Humanitarian Aeromedical Retrieval using a Long-Range Commercial Aircraft: A Field Report

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Abbreviations:
AREU: Agenzia Regionale Emergenza Urgenza [Regional Emergency Agency]
CROSS: Centrale Remota Operazioni Soccorso Sanitario [Remote Health Care Operations Center]

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Specific Event Identifiers

a. Event Type: Conflict (Russia-Ukrainian War)
b. Event Onset Date: February 24, 2022
c. Location of Event: Milan, Italy and Lublin, Poland
d. Geographic Coordinates in Latitude, Longitude, Elevation: 45°28′01″N 09°11′24″E and 51°15′N 22°34′E
e. Dates (or Times) of Observations Reported: April 2, 2022
f. Response Type: Humanitarian Relief

Abstract

This field report presents the planning and execution of a large-scale aeromedical refugee retrieval operation amid the on-going Russia-Ukraine crisis. The retrieval was coordinated by the Italian Department of Civil Protection and led by the Centrale Remota Operazioni Soccorso Sanitario (CROSS), a governmental facility overseeing medical assistance. An Airbus A320 was chosen for its capacity of 165 passengers, with one emergency stretcher maintaining maximum seating. The aircraft was equipped with an Advanced Life Support kit, and specific considerations for medical equipment compliance were made. Special cases, including patients with on-going chemotherapy and end-stage kidney disease, underwent fit-to-fly screening. The boarding process in Lublin, Poland involved triage and arrangements for passengers with gastroenteric symptoms. Notably, 22 passengers with recent episodes of illness were isolated. The successful operation, demonstrating the viability of evacuating vulnerable individuals via commercial airlines, underscores the importance of precise planning and coordination in crisis situations.

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Introduction

The current conflict between Russia and Ukraine originated in February 2014 when Russia annexed the Crimean region from Ukraine and provided support for the pro-Russian separatists in the Ukrainian Donbass region. On February 24, 2022, the situation took a significant turn as Russia initiated a full-scale invasion of Ukraine, drawing global media attention and sparking wide-spread condemnation. As a result of this large-scale invasion, several territories in Ukraine were temporarily occupied and many health care facilities were attacked.[1,2] Since the beginning of the conflict, Italy has consistently expressed its willingness to accommodate Ukrainian refugees, resulting in a continuous influx of individuals towards regions in Italy that have a longstanding history of hosting Ukrainian workers for several years. Humanitarian organizations on the ground have prioritized individuals with clinical vulnerabilities or families with children. In the following days, with the support of numerous non-governmental organizations in the area, a growing number of people sought refuge, prompting the initiation of a humanitarian triage to determine the urgency of transfers. As soon as diplomacy allowed, foreign medical teams arrived to scout individuals in fragile conditions suitable for aeromedical retrieval. In Italy, these activities were coordinated by the Department of Civil Protection (Rome, Italy) through the Centrale Remota Operazioni Soccorso Sanitario (CROSS). The CROSS - Remote Dispatch Center for Health Emergency Operations is a governmental facility that operates in the field of emergency medical assistance. In case of necessity, the Italian Department of Civil Protection activates the CROSS to conduct reconnaissance of available regional health

Figure 1. Medical Area within the Airbus A320.

resources and to manage medical evacuation operations. To reduce reliance on ground transportation, especially considering the incompatible travel times for certain passengers, CROSS orchestrated the selection of patients and individuals deemed suitable for aeromedical retrieval. Aeromedical retrieval involves dispatching a specialized team of health care professionals aboard medically equipped aircraft to a patient's location, often in rural and remote areas, facilitating rescue and stabilization before transferring them to definitive care in another location.[3] Recent research found that, in a majority of Union Civil Protection Mechanism (UCPM) Countries, there are significant deficiencies in medical aerial capacities for patient transport during major crises, particularly in terms of lacking public fixed-wing capacities for transporting multiple patients.[4] As of now, no reports have been identified regarding mass humanitarian aeromedical retrieval or the utilization of a standard commercial airline plane for aeromedical retrieval. The purpose of this paper is to present the experience in organizing and executing the long-range aeromedical retrieval of refugees using a commercial fixed-wing aircraft amid the on-going Ukrainian conflict.

