# Army Medicine's Critical Role in Large-Scale Combat Operations Enable the Force

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Recent corps-level Warfighter exercises focused on large-scale combat operations (LSCO) consistently produce fifty thousand to sixty thousand casualties per one hundred thousand personnel, of which ten thousand to fifteen thousand were injured but able to return to duty (RTD).<sup>1</sup> The impact on combat operations is clear—without effective medical support accomplished through lifesaving point-of-injury care, evacuation, treatment, and the maximized RTD of casualties, maneuver units will not maintain the initiative required to fight and win on the future multi-domain battlefield.

Army medicine represents a critical combat multiplier by applying health service support and force health protection functions. These enable the operational force through medical command and control (C2) designed to clear the battlefield of wounded and maximize RTD. Unencumbered and reconstituted maneuver units seize, retain, and exploit the operational initiative more effectively. As the Army continues its focus on multi-domain operations (MDO) against near-peer threats, Army medicine must continually refine its combat-enabling supporting functions.

Army medicine's immense success during recent limited contingency operations, a testament to the professional application of the art and science of operational medicine, will be tested in future highly contested MDO environments by the volume of casualties. The U.S. Army Surgeon General, Lt. Gen. Raymond Dingle, concurs: "LSCO may result in a significant increase in casualties from what [the] DoD experienced during our wars in Iraq and Afghanistan."<sup>2</sup> He continues to describe how medical and maneuver operations will have to change in LSCO "due to the sheer number of patients presented. In recent conflicts, when a unit sustained a casualty, the unit's mission became focused on evacuating that casualty. In LSCO, that may not be an option."<sup>3</sup>

Army medicine must continue to modernize in alignment with the needs of the operational force. LSCO against a near-peer adversary will undoubtedly create challenges unseen since World War II in terms of casualty volume and the corresponding stress on the Army health system as part of the globally integrated health system (GIHS). The Army health system requires biodefense capabilities (infrastructure, equipment, and procedures) able to protect, detect, diagnose, and treat soldiers affected by biological hazards including endemic and man-made biological threats. An effective health surveillance capability supports operational objectives and will enable risk analysis, inform protection decisions, and guide other hazard mitigation



An air evacuation unit of the 9th U.S. Air Force is shown in March 1944 loading a soldier patient aboard a troop carrier transport in Italy to fly him to a general hospital several hundred miles away. (Photo courtesy of the National Archives)

or containment activity. Ongoing medicine modernization efforts will enable successful cross-domain maneuver. Effective battlefield clearance, maximized RTD, unencumbered semi-independent operations, and optimized battlefield conditions enabled by effective medical C2 represent Army medicine's critical LSCO role on an MDO battlefield.

### Enable the Operational Force— Clear the Battlefield

The December 1944 Battle of the Ardennes illustrates the challenges LSCO presents where the operational environment (OE) shifts, causing limitations in providing medical logistics (Class VIII), treatment, and medical evacuation (MEDEVAC) for many casualties. Early in the battle, U.S. Army medical battalions and their corresponding clearing companies struggled to clear the battle wounded and execute retrograde operations. Due to immediate threats, many units sacrificed equipment to evacuate the wounded, while other units cared for wounded in place while German forces overtook their positions.<sup>4</sup> As the German army converged on the northern edge of the Bulge, the 618th Clearing Company exemplified the use of nonstandard evacuation by effectively transporting nearly one hundred casualties using leveraged space on passing trucks as platforms of opportunity casualty evacuation (CASEVAC) assets.<sup>5</sup> Closer to the communication zone, large medical units such as the 4th Convalescent Hospital dispositioned over 1,400 patients in preparation for retrograde movement.<sup>6</sup> Later, as the battle focused on Bastogne, main supply and evacuation routes became unavailable to frontline medics and medical treatment companies, necessitating prolonged care within the unit-level Role 1 and the area support Role 2 medical treatment facilities (MTF).<sup>7</sup> Medical units,

augmented by small surgical teams, created makeshift field hospitals that provided minimal lifesaving care to conserve Class VIII medical supply and sustain lifesaving treatment. In all, the makeshift hospitals admitted over 960 patients and returned to duty numerous others during the eight-day siege of Bastogne, while the total personnel admitted to 1st and 3rd Army hospitals during the Battle of the Ardennes topped 148,000.<sup>8</sup>

