



Preserving Combat Power Through AI-Driven **Medical Readiness**

tagup.ai



This technology [Manifest] has been an **absolute game changer** for us. In my 20+ years in military supply, I've never seen technology that can do anything close to what you're doing.

**COMMANDER, U.S. NAVY
MEDICAL LOGISTICS OFFICER**

Introduction

Medical readiness is essential to enabling a combat-ready force. The ability to rapidly treat injuries and get service members back to the fight preserves military power and sustains operational tempo. But the medical logistics mission is challenging, facing constraints such as perishables with unforgiving stability windows, specialized storage and transport requirements, and clinically curated sets where a missing component can delay or prevent medical care. In contested, degraded, and data-sparse environments, legacy tools are unable to keep pace, creating critical vulnerabilities that threaten the lives of our service members.

To secure medical readiness and preserve combat power, the U.S. must modernize medical logistics operations with artificial intelligence (AI). Tagup's Manifest™

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platform combines human expertise with next-generation AI to optimize mission-critical supply and maintenance operations, ensuring a resilient medical supply chain that enables life-saving care in the most challenging conditions imaginable.



The Stakes of Medical Logistics

Medical logistics is the enterprise that sources, maintains, positions, and sustains Class VIII medical materiel across military and civil-support missions.

Medical logistics ensures the right medical supplies and equipment – bandages,

tourniquets, pharmaceuticals, plasma, devices, kits, etc. – are available at the point of need to enable life-saving care. Not having the right supplies available or equipment calibrated can quite literally mean the difference between life and death.

Medical Logistics during World War II: The Siege of Bastogne



Source and photo credit: Dr. Grant Harward, "Encircled at Bastogne: A Case of Prolonged Care," *Infantry Magazine*, Winter 2021, https://www.benning.army.mil/infantry/magazine/issues/2021/Winter/pdf/12_Harward.pdf.

In December 1944, U.S. forces at the Belgian town of Bastogne were surrounded by German forces, preventing evacuation and resupply and forcing prolonged care. Aid stations lacked basic medical essentials, including scalpels, antiseptic, anesthesia, and morphine, as the number of injured and sick climbed. This shortage of essential medical materiel, compounded by overcrowding and

unsanitary conditions, resulted in many survivable wounds becoming fatal. Once LTG George S. Patton's Third Army restored regular supply and evacuation of Bastogne, medical outcomes improved markedly. The siege of Bastogne demonstrates the decisive role medical logistics plays in enabling life-saving care and sustaining survivability.



The Constraints of Medical Logistics

Military medical logistics faces a series of constraints distinct from other classes of supply, posing a number of challenges for ensuring life-saving care.

Perishability

Much of the medical supply category is potency-dated: drugs, biologics, reagents, and diagnostic tests carry firm expiration or stability windows, so timing itself becomes part of readiness. Unlike most other classes of supply, these items lose clinical value over time rather than through wear-and-tear, driving two persistent risks: waste from disposal of expired medical materiel and lack of clinically effective items at the point of care.

Specialized Storage

Medical materiel often requires specialized storage: monitored cold/ultra-cold environments for vaccines and blood, safe handling for compressed medical gases, and secure vault custody for controlled substances. These conditions must be maintained across storage and transport, making temperature control, handling protocols, and custody documentation core to the logistics mission.

Clinical Specificity

Care is delivered through clinically curated sets/assemblages, where the exact item and model matter. If even one required item is missing or not clinically equivalent, the set can delay or prevent life-saving care at the point of need. While other classes of supply can accommodate substitutions, medical sets must match an approved clinical configuration to safeguard patient safety and uphold quality of care.

Environment & Instrument Sterility

On the battlefield, having the right medical materiel is not enough; units must also carry the supplies and equipment needed to create and maintain sterile environments and instruments. From in-field surgeries to infectious diseases and biological warfare, medical logistics must ensure sterilization and decontamination capability so that care can be delivered safely at the point of need.

Traceability & Safety

Pharmaceuticals and medical devices require lot/serial traceability so that recalls, hazard alerts, and safety communications can be executed rapidly and precisely across dispersed nodes. Thus, medical logistics must routinely track FDA and manufacturer alerts and direct, verify, and document actions down to specific lots/devices to protect patients, making data quality and visibility a safety issue.

Civilian Supplier Overlap

Medical supply is predominantly commercial, relying on the same vendors and distribution networks as civilian healthcare rather than dedicated military production. This overlap not only exposes military medical logistics to the same shortages, recalls, and sourcing disruptions as the private sector, but can also create competition for resources during large-scale operations or health crises.



The Readiness Gap: Medical Logistics Vulnerabilities and the Evolving Battlefield

Today's medical logistics enterprise operates on systems and workflows that are static, reactive, and disconnected. Supply and maintenance data is fragmented across siloed information systems that function primarily as data stores rather than predictive decision tools, limiting enterprise-level visibility and slowing logistics decision-making. In the absence of predictive modeling, many planning functions require manual processing and heuristics, approaches that are rarely able to anticipate real-world uncertainties such as variable supplier wait times, changes in operational tempo, and consumption rates. The result is simultaneous shortages and overstocking, which leads to suboptimal readiness levels (e.g., lack of available



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medical equipment) and significant waste (e.g., disposal of expired pharmaceuticals).

