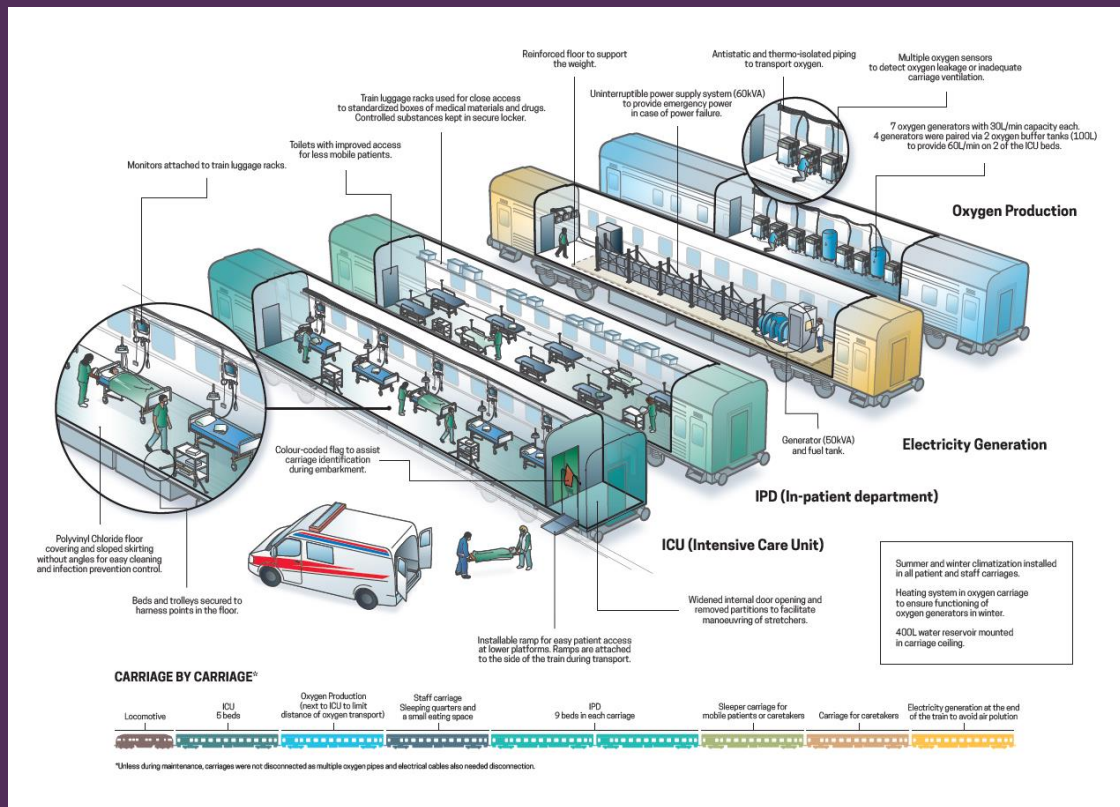




# RAMPEN MANAGEMENT



## ACADEMIEJAAR 2022-2023

### *Characteristics of Medical Evacuation by Train in Ukraine, 2022*

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## Characteristics of Medical Evacuation by Train in Ukraine, 2022

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## **Abstract:**

**Importance:** The 2022 war in Ukraine severely affected access to health care for patients in the conflict-affected regions and limited options for medical evacuation. Air transport, a common method of medical evacuation in war zones, was unsafe due to the conflict of 2 modernized military forces that were in possession of aircraft and surface-to-air weapons; therefore, Médecins Sans Frontières, in collaboration with the Ukrainian railway company and Ukrainian health agencies, addressed this by initiating medical evacuation via medically customized trains.

**Objective:** To describe the implementation of medical evacuation trains aimed at improving the access to health care for war-affected patients.

**Design, Setting, and Participants:** This case series describes the remodeling of 2 trains used for medical evacuation in a conflict zone during the war in Ukraine. The study was conducted from March 30 to November 30, 2022. One train had minimal adjustments and could be rapidly deployed to address the most pressing humanitarian needs, while the other underwent major structural modifications to provide intensive care capacity. The report details the medical capabilities of the trains, the organization of referrals, and operational challenges encountered. Additionally, it includes a case series on the characteristics of patients transported in the initial 8 months, based on routinely collected programmatic descriptive data of all patients transported by the medical trains.

**Results:** In 8 months, 2481 patients (male-female ratio, 1.07; male, 1136 [46%]; female 1058 [43%]; missing data, 287 [12%]; median age, 63 years [range, 0-98 years]) were evacuated from 11 cities near the Ukrainian conflict frontline to safer areas. Initially, the trains predominantly evacuated trauma patients, but over the course of the war, the patient characteristics changed with more medical and nonacute conditions, and fewer trauma patients. The main reason for entry into the intensive care unit train carriage was for close monitoring and observation, and the main interventions performed were primarily for respiratory failure.

**Conclusions and Relevance:** The findings of this study suggest that medical evacuation in a war zone by converted trains is possible and can improve access to health care for war-affected patients. The presence of intensive care capacity on board allows for transport of more severely ill or injured individuals. However, the target population should not be limited to trauma patients, as health care institutions affected host a much broader population whose needs and urgency for evacuation may change over time