated, divided by the number of individuals in the same military unit. The vaccination

compliance rate was calculated similarly, excluding individuals who have been previously found positive for SARS-CoV-2 from the denominator. The actual size of each unit could not be published because of security restrictions. We used a Chi-square test to compare categorical variables, and a student *t*-test to compare continuous variables. A multivariable linear regression analysis modeled vaccination rate in each military unit against the unit type (group A or B), the mean age, and the rate of male individuals. Since individuals who have been previously found positive for SARS-CoV-2 were not vaccinated, the rate of these individuals within a unit had an inherent negative correlation with vaccination rates. This variable was, therefore, excluded from the multivariable analysis. A *P*-value of .05 was considered significant.

RESULTS

A total of 18,719 individuals in 70 military units were included in the study. The mean of the mean age in each of the 70 units was 22.77 ± 1.35 (range 20.65-25.43) years, 13,290 (71.13%) were males. The youngest participant was 18 years old, and the oldest was 50 years old. On February 18, 2021, 52 days after the vaccination campaign was launched, 15,871 (84.79%) of the study population have been vaccinated by at least the first of the two Pfizer COVID-19 vaccine doses, expressing a compliance rate of 88.21%. Since 726 (3.88%) of the individuals in the study population have been previously found positive for SARS-CoV-2, a total of 16,597 (88.66%) of the study population have been subsequently considered to be SARS-CoV-2 immune, or on the verge of immunity if did not complete a week from the second vaccine injection.[18]

A total of 12,642 (67.54%) individuals served in 26 frontline combat units and essential military domains (group A) and 6,077 (32.46%) individuals served in 44 rear administration and support military units (group B). Group A was composed of units with a slightly lower mean age and a greater male predominancy ($P < .001$) but similar cumulative SARS-CoV-2 cases rates ($P = .677$, Table I). The vaccination rate in group A was found to be higher than in group B ($P < .001$, Table I, Fig. 2). A multiple linear regression that modeled the COVID-19 vaccination rate in each unit against unit type, mean age, and rate of male individuals was found to be statistically significant, although only 19.2% of the variance could be explained by the independent variables [$F(3,66) = 5.221$, $P = .003$, $R^2 = 0.192$]. The unit type added statistically significantly to the prediction (B = 0.118, 95%CI 0.039 to 0.196, P = 0.004), while the mean sex distribution and the mean age did not (B = −0.109, 95%CI−0.286 to 0.068, P = 0.222 and B = 0.004, 95%CI−0.021 to 0.029, P = 0.753, respectively).

DISCUSSION

In this article, we summarized efforts taken to promote COVID-19 vaccination among young adults who served in military units, aiming to address the COVID-19 threat on the individual wellbeing, and on national security. The presented measures have been led by multidisciplinary teams that included commanders, medical officers, logistics, and HR professionals. In previous surveys in various countries that have been conducted before vaccine accessibility, it was found that 47.2%[19] to 78%[20] of populations of similar age declared that they were likely to be vaccinated.[13,20–23] In this study, we documented a 88.21% compliance rate to COVID-19 vaccination. To the best of our knowledge, this is the first report on an actual vaccination compliance among the military population.

History has taught us that vaccines have been an essential tool in halting pandemics.[24] Notable examples include smallpox, polio, measles, and many veterinary diseases.[24] Following the development and approval of effective vaccines consecutive actions must be taken to promote adherence and increase accessibility.[24–26] Inadequate and unstable vaccination uptakes can hinder and prevent communities from uprising and defeating pandemics despite an available solution. Successful promotion and encouragement requires a multidisciplinary approach that utilizes media, social sciences, marketing, and interpersonal relationships.[27] Schoch-Spana et al.[25] outlined the steps required to encourage vaccination in the population: collaboration with social science experts, transparency and expectations adjustment, accessibility to

TABLE I. Descriptive Statistics of 18,719 Individuals Who Served in 70 Military Units

Variable	Group A (*n* = 26 units, 12,642 individuals)	Group B (*n* = 44 units, 6077 individuals)	Total (*n* = 70 units, 18,719 individuals)	*P*-value
Age (years, mean ± SD[b], range)	21.42 ± 0.38, 20.65 to 22.29	23.3 ± 1.1, 21.14 to 25.43	22.77 ± 1.35, 20.65 to 25.43	<.001
Sex (% male, mean ± SD, range)	82.82 ± 17.42, 39 to 95	64.64 ± 9.59, 41 to 80	71 ± 16.03, 39 to 95	<.001
SARS-CoV-2 positive rate[a] (mean ± SD, range)	3.59 ± 2.04, 0.66 to 9.86	4.46 ± 3.51, 0 to 11.9	3.88 ± 3.12, 0 to 11.9	.677
Mean vaccination rate in each unit (mean ± SD, range)	86.42 ± 3.06, 80.14 to 91.73	81.39 ± 11.67, 34.28 to 94.28	84.79 ± 10.33, 34.28 to 94.28	<.001

[a]Cumulative.
[b]SD=Standard Deviation.

