

## T-AH 21 Next Generation Hospital Ship

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Future force structures envision ships and amphibious forces operating in distributed operations with disaggregated forces, while specifying a need for medical support afloat near the point of injury in the event of casualty sustainment. Current Afloat Theater Hospitalization is provided by two *Mercy*-Class hospital ships (T-AH) that have reached the end of their service life. When operationalized, their size and inflexible design precludes the ability to support Group-level transit or distributed operations.

In the Next Generation Hospital Ship (T-AH 21), an agile, scalable, surgical capability afloat meets this need by receiving, triaging, and allowing for surgery and stabilization care prior to preparing patients for transport to another location for more advanced treatment. Following the push towards distributed care, our design was for a smaller ship which allowed for a more expansive network of ships providing high quality care in remote locations.



*Rendering of T-AH 21 alongside USNS Mercy*

A robust trade space entails a variety of inputs to the maximum extent possible consisting of feasible ships or characteristics of ships that meet the project's objectives. Practical experience and familiarity with naval vessels proved essential in order to provide a useful group. The specific hull offsets were not identified, but rather their unique features associated with the hullform itself. For example, when looking at interoperability, a ship that has a well deck will score higher than a monohull without one. Once a hullform was chosen, the Rapid Ship Development Environment was used in order to perform a trade-off analysis for various independent parameters such as length, beam, stores, engine type, etc. A final, non-dominated, and cost-efficient option was chosen and further optimized during the outfitting design work.

A greater number of hospital ship points of care allowed the design to be scaled down to an operating suite of six larger reconfigurable rooms. Prior user feedback and operational lessons learned necessitated an increase and reconfiguring of the Intensive Care Unit capability, expanding the capacity beyond that of the *Mercy*-Class by almost 20%, accompanied by a corresponding reduction in the previously under-utilized limited care facilities. Under the design philosophy of

flexibility and multi-mission capability, the T-AH 21 electrical plant is a high-capacity Integrated Power System for electric-drive propulsion and power distribution. The power network accommodates medical technological increases in power consumption, while providing a high-speed transit operational capability. A major reconceptualization of the patient and passenger transfer was performed, facilitated by space for up to four boat davits, with two per side located near the waterline for expanded boat operations in heavier seas. Additionally, a primary flight deck aft with hangar space for an embarked MV-22 Osprey tilt-rotor aircraft was designed with the real option of space provisions forward for a secondary flight deck on the ship’s forecastle. Pierside care is facilitated by a “roll on-roll off” ramp capable of easily receiving high volumes of ambulatory patients or multiple ambulance vehicles.

|                           | <i>Mercy</i> -Class (T-AH 19)        | Next Generation Hospital Ship (T-AH 21)                          |
|---------------------------|--------------------------------------|--|
| LOA                       | 894 ft                               | 535 ft   |
| Beam                      | 100 ft                               | 99 ft  |
| Full Load Draft           | 33 ft                                | 25.5 ft  |
| Speed                     | 14 kts                               | 26.5   |
| Range                     | 9,000 nm                             | 10,000 nm  |
| Endurance                 | 30 days                              | 30 days  |
| Electrical Load Capacity  | 1,750 KW                             | 37.5 MW Integrated Propulsion System                             |
| Embarkation Type          | Limited rotary, surface, and walk-on | Pier vehicle, rotary, tilt-rotor, 4-boat surface transfer davits |
| Operating Rooms           | 12                                   | 6  |
| <b>Total Bed Capacity</b> | <b>1,000</b>                         | <b>497</b>   |
| CASREC Capacity           | 33                                   | 35   |
| ICU Capacity              | 88                                   | 112  |
| Intermed. Care            | 480                                  | 200  |
| Limited Care Capacity     | 399                                  | 150  |

*Comparison between USNS Mercy and T-AH 21 class*

As the Navy’s mission for maritime superiority calls for increases in distributed operations, the role and capacity that a hospital ship provides will change accordingly. The Next Generation Hospital Ship (T-AH 21) provides a fresh perspective for the new direction of Navy Medicine’s afloat care mission and delivers an affordable, producible, and effective solution for the Fleet.