As with the Battle of the Ardennes, the future LSCO environment will possess challenges to flexibility and mobility coupled with a large volume of casualties. Medical personnel will experience intermittent air and ground evacuation with medical logistics constraints. Due to contested domains, medical units at echelon will hold and care for casualties for extended periods. This inevitability requires a ground-up look at medical capabilities beginning with the combat medic who provides organic and area medical support to maneuver units. The combat medic is responsible for the immediate life-saving measures necessitated by combat trauma. Combat medics are responsible for the wealth of disease and nonbattle injury prevention measures, combat and operational stress preventive measures,

casualty collection, and support of MEDEVAC

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to MTFs.<sup>9</sup> The medic, unaided or in support of the physician or physician assistant, represents the first medical person who provides tactical combat casualty care in the contested OE.

The last seventeen years of battlefield experience, empowered by U.S. multi-domain dominance, enabled a medical support concept where air and ground evacuation assets transport urgent and urgent-surgical casualties to MTFs that provided resuscitation, initial wound and damage control surgery, and postoperative treatment within one hour of injury, and in many occurrences, in far less time.<sup>10</sup> However, with contested air and ground movement along with increased lethality associated with emerging weapon systems, casualties in future LSCO will require critical care for more prolonged periods. The increase in medical complexity and volume will necessitate enhanced skills at the tactical combat-medic level to facilitate resuscitative care and monitoring as far forward as feasible and extended throughout the roles of care.

Combat medic knowledge, skills, and behaviors must address the additional performance measures required of prolonged care: (1) enhanced patient monitoring, (2) enhanced resuscitative measures such as whole blood administration, (3) manual and mechanical ventilation, (4) enhanced pharmacological pain treatment, (5) enhanced physical exam and diagnostic procedures, (6) enhanced wound care, (7) nursing measures, (8) life- and limb-saving surgical interventions, (9) proficiency with synchronous and asynchronous telemedicine capabilities, and (10) the ability to prepare casualties for evacuation.

The U.S. Army Medical Center of Excellence is creating an education and training program to address emerging requirements in the form of the Combat Medic Program of Instruction (POI) update. The future medic will graduate from the Advanced Individual Training course with validated baseline competence to provide additional far-forward medical capability to mitigate the lethality associated with LSCO. The influx of newly graduated enhanced medics into the operational force will create a knowledge and performance gap between new medics and those who graduated under the previous POI. The development of a Master Medic course with a corresponding additional skill identifier for graduates is underway to address this gap. Graduates of the Master Medic course will train legacy POI medics to the enhanced standards to increase the combat effectiveness of the nearly thirty-five thousand combat medics throughout the Army. The master medic trainer will be responsible for the brigade combat medic training plan. As the skill-level-twenty tasks are currently a unit responsibility, the master medic trainer will leverage the most up-to-date performance measures to inform the unit training plan and drive the overall medical perforreport, Preparing for Large-Scale Combat, LSCO presents dilemmas for commanders and overwhelms organic ground and air ambulance MEDEVAC capabilities. As the volume of injured will stress these capabilities, commanders in preparations must build a robust casualty evacuation training plan that maximizes the use of non-standard vehicles for CASEVAC, along with Ambulance Exchange Points placed far enough

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mance of his or her respective brigade. The medic of the near future will bring enhanced capabilities with "courage to conserve our fighting forces by providing medical care to all those in need."11

With air, land, and sea dominance no longer a foregone conclusion, temporary delays in MEDEVAC will significantly affect battlefield clearance and movement of casualties through the levels of medical care. Due to the lethality employed, high numbers of mass casualty events that overwhelm medical assets will extend evacuation times outside the one-hour standard, potentially increasing died-of-wound rates. Leaders will need innovation and agility, infusing historical strategies, to efficiently evacuate casualties off the battlefield. Critical thinking and higher-level medical skills are vital to maintain high survivability rates, maximize RTD rates, and allow maneuver commanders to maintain the combat power necessary to win on the modern battlefield.