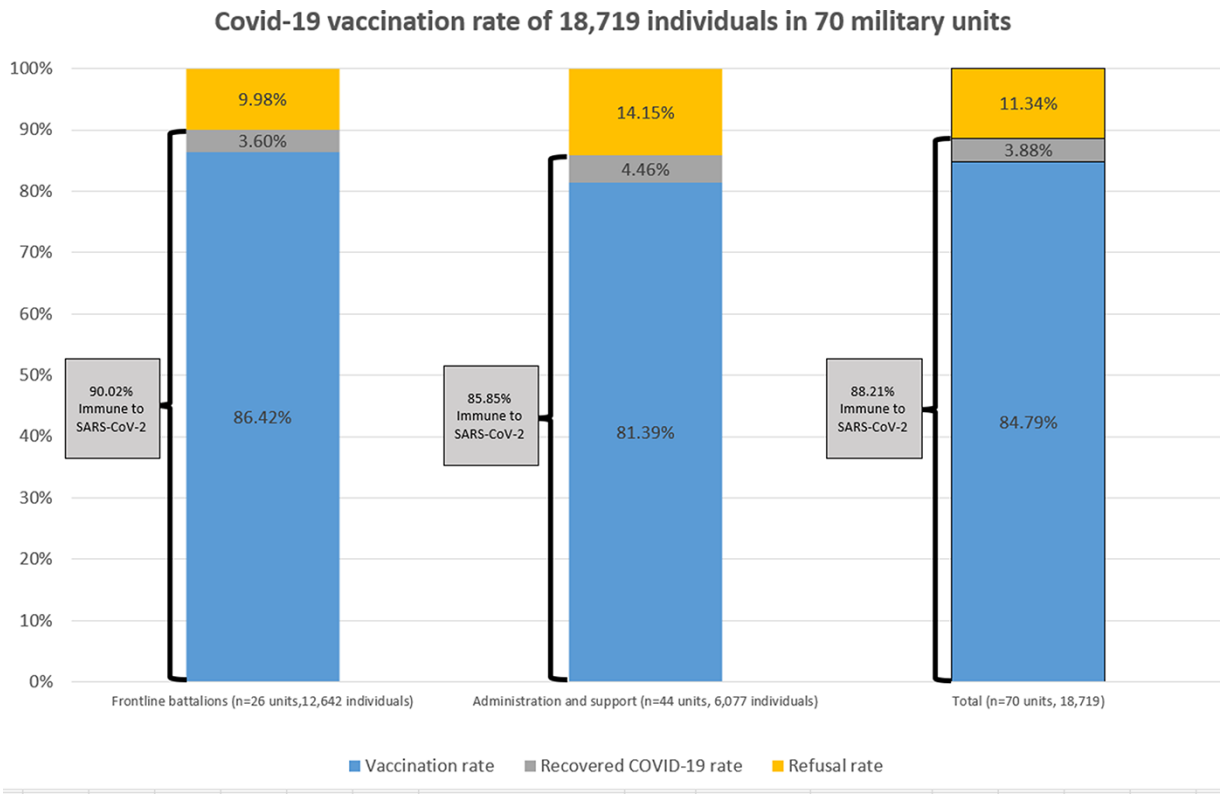

FIGURE 2. Covid-19 vaccination rate in 70 military units (18,719 individuals) in the Israeli defense forces.

information, rumors refutation, cooperation with celebrities and public figures in various sub-communities, increasing accessibility of the vaccine and creating a sense of ownership of the process. We translated these principles into actions that suited the military.