Observations

Planning

A multidisciplinary team, under the coordination of the Department of Civil Protection, was assembled to evaluate the feasibility and organize the operation. Field medical information was supplied by a previously deployed medical unit from the Confederazione Nazionale delle Misericordie d'Italia (Florence, Italy), a prominent national charitable organization specializing in health emergencies in Italy. I-HELP (Milan, Italy), a private company experienced in critical care transport and mass events management, collaborated with its partner ITA Airways (Rome, Italy), the Italian flag carrier, to assess the feasibility of providing a suitable aircraft, handling all aspects related to equipment, and coordinating human resources. Additionally, the Emergency Medical Service (EMS) agency of the Lombardy region, Agenzia Regionale Emergenza Urgenza (AREU), played a crucial role as the medical care provider and facilitated all post-evacuation medical operations, including hospital bed allocation in Italy. Both I-HELP and AREU have standardized training in mass-casualty management and significant clinical exposure to such events.[5–7]

After the field assessment, the decision was made to utilize an Airbus A320 airplane (Airbus SE; Leiden, Netherlands). The flight was authorized on the Milan-Lublin route and scheduled for April 2, 2022. The aircraft was configured with a total capacity for 165 people, including 81 children aged between one month and 15 years. Seat rows could be adjusted to accommodate one or more stretchers. In this particular situation, each stretcher necessitated the removal of six seats. Consequently, only one emergency stretcher was installed, allowing to maintain the maximum seating capacity for passengers; all the necessary items for a second one were carried in the cargo bay. The vicinity of the stretcher was arranged as an examination and emergency zone (Figure 1), fully equipped with Advanced Life Support and critical care capacity. This kit included essential equipment for advanced airway management, vascular access, surgical kits for chest drainage or surgical airway procedures, medications, two monitor-defibrillators, and a comprehensive range of medications such as antiemetics, antiallergics, antihypertensives, analgesics,

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antipyretics, and sedatives. Additionally, three extra oxygen cylinders were provided to address potential emergencies during the flight.

Specific considerations had to be made regarding the equipment brought on board: the monitors used (ZOLL X Series, ZOLL Medical Corporation; Chelmsford, Massachusetts USA), as well as the syringe pumps (B. Braun Perfusor Compact, B.Braun; Melsungen, Germany) and suction device (Laerdal LSU 4, Laerdal; Stavanger, Norway), were already compliant with air transport regulations, facilitating their swift approval for use on board. It was not possible to increase the on-board oxygen quantity as it would have exceeded regulatory and aircraft technical specifications. The medical team also arranged for blankets and pillows for each passenger, along with the availability of water and food on board.

Due to a generous private donation, toys were provided for each child on board, underscoring the belief in considering comfort care in the planning of such missions. The medical team comprised an attending anesthesiologist and a pediatrics senior resident along with two critical care nurses and 10 emergency medical technicians. Along with the medical team, the cabin was staffed by flight attendants with the usual standard airline configuration for this type of aircraft. The anesthesiologist and one of the nurses possessed extensive background in handling health crises and providing assistance to patients on air ambulances and commercial flights. The team designed the seat allocation by considering specific public health considerations. This required constant interaction between the medical team and the airline technical team. The potential presence of passengers with airborne, droplet, enteral, and physical transmissible diseases were taken into account. As a precaution, a dedicated triage for such conditions (checking for fever, vomiting, diarrhea, and dyspnea) was conducted at the aircraft entrance. All adult passengers adhered to the precautionary measure of wearing an FFP2 (N95) mask for the duration of the entire transport.[8,9]

Before departure, the on-site medical scouting team flagged the following special circumstances: 46-year-old female and 62-year-old necessitating on-going chemotherapy for pre-existing oncologic conditions; 35-year-old male with end-stage kidney disease with renal replacement therapy (required same day as departure); and 66-year-old female with new onset of ischemic stroke 48 hours before departure. Assistance with wheelchairs to the seats was organized for these individuals. Each of these patients was assigned a pre-arranged hospital bed in Italy before departure. Each patient underwent a fit-to-fly screening by the medical team on site.[10]