These challenges intensify on the contested modern battlefield, where logistics must persist across land, air, and sea despite adversarial attempts to disrupt its operations. Current static, reactive, and disconnected systems and workflows cannot adapt with the speed of relevance necessary to preserve combat power in a degraded and contested operational environment. The modern battlefield calls for a dynamic, proactive, and unified medical logistics enterprise, which will be delivered by AI. We developed our AI-powered Manifest platform to safeguard medical readiness on the contested modern battlefield.

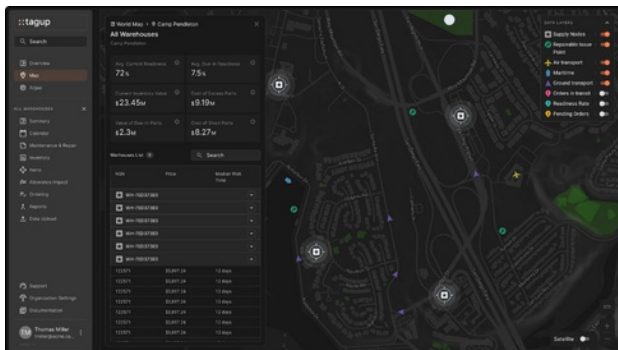


Manifest: AI for Logistics Dominance

AI-Powered Logistics Optimization

Our Manifest platform redefines logistics superiority with next-generation AI. Manifest unifies siloed logistics data and supplements that data with the knowledge of domain experts to create a comprehensive model of the logistics domain. Manifest then uses proprietary Generative Reinforcement Learning™ to simulate logistics outcomes across millions of scenarios and identify optimal courses of action across timelines and constraints.

Built and tested with the U.S. Marine Corps and U.S. Navy, Manifest supports end-to-end logistics operations across inventory, maintenance, and mobilization.



CASE STUDY

U.S. Marine Corps Medical Logistics Unit Optimizes Medical Supplies with Manifest

BACKGROUND

From civilian disaster relief to field surgical care, the U.S. Marine Corps relies on sustainment from medical logistics units to ensure delivery of life-saving care. This Marine Corps medical logistics unit manages hundreds of supply blocks, each of which comprises hundreds of NSNs.

CHALLENGE

Difficulty in forecasting consumption and replenishment rates, variable customer wait times, and sudden changes in deployment and exercise schedules led to a suboptimal readiness level below the target of 80% and disposal of millions of dollars of expired materiel each year.

SOLUTION

The medical logistics unit implemented Tagup's AI-powered Manifest platform to dynamically optimize inventory levels of medical consumables. Manifest first unified siloed logistics data and combined that unified data with intimate, on-the-ground knowledge of the defense medical supply chain. Manifest then applied Generative Reinforcement Learning to simulate outcomes across millions of scenarios, including forecasting previously difficult-to-predict logistics variables such as when ordered parts will arrive, which parts will be consumed, and which blocks are most likely to be required for future deployments.

RESULTS

With Manifest, the medical logistics unit realized the following results:

20%

reduction in
purchasing costs
*(without compromising
readiness)*

40%

reduction in
materiel handled
*(without compromising
readiness)*

13%

increase in
readiness
*(for the same level of
budget, based on
simulations)*

6%

increase in order
fill rate
*(for the same level of
budget, based on
simulations)*

Manifest for Medical Logistics

While Manifest supports all classes of supply, its optimization engine directly addresses the unique constraints of medical logistics. Manifest empowers logisticians, planners, and commanders to:

Improve operational visibility

Maintain end-to-end visibility of supplies and equipment across nodes, facilitating safety alert mapping to on-hand stock.

Right-size inventory

Optimize inventory levels at the granularity of an NSN to preserve readiness while minimizing perishables expiring on the shelf.

Anticipate replenishment

Forecast demand and supplier wait times to ensure clinical integrity of sets and predict outages before shortfalls hit medical teams.

Accelerate mobilization planning

Select the optimal mix of medical supplies and equipment for a mission in seconds rather than hours or days.

Optimize maintenance scheduling

Plan preventive maintenance, calibrations, and repairs to ensure readiness of medical equipment and devices.

Simulate contested logistics

Model impact of shocks to supply, demand, and transport (surge scenarios, supplier loss, etc.) to ensure supply chain resilience.

Manifest advances medical readiness while minimizing costs and waste, ensuring our warfighters have the essential medical supplies they need when lives are in the balance.



Conclusion

Medical logistics must preserve combat power despite inherent constraints, from perishability to specialized storage to clinical specificity. However, today's manual, reactive, and disconnected logistics systems and workflows turn these constraints into operational friction, resulting in simultaneous shortages and overstocking that threaten force readiness and mission success. This friction is a liability in any operational environment, but escalates on a contested and degraded battlefield marked by compressed timelines, dispersed operations, and deliberate disruption, making the ability to

see, model, and adapt in real-time a readiness requirement.

Manifest delivers the integrity, adaptability, and resilience the U.S. medical supply chain needs on the modern battlefield. Manifest has been proven to enhance medical readiness in real-world operational environments, ensuring our forces have the supplies and equipment they need to save lives. Manifest does not simply safeguard U.S. logistics capability, but sets a new standard in logistics superiority for an asymmetric advantage on the modern battlefield.

About Tagup

Tagup is a Boston-based defense technology company founded at MIT that is redefining logistics superiority with next-generation AI. The company's platform, Manifest, combines human expertise with proprietary Generative Reinforcement Learning to optimize complex, high-stakes decision-making, delivering a decisive operational advantage in contested, degraded, and data-sparse environments.

For more information:

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