The motivation for being vaccinated is not dichotomous but can rather be categorized to different vaccination impetus or refusal levels.[27,28] People refuse vaccination because of various reasons that are often associated with culture, prior beliefs, community leaders influence, family perceptions on modern medicine, personal demographic characteristics, and health status.[13,14,20,21,27,29] The introduction of a novel vaccine based on mRNA technology further increased hesitancy because of safety concerns.[19] We noted differences when comparing two types of military groups: The first group (A) included frontline battalions and units in highly essential military domains which have been involved with more prestige and somewhat exclusive missions; the second group (B) included rear administration and support units. Individuals of the first group were more compliant with vaccination, compared with the second group (Table I and Fig. 2). An individualized analysis of personal risk factors for a lower vaccine acceptance was beyond the scope of this article. Nevertheless, these findings are in line with previous surveys that presented a lower level of trust and vaccine acceptance by different populations.[13,14,22,26]

Pre-vaccination consultation meeting were tailor fitted to the military personnel. The current study population had been composed of grossly healthy young adults of both sexes. Similar populations were found to be worried about the health implications of COVID-19 on their older family members and friends[30] but felt relatively resistant to COVID-19 and did not consider their personal wellbeing at risk.[13,31] We also assumed that young adults would be interested in gaining back the ability to perform social encounters[30,32,33] and that they would be troubled about their future,[30] including limitations on international travel,[34] limited ability to gain a profession under lockdown,[30,33,35] and scarcity of available occupation opportunities for young and unqualified veterans.[33,36] Upon consultation meetings, we faced concerns from female individuals about the false association between COVID-19 vaccine and infertility.[13,20–23,37–39] In this study, military units with a higher rate of females achieved lower vaccination rates, although this variable was statistically insignificant. When discussing COVID-19 health-related risks, we focused on long-term possible implications of post-COVID in young people[40] rather than the acute illness[13] and presented the consequences of possible transmission of the disease to their older family members and friends.[41] We pro-actively addressed infertility-related fake rumors.[37–39] We elaborated on the implication of repeated lockdowns on the economy and society and presented the possible positive changes in all aspects

of life when the population would be vaccinated,[22] focusing on restoring retail and recreational activities, reopening universities, gaining back unlimited transportation, and retrieving many parts of the pre-pandemic social life.[13,30,32]

In the framework of military medicine, it is essential to keep in mind that commanders cannot force soldiers to be vaccinated. Such actions can harm the sense of trust that is essential in the soldier-commander-surgeon relationship. Actions that hurt soldiers' autonomy were able to provoke antagonism instead of cooperation, both inside the military and between the military and the civilian population of which soldiers are being drafted. Therefore, throughout the campaign, we made sure to state that each soldier had the right to refuse vaccination.

The logistical effort was found to be crucial in maintaining a high vaccination rate. Maximizing accessibility to vaccines has been previously found effective in increasing the overall vaccination rate without changing opinions regarding the vaccine itself.[42] Pfizer issued significant transportation restriction on the vaccine vials.[9,18,43] Therefore, we established central vaccination sites and transported soldiers to these sites, rather than vaccinate them on their camps. The logistics and HR teams assorted a joined taskforce and composed a comprehensive transportation and allocation plan. Only in cases of heavily populated military domains were we able to form local vaccination sites. This further emphasizes on the importance of careful planning and collaboration between professionals of multiple fields.

This study had several limitations. This was a retrospective study of a mainly descriptive nature. Causation between the actions presented and the vaccination rates could not be defined. The study described a specific population in a specific geographic location, and a generalization to other populations should be done with caution. This study focused on the measures taken to promote vaccination in military units, and units rather than individual subjects were compared. Accordingly, analyzing specific personal risk factors that could anticipate a lower vaccination compliance among individuals was beyond the scope of this article. We are currently conducting a successive study in which individual demographic and personal data are collected and analyzed to answer this important issue.

CONCLUSIONS

A high COVID-19 vaccination rate had been achieved in a short period following a multidisciplinary collaboration. The information presented can serve organizations worldwide with similar characteristics that are planning a mass COVID-19 vaccination campaign.

Take home messages:

- A tight collaboration of commanders, medical staff, HR, and logistics professionals is essential for the success of a vaccination campaign.
- A sense of trust between military personnel, commanders, and medical staff should be obtained to promote a positive atmosphere towards vaccination. This can be achieved by a using multiple communication means, and a high level of transparency and self-example of all involved.
- Actual incentives for vaccination can be tailored fitted to military units and specific military professionals in order to promote vaccination motivation.
- Vaccine availability for those wishing to be vaccinated is essential and includes efficient transportation and scheduling platforms and accessible vaccination sites with a friendly and professional medical staff.

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CONFLICT OF INTEREST STATEMENT

None declared.

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