In recent conflicts, rapid MEDEVAC has become a customary norm; however, during future LSCO, as with the Battle of the Ardennes, organic MEDEVAC platforms alone will not be able to support the anticipated casualty volume. Commanders will rely heavily on CASEVAC platforms to assist in clearing casualties from the battlefield. CASEVAC assets are essential to ensure a consistently available evacuation process that clears the battlefield and enables operational momentum. A significant observation from the combat training centers is a lack of adequate planning, coordination, training, and employment of unit CASEVAC. The January 2021 Center for Army Lessons Learned

forward to relieve the pressure on MEDEVAC and CASEVAC ground transport from unit-level Role 1 facilities. This training plan is essential to ensure reduced transportation times and maximized survivability rates.<sup>12</sup> Commanders must resource, plan, and routinely rehearse CASEVAC and MEDEVAC assets to expeditiously clear casualties.

Emerging technology will provide increased capacity for CASEVAC and MEDEVAC platforms. Expedient leader-follower technology will allow one soldier to lead a convoy of CASEVAC or MEDEVAC vehicles with up to nine autonomous vehicles following. This technology will substantially increase the medical team's treatment capacity by creating personnel efficiencies that allow up to eighteen trained medical personnel formerly used as vehicle drivers to shift to field MTF or line-medic duties, or to provide enhanced medic skills within a MEDEVAC or CASEVAC platform. Aeromedical evacuation formations will capitalize on favorable operational conditions by leveraging the enhanced range, speed, and airframe survivability of the future vertical lift platform, thus improving response times, increasing the coverage provided within a one-hour flight path, and ultimately increasing casualty survivability. Enhanced MEDEVAC and CASEVAC capabilities, coupled with enhanced prolonged care capability at echelon, will extend the "golden hour" paradigm into a "golden window."

Evacuation on the future battlefield requires a thorough understanding of a potentially diverse and complex OE. Joint and international forces must coordinate and distribute medical assets across the area



of operation, enabling evacuation coverage and access to expeditious medical treatment. In specific theaters of operation, the dominating terrain feature is water, complicating casualty movement and necessitating enhanced joint interoperability. Based on the Interim National Security Strategic Guidance and the continued threat within the Indo-Pacific theater, focused rehearsals of ship-to-shore and shore-to-ship casualty evacuation processes must ensure integration of joint and multinational partners.<sup>13</sup> The Army's watercraft fleet represents a current resource potentially available for the mission essential task of patient transport during joint operations.<sup>14</sup> If manned with appropriate medical personnel, the large casualty carrying capacity of these platforms is a substantial evacuation asset. When water is the dominant element preventing transport, the U.S. Air Force's aeromedical evacuation and joint forces strategic evacuation assets will be in high demand by the competing interests of logistics, personnel movement, and patient evacuation. Analysis of current joint CASEVAC platform capabilities and capacities along with joint training exercises to test the interoperability of these capabilities must continue. CASEVAC assets are essential to ensure a

Soldiers evaluate and treat casualties during a training exercise in Kabul, Afghanistan, 24 October 2014. (Photo courtesy of the Department of Defense)

consistently available evacuation process that clears the battlefield and enables operational momentum.

#### Enable the Operational Force— Return to Duty

Due to the future LSCO environment's increased operational tempo, unit dispersion, and increased lethality, Army medicine's capabilities must provide essential support where the OE requires with a focus on rapid treatment, disposition, and the return to duty of casualties. Casualties will move along two evacuation pathways designed for maximized medical readiness and efficient use of resources. The first pathway focuses the application of resources toward RTD casualties, maximizing the speed they are reconstituted back into their units and combat operations. The second evacuation pathway prioritizes casualties that require evacuation from the theater of operations due to the severity of injuries. These resource-intensive casualties will be rapidly evacuated to MTFs in the corps or higher areas, thus aligning the resourcing need of the casualty to the appropriate role of medical care without absorbing the medical capacity of forward units focused on damage control and RTD.

