

# The Future of Combat Casualty Care

## Is the Military Health System Ready?

**T**he 2018 National Defense Strategy signaled a shift in the global security environment and the nature of the threats that the United States must prepare to face in future combat operations. In contrast to the counterinsurgency or counterterrorism operations of recent years, the strategy prioritized preparations for rapidly executed, large-scale conflict between nations. Potential adversaries—such as China, Russia, Iran, and North Korea—are investing in long-range, high-precision missile systems that give them the ability to launch strikes against U.S. forces from greater distances and to cause larger numbers of casualties.

With such capabilities in the hands of U.S. adversaries, defense planners, logisticians, and senior leaders in the U.S. Department of Defense are exploring options to increase the resilience of medical support for U.S. forces in high-intensity conflict environments. One key element of that planning falls to the Military Health System (MHS), the entity responsible for both providing day-to-day health care coverage to service members, military retirees, and their families and treating U.S. forces injured in combat.

What are the ramifications of these evolving threats for combat casualty care, and is the MHS—which has been undergoing restructuring—ready to meet this challenge? The MHS has multiple opportunities to better prepare for a future conflict environment that could differ from those of recent decades. The open-source literature highlights several important considerations for the MHS:

- Are expeditionary medical treatment facilities prepared to receive the anticipated volume of casualties and offer service members the same level of care as in recent conflicts?

### KEY FINDINGS

- The Military Health System needs a resilient and responsive posture to treat combat casualties in a rapidly evolving global threat environment.
- Preparing for a potential conflict with a near-peer adversary requires understanding the likely requirements for medical care on the future battlefield—including the types of injuries and numbers of casualties—in the aftermath of an attack involving high-precision, long-range weapon systems and other advanced capabilities.
- The Military Health System can improve its combat medical support posture, but it will need to evaluate and implement a portfolio of mitigations including
  - an improved capability and expanded capacity to treat casualties at or near the point of injury
  - an agile, resilient, and global network of treatment facilities, storage sites for medical supplies, and transportation assets
  - adequate preparation for homeland support and homeland defense missions
  - a resilient industrial base for medical supplies.

- Are the services able to rapidly establish an expeditionary network of care to receive combat casualties?
- Can the current medical logistics and sustainment posture meet the requirements of a future fight?
- Is the MHS prepared to support the homeland defense mission in such a scenario?
- Does the medical supply industrial base have the capacity to meet MHS demand in the care of combat casualties?

## A Look at Casualty Care on the Future Battlefield

Over the past few decades, MHS combat care capabilities have evolved to meet medical support requirements in the Iraq and Afghanistan theaters. The MHS has developed an agile, efficient network of deployed care capable of quickly stabilizing, treating, and evacuating wounded service members, and it has successfully treated patients injured in the line of duty and limited loss of life. But this posture of medical support is based on patient loads that were relatively light in environments where U.S. forces had air superiority that allowed them to safely evacuate patients to higher echelons of care when needed. These assumptions do not align with many aspects of the future large-scale combat operations suggested in the 2018 National Defense Strategy.

Adversary weapon systems, such as ballistic and cruise missiles, could cause damage at air bases across a combat theater and could yield numbers of blast casualties that greatly exceed those treated in recent conflicts. With large numbers of personnel wounded or killed, U.S. forces' ability to wage war would be significantly diminished. Treating injuries and ensuring that personnel can return to duty as quickly as possible will be critical to sustaining operational capability. Furthermore, the ability of deployed medical care to stabilize and treat serious combat wounds is important to reconstituting the force and ensuring its resilience over the longer term. However, preparing to treat combat casualties is only one aspect of the enhanced challenge.

An adversary with advanced weapons could directly target key infrastructure that supports military mobility—parked aircraft, runways, and fuel tanks, for example. Damage or destruction of these assets can make it difficult or impossible for U.S. forces to freely move around the battlespace and to fight back against an adversary. This contested environment can severely

degrade U.S. capacity to evacuate wounded service members or replenish urgently needed medical supplies.

In such future combat operations, large-scale streams of trauma patients and degraded availability of evacuation transport assets could quickly tax or overwhelm the capacity, capability, and throughput of deployed military medical care.

