Commercial Cruise Ship to Hospital Ship Feasibility Study

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The Department of Defense has two T-AH class hospital ships in operation, the United States Naval Ship (USNS) Mercy (T-AH-19) and USNS Comfort (T-AH-20), which were converted from oil tankers in the 1980s and are now scheduled to be decommissioned in the mid-2030s. Multiple replacement options have been presented. Cruise ships function similarly to hospital ships by constantly receiving large guest populations and supplying the necessary support capabilities throughout their stay onboard. Therefore, a cruise ship would require less modification during the conversion process than a comparably sized industrial vessel. This project was also motivated by the COVID-19 pandemic. New hospital ships could assist with pandemic response, and cruise line companies currently have increased motivation to sell their ships. This project aimed to determine if acquiring and converting a cruise ship would be a lower cost, less complex alternative to constructing a new hospital ship.

The main design requirement based on fleet feedback was that future hospital ships needed to be more expeditionary and designed with increased focus on Humanitarian Aid/Disaster Relief (HA/DR) operations. For the baseline cruise ship, the Vision class cruise ships from the Royal Caribbean Group were selected due to their smaller size, optimal speed, range, electrical capacity, and guest capacity. A 3D model was generated to better understand the space available, and 2D deck plans were generated to establish the Hospital Ship Conversion (HSC) arrangement. The HSC was equipped with a flight deck based on the LPD-17, and specialty patient elevators were added throughout the center of the ship. A wheelchair-accessible brow and converted lifeboat tenders were included to optimize patient access to the ship, and guest spaces were converted to flexible patient spaces which allowed a single ward to be used in multiple configurations based on mission needs. With these modifications, the team analyzed the ship's weight changes (which were within 0.5%), and a weight-based cost estimate was developed using the MIT cost model. From this analysis, the HSC would maintain stability, maneuvering and seakeeping capabilities comparable to the Vision class, and the total cost for the conversion of two ships was estimated around $3.1-$5.2 billion. Lastly, the team validated the proposed deck plans by analyzing patient flow paths for the most anticipated patient scenarios to ensure each arrangement minimized both the required distance traveled throughout the ship to receive care and was free of obstacles.

In conclusion, a cruise ship could serve as an effective baseline for a hospital ship conversion. Many features of a cruise ship can be repurposed or directly used in a converted hospital ship, and with the Vision class specifically, the HSC was able to utilize the existing machinery equipment, propulsion system, water production plant, crew living spaces, dry and refrigerated storage capacities, food-handling spaces and guest rooms. Repurposing so much space and equipment is uncommon for conversion projects, and using most of the original ship could help reduce the required conversion timeline by reducing the project's complexity. Therefore, converting a cruise ship to a hospital ship could have the added benefit of being less strenuous on the constructing shipyard's schedules compared to acquiring a new hospital ship. Additional areas of study and further recommendations exist, but in short, a cruise ship provided an optimal starting point for conversion to a hospital ship.

Figure 1: Vision class Cruise Ship

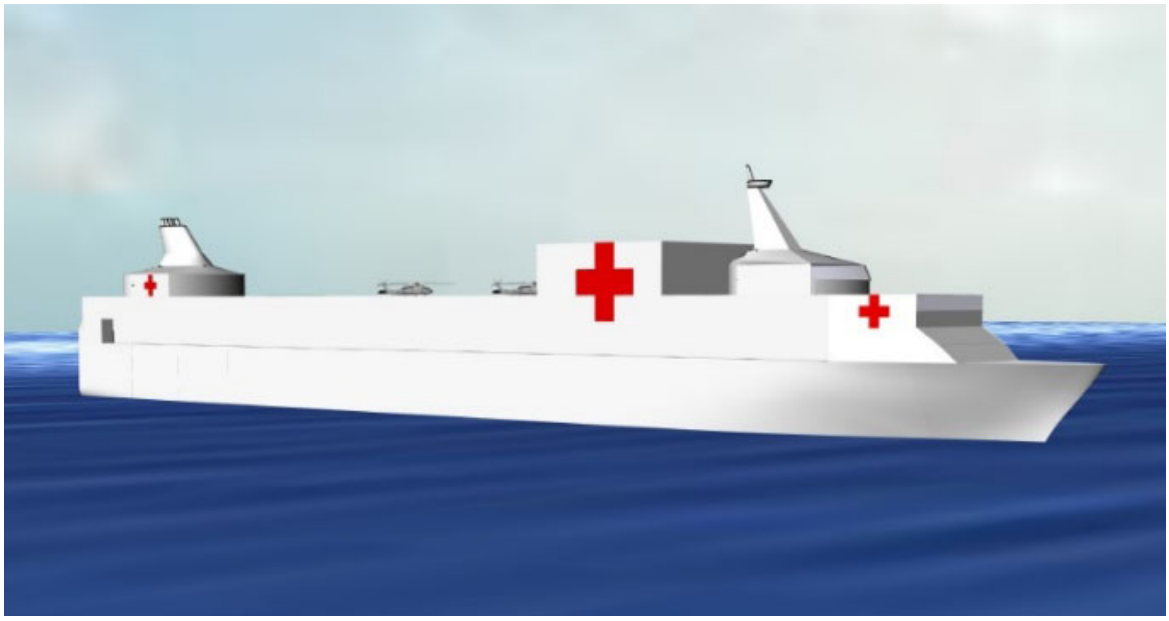

Figure 2: Hospital Ship Conversion (HSC)