Medical support requires flexibility to augment capabilities at echelon as the operational conditions dictate. Area support assets such as the medical company (area support) and the brigade support medical company are 100 percent mobile and can support augmentation from forward resuscitative surgical detachments and the future prolonged care augmentation detachments to provide rapid casualty stabilization, extended care, critical enroute care, and RTD. The future division support hospital concept proposes 100 percent mobility to support mobile division operations and can move at the speed of a medical company but with enhanced surgical and critical care capabilities.<sup>15</sup> The future corps support hospital, with similar surgical and ancillary support capabilities to the current hospital center, will focus on care, treatment, and reconstitution for those casualties able to RTD within five to seven days.<sup>16</sup> The highest intertheater medical capability resides at the theater level. The theater support hospital, requiring less mobility, will prioritize medical capability and casualty volume to reconstitute forward units with soldiers ready to fight within 30 to 120 days.<sup>17</sup> Casualties on the non-RTD evacuation pathway will receive expedited transport to a GIHS definitive care facility. Since biological threats and hazards are a pervasive feature of the strategic environment for the foreseeable future, the Army must maintain and increase its biological defense capabilities to successfully prosecute MDO and LSCO.<sup>18</sup>

#### Enable the Operational Force— Support Semi-Independent Operations

Independent maneuver requires the capacity and capability to empower initiative within the confines of the OE.<sup>19</sup> Enabled by enhanced medical support, reduced visual and electromagnetic signatures, and reduced logistics demand, multi-domain formations sustain and protect themselves in isolated environments until additional support is available.<sup>20</sup> Future enhanced medical support will further empower semi-independent and independent operations through sustainment efficiencies that allow for the reallocation of resources toward forward supply chain requirements and systems that provide rapid, risk-informed decision support. The reduction of sustainment demand coupled with enhanced capabilities yields improved casualty and unit survivability with extended operational reach.

The reduction in the size and weight of medical supply improves medical unit mobility at echelon and creates capacity to meet forward unit sustainment requirements. Future medical formations will leverage emerging technologies to reduce energy requirements for temperature-sensitive medical supplies and the heating, ventilation, and air conditioning of temporary shelters and MTFs utilizing power supply systems that optimize how and when energy is produced. The reduced footprint required by future energy generators lessens the transportation support requirement and the amount and frequency of refueling. Improved medical equipment set modularity will further reduce the space required for transport. These efficiencies increase the net logistical support available to maneuvering units. Significant efficiencies also lie in the method of medical resupply. Emerging medical supply processes will leverage Expedient Leader Follower (ExLF) technology to reduce the risks associated with supply transport and the total number of personnel required for Class VIII resupply. ExLF provides scalable autonomy technology "providing the capability to conduct a three- to ten-vehicle convoy with one manned vehicle leading," reducing human requirements to provide expedient resupply.<sup>21</sup> Artificial-intelligence-enabled supply systems will efficiently target resupply based on data provided by casualties' wearable medical sensors. During mass casualty and prolonged care events, the supply systems will automatically record supply usage rates and resupply based on operational conditions.

Medical personnel will leverage medical expertise from the division, corps, theater, and continental United States (CONUS)-based support through operational virtual health capabilities. Medics trained in telemedicine will have synchronous and asynchronous reach-back capability to higher echelon medical capabilities to include CONUS-based MTFs for preventative and occupational medicine, surgery, and other medical specialties and subspecialties. The AI-enabled clinical decision support system (CDSS) device will further assist in facilitating far-forward advanced medical care performed by organic medical personnel assisting with triage, diagnosis, treatment, and monitoring of casualties. The CDSS will enable complex medical decision-making, improve casualty outcomes, improve RTD potential, and maximize the number of casualties the medical team can effectively treat. The CDSS and operational virtual health capabilities enable the enhanced combat medic to perform a broader range of public health, disease and nonbattle injury, and medical life-saving skills, maximizing the sustainment and protection functions across all formations.