## Enhancing Treatment Options at and Near the Point of Injury

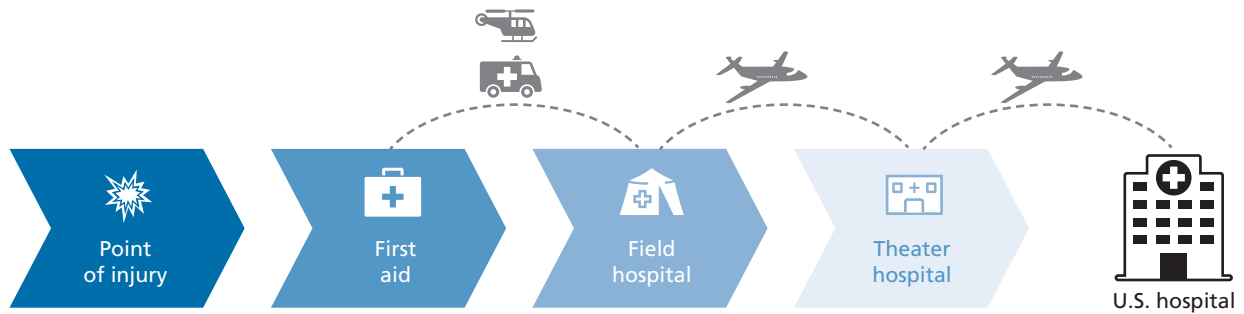
The current paradigm for medical support has at least three significant limitations under the conditions expected in future combat operations that could constrain access to high-quality care for injured personnel:

1. the capacity of field hospitals to treat and hold large numbers of combat casualties
2. the ability to rapidly triage, treat, and discharge patients through expeditionary military treatment facilities (MTFs)
3. the ability to provide high-quality care with available medical resources at MTFs.

That said, the MHS could pursue several possible mitigations to help ease constraints in one or more of these areas. For example, expanding the capacity of field hospitals to add beds, operating rooms, and critical care wards—along with the medical personnel needed to staff them—can increase patient holding capacity where it is most needed. First responder training to enhance forces' ability to provide life-saving interventions at the point of injury could improve treatment capability overall. And pairing resilient resupply mechanisms, such as autonomous drones, with triage strategies specific to mass trauma events could accelerate patient throughput—improving patient outcomes, returning service members to duty more quickly, and reducing the need for casualties to be evacuated to higher echelons of care.

Under a heavy load of trauma casualties, expeditionary MTFs will be highly resource-constrained. Given the current emphasis on the fast and efficient flow of patients through an MTF, attempts to alleviate congestion and improve care with a single mitigation strategy can lead to bottlenecks further along in the care network. For example, if first responders are able to save more lives at the point of injury, a larger number of severely wounded trauma patients will need to be admitted to already congested MTFs. Consequently, a portfolio approach of selecting multiple mitigation

Evacuation to a higher echelon of care depends on the nature of the injury, available capacity and capability, and triage strategy



strategies will be needed to improve the quality of care for combat casualties.

With hostilities expected to arise with limited warning in a future combat environment, it is important to ensure that an expeditionary care network and critical medical supplies are in place before the first wave of combat casualties requires treatment.

## Prepositioning Medical Assets

During the Cold War, military planners similarly recognized the importance of a robust network of prepositioned materiel in Europe, which ensured that needed capability could be set up in the field quickly. Prepositioning postures are nowhere near as robust today, so medical planners face the additional challenge of reinvigorating the U.S. military's global medical warehousing network. In doing so, they will need to consider, for example, what to store, where to warehouse it, and how to move it to likely points of end use.

Placing medical materiel in areas where it is expected to be used can expedite deployment and signal U.S. readiness. But there are costs associated with warehouse storage, personnel to monitor stocks, replacing supplies that expire or deteriorate, and transporting the supplies and equipment. Detailed assessment is key to balancing the pros and cons in designing a prepositioning posture and determining the most cost-effective modes of transportation to move materiel to their intended points of end use.

## Improving the Resilience of Medical Logistics and Sustainment

Medical logistics and sustainment play an important role in ensuring that service members have ongoing

access to medical support in a conflict. If the operational tempo for medical care accelerates, then logistics requirements will as well. Scaling up and adapting current approaches may not be sufficient; rather, a fresh look at the expected requirements and solutions is warranted.

Many elements of stored medical materiel have special handling and maintenance requirements, needing periodic inspection, repair, and replacement. The MHS has a range of manpower options to support these operations, such as on-site maintenance and traveling maintenance teams, but it might also want to consider the cost-saving potential of civilian and contracted labor. In determining whether and when civilian labor might be an alternative, medical planners must consider the requirements for these maintenance specialists to deploy to support contingency operations.