This intervention model is designed to safely evacuate vulnerable individuals, including the elderly, children, and those with disabilities or specific needs. Individuals selected for evacuation are selected from field teams through the SVEI form (descriptive sheet for the assessment of the immediate needs of vulnerable and disabled individuals involved in the emergency), introduced through the Italian Prime Minister's Directive on January 7, 2019. Emphasizing the importance of not leaving behind vulnerable individuals, this directive underlines the need for the emergency team to promptly respond, recognizing the potential impact on dignity and addressing both temporary and enduring disabilities or vulnerabilities. The SVEI form aims to identify specific needs among those receiving general assistance and provide tailored support accordingly. Trained nursing staff in the field are responsible for completing and submitting this form.[11]

Operations

Upon arrival in Lublin, Poland, the refugees boarded directly using the transportation provided by Confederazione Nazionale delle Misericordie D'Italia, as stated by its disability evacuation (Dis. Evac.) team, already at the border between Poland and Ukraine from the beginning of the war. Medical personnel were present at both the rear and front entrances for triage operations, while nurses, in collaboration with the flight crew, arranged individuals with gastroenteric symptoms on the right rear side of the aircraft. Those with pre-existing vulnerabilities, as identified by the scouting unit, were seated near the stretcher for continuous health monitoring (left rear side). The boarding process took approximately fifty minutes, and one more time, it required a swift cooperation between the aircraft technical team and the medical equipment to ensure aircraft weight balance guaranteeing the medical team requests.

Twenty-two passengers had experienced multiple episodes of diarrhea or vomiting in the 24 hours preceding the flight. They were instructed to remain in their seats and use only the rear right side (dedicated isolated) restroom to prevent potential contagion.

Oral rehydration was considered necessary for three children, and in an additional case (a five-year-old male), intravenous volume replacement with glucose-saline solution was administered due to severe dehydration accompanied by symptomatic hypotension. Furthermore, during the flight, a 55-year-old patient experienced psychomotor agitation, which was effectively addressed with oral diazepam. Additionally, another case presented chest pain with evidence of ventricular premature beats, and the condition was successfully treated with oral nitrates.

Upon arrival at Milan Malpensa Airport (Italy), AREU arranged for the hospitalization of refugees requiring medical care, totaling six individuals, while the remaining travelers reached their final destinations in specifically designed reception facilities using transportation provided by the Confederazione Nazionale delle Misericordie D'Italia.

Analysis

In this concise report, experiences are shared of a successful large-scale aeromedical evacuation operation conducted through a private-public partnership. The goal of this initiative was to facilitate the evacuation of refugees amid the on-going conflict between Russia and Ukraine. To date, many countries have predominantly governmental (emergency medical teams) or military response systems to humanitarian disasters.[12–14] However, the use of commercial carriers should be considered as a rescue strategy, especially to reserve dedicated means (air-ambulances) for non-ambulant patients or those requiring intensive care. Planning must be meticulous and take into account the potential evolution of clinically stable conditions, as well as the possibility of medical emergencies arising during the journey. Electromedical equipment must be fully compliant with flight regulations (adhering to standards on radio frequencies, radio emissions, and electrical safety), considering that these standards may vary from country to country. The need for electrical autonomy throughout the entire journey should also be considered, as power supply on board is not guaranteed. Careful consideration should be given to stocking oral medications that are not typically part of rescue provisions, given the plethora of non-severe symptoms that may manifest during the flight. Collaboration with the carrier is essential to ensure a proper reception for individuals coming from a situation of significant emotional and physiological stress, secondary to the unavailability of social structures and basic necessities. Lastly,

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scouting activities play a crucial role in identifying potentially complex clinical situations for which it might be necessary to increase assistance materials and the number of health care professionals on board.

Limitations

Some limitations about this field report are worth mentioning; researchers actively participating in the field may introduce bias or subjectivity during observations and data collection, potentially influencing the reliability of the findings. Moreover, outcomes from field research might not always be broadly applicable due to their context-specific nature, and the data collected may be incomplete or inaccurate, limiting the generalizability of the results.

Conclusion

The evacuation of vulnerable individuals and patients with chronic conditions using commercial airlines appears, in this experience, to be safe and feasible. Pre-defined agreements with airline companies are desirable to minimize preparation time, taking into account the time required by the relevant authorities to authorize the flight.

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