The 2021 Army Biological Defense Strategy highlights the necessity for units to exercise and train operational decision-making against realistic scenarios for biological warfare attacks and outbreaks of contagious disease. Integration of research, development, test, and evaluation capabilities and subject-matter expertise is needed to enable rapid execution of responses, such as the deployment of new medical countermeasures.<sup>22</sup> This potential requirement requires medical units to develop or reinvigorate their current tactics, techniques, and procedures regarding safe and effective chemical, biological, radiological, nuclear, and explosives (CBRNE) patient management. Injuries caused by CBRNE events place a substantial demand on personnel and resources to minimize collateral exposure. This causes a temporary reduction of operational medical capabilities by extending casualty treatment times and increasing time to evacuation from the battlefield.



To view the 2021 Army Biological Defense Strategy, visit <u>https://armypubs.army.mil/epubs/DR\_pubs/DR\_a/ARN32553-SD\_04\_STRATEGY\_NOTE\_2021-01-000-WEB-1.pdf.</u>

#### Enable the Operational Force— Setting the Conditions for Battlefield Success

Army medicine experienced immense challenges during the mobilization period leading up to formal involvement in World War II. As competition transitioned to conflict and the size and scope of medical assets rapidly expanded, organizational structures required further development to support theater commanders. The future Army service component command medical C2 structure will require layered, agile, and responsive capabilities to synchronize subordinate medical command support needs with host nation, coalition, and CONUS-based civilian and Department of Defense medical resources. The medical C2 structure will support unity of effort, operational reach, freedom of action, and the endurance of the operational force through effective support of formations to clear the battlefield and enable cross-domain maneuver.

During periods of competition, the future Theater Medical Command will be responsible to the Army service component command to establish medical partnerships with joint, coalition, and host nation partners to set the conditions for effective medical support. These actions also provide an opportunity for medical capability building among strategic partners, thereby enhancing strategic messaging and the favorable view of the U.S. military among host nation and coalition partners. During conflict, the Theater Medical Command will synchronize and regulate medical operations throughout the theater. A corps-level subordinate medical C2 organizational concept, the Expeditionary Medical Command, will focus on the medical planning, coordination, and execution functions within the operational support to deep maneuver areas to include the joint reception, staging, onward movement, and integration while providing medical C2 of subordinate medical brigades providing support to their assigned division's scheme of maneuver. The medical C2 capacity at echelon provides the decisive advantage of decentralized, rapid decision-making that enable effective support to maneuver commanders.

Linked with sustainment and protection operations from the deep maneuver to the strategic support areas, the medical common operating picture (MEDCOP) will be part of the future AI-enabled, all-domain battlefield concept of operations built upon a unified, secure, and robust communications network. The MEDCOP will allow leaders at echelon to rapidly receive, organize, analyze, interpret, and display battlefield information. Leveraging the next-generation electronic health record that provides near-real time medical information from point-of-injury through evacuation to a GIHS MTF, the MEDCOP will collate data from wearable medical sensors, medical logistic utilization rates, and real-time operational variables such as evacuation timelines and conditions and biodefense status. The MEDCOP will utilize this vast array of information to generate risk-informed commander recommendations that synchronize not only Army capabilities but also those of the total force.<sup>23</sup>

#### Conclusion

LSCO will present challenges to the operational force that Army medicine must rise to meet to maintain the initiative required to fight and win on the future multi-domain battlefield. Army medicine will leverage emerging technologies to maximize battlefield clearance, medical treatment, evacuation, hospitalization, and the rapid RTD of injured personnel to reconstitute combat strength. Through a marked support requirement reduction with a simultaneous increase in force protection and life-sustaining medical capabilities, maneuver commanders will possess more resources for semi-independent operations on the future dispersed multi-domain battlefield.

Army medicine will focus all its functions within the geographical combatant command theater of operations on the readiness of the fighting force. Effective medical C2 will create the conditions for effective multimodal medical support at echelon that will mitigate a LSCO environment marked by increased lethality. Army Medicine's continual refinement will keep pace with the OE and support the warfighter as we seize, retain, and exploit the initiative across multiple domains and defend vital U.S. interests.

#### Notes

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<sup>15.</sup> Ibid.

<sup>16.</sup> Ibid.

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