The MHS might consider partnering with other countries to help fill gaps in medical logistics capabilities and sustainment support and to help the U.S. military secure critical medical supplies, patient transport assets, and facilities and medical staff to treat wounded U.S. personnel. Medical logistics support relies on the ability to maintain awareness of the status of medical materiel—what assets are where, what levels of stock are on the shelf, and the condition of supplies and equipment. Reliable and enduring awareness in a contested environment requires resilient data systems and communication links.

## Preparing for Missions at Home

The MHS provides medical care to service members not only on far-away battlefields but also in or near the U.S. homeland, and these missions are no less challenging. Defending the homeland from attack is an essential national security priority. In light of adversary efforts to field long-range precision weapon systems, base opera-

tions in the Arctic have been receiving increased attention because of their importance to homeland defense. But the climate and austere geography of these locations make conducting military operations particularly challenging.

Should U.S. forces in the Arctic come under attack, the extreme climate has special implications in planning for combat casualty care—from receiving resupply shipments and evacuating patients to higher echelons of care to providing trauma care at the point of injury. Moreover, the typically small operating locations in this region tend to have small clinics and a limited number of medical staff, both of which would be difficult to scale up quickly and cost-effectively.

Moreover, casualties flowing back to the homeland—whether from the Arctic or other locations—could arrive in large enough numbers to overwhelm military treatment facilities in the United States. The country has not managed the large-scale movement of combat casualties or navigated the ensuing challenges of providing care en route and allocating space and resources for their treatment and recovery since World War II. Planning for such scenarios might require the MHS to consider new partnerships, data systems, training programs, and investments in medical equipment and materiel to limit potential shortfalls in the provision of casualty care.

## Building a Resilient Industrial Base

If the MHS must deliver medical support to large numbers of combat casualties, demand for lifesaving medical supplies could outstrip the ability of the industrial base to supply them. Under typical day-to-day conditions, the industry is widely capable of providing safe and effective drugs and supplies to care networks. However, the industry has been under significant pressure to manage costs, limiting manufacturing surge capacity and posing a particular problem when large quantities of low-cost drugs—especially generic pharmaceuticals—are needed on an emergency basis.

To overcome these challenges, firms have instituted some safeguards, such as working with international partners whose production costs are lower and carefully tailoring production capacity to match expected demands. As a result, the industrial base has a limited ability to surge production in response to a significant spike in demand.

Nonetheless, in a sudden-onset large-scale conflict scenario, it may be difficult for medical providers to secure sufficient quantities of key drugs to meet the needs of all patients. Consequently, the MHS might wish to pursue a range of mitigation strategies, such as targeting resources to incentivize industry investments in production capacity, diversifying the industrial base, and supporting international partners to enhance their quality assurance and quality control processes. Such steps can mitigate the risk of supply shortages by promoting flexibility in industrial supply chain operations.

## In Conclusion

The future threat environment as envisioned in the 2018 National Defense Strategy has significantly changed the operational view of front-line combat units and the capabilities they will need in a conflict with a potential adversary. Medical and other combat service support functions face a similarly daunting paradigm shift.

The MHS has a range of opportunities to improve its capability to treat casualties in a future fight—including mitigations to expand treatment and enable a more agile force reconstitution, resilient logistics, and robust sustainment.

It is important to recognize that no single mitigation—no “silver bullet”—will broadly improve the performance of expeditionary medical care in expected future conflict scenarios. Consequently, it will be important for the MHS to continue exploring combinations of mitigations and to assess the overall cost and performance of each portfolio. In this way, the MHS will be better able to conduct its assigned missions, ensuring heightened support to the warfighter both at home and in combat.

---

This brief describes work done in RAND National Defense Research Institute and documented in *Preparing for the Future of Combat Casualty Care: Opportunities to Refine the Military Health System's Alignment with the National Defense Strategy*, by Brent Thomas, RR-A713-1, 2021 (available at [www.rand.org/t/RR-A713-1](http://www.rand.org/t/RR-A713-1)). To view this brief online, visit [www.rand.org/t/RBA713-1](http://www.rand.org/t/RBA713-1). The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors. **RAND**® is a registered trademark.

Limited Print and Electronic Distribution Rights: This document and trademark(s) contained herein are protected by law. This representation of RAND intellectual property is provided for noncommercial use only. Unauthorized posting of this publication online is prohibited. Permission is given to duplicate this document for personal use only, as long as it is unaltered and complete. Permission is required from RAND to reproduce, or reuse in another form, any of our research documents for commercial use. For information on reprint and linking permissions, please visit [www.rand.org/pubs/permissions](http://www.rand.org/pubs/permissions).

© 2021 RAND Corporation