



## US Army Heritage and Education Center



Analysis and Research Team

# Army Medical Capacity: Ready to Meet the LSCO Challenge?

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THE UNITED STATES ARMY WAR COLLEGE

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Jessica J. Sheets, PhD<sup>1</sup>

*In today's OE [operating environment], the reduced medical footprint forward places a high demand on en route care capabilities. Consequently, patient evacuation capabilities are even more critical than in the past and the United States Army in coordination with the other Service medical elements must integrate with lift operations, as well as with the associated capabilities of multinational forces.*

~ FM 4-02, *Army Health System*, November 2020, p. 1-8.

## Executive Summary

Large scale combat operations (LSCO) in great power competition will challenge the current Army medical battlefield treatment system. Since the end of the Cold War, force reductions and reorganizations have led to an inadequate medical force structure for handling the large number of casualties expected in large-scale combat. The Army has drastically reduced its capacity for in-theater treatment at a time when battlefield evacuation might become much harder. The air lines of communication will be contested in great power competition, complicating evacuation operations. Hospitals would need to have greater capacity—more beds, more staff, more equipment, more surgeons, more operating tables—for the mass casualties expected in LSCO. Yet, those hospitals' large footprints and plethora of supplies and personnel make tempting

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<sup>1</sup> When not an expert, surround yourself with experts. This study could not have reached the depth it did without the guidance and commentary of the following authorities in the medical field: AMEDD historians Dr. Sanders Marble, Lewis Barger, Scott Woodard, Nolan A. (Andy) Watson, and Dr. Grant Harward; Pete Kalamaras Jr., MAJ Brian Downs, and Luis Diolazo of the Office of the Surgeon General; Edward Chan at RAND and Mary Avriette of Pardee RAND Graduate School; and LTC George Barbee, COL David Boyd, and COL Craig McFarland, US Army. Special thanks also to my USAHEC colleague and fellow historian Dr. Michael Lynch for his support and astute direction.

targets for certain adversaries. Recent efforts at modernization have reduced the hospital footprint, but it has also reduced the total number of beds available.

During World War II, hospitals could be placed in relatively safe rear areas away from imminent danger. The advent of new technology and changes in the nature of warfare, however, have eliminated these safe havens, making the prospect of large-scale combat with peer adversaries even more ominous. The *Army Health System Doctrine Smart Book* (February 2020) notes in the context of LSCO combat with peer threats, “There are no safe havens to conduct medical treatment in organic support, or area support at any deployed role of care.” Army Chief of Staff, GEN Mark Milley did not have encouraging words for Congress prior to that, in 2019. A representative asked him if in future wars Soldiers could be evacuated within the golden hour. Milley acknowledged that was unlikely. He noted, “Evacuating Soldiers in high intensity combat against a potential adversary like the Russians or Chinese or even North Korea — first of all the scale and scope of casualties will be significant, really significant, and the ability to evacuate those casualties within sixty minutes.... We’ll try, but I’m not guaranteeing.”<sup>2</sup>

The Army’s over-reliance on air evacuation and reduction in medical capacity since DESERT STORM mean the Army needs to make some changes to be best prepared to care for wounded Soldiers in LSCO. Other considerations in preparation for LSCO include the following:

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<sup>2</sup> Department of the Army, *Army Health System Doctrine Smart Book*, February 3, 2020, p. 174; Sydney J. Freedberg Jr., “The Army’s Plan to Save the Wounded In Future War,” *Breaking Defense*, April 12, 2019, <https://breakingdefense.com/2019/04/the-armys-plan-to-save-the-wounded-in-future-war/>.

- How much is the Army relying on medical units in the Reserve Components, which will not be available as rapidly as active units?
- How will the stateside civilian and military medical establishments hold up to an influx of LSCO casualties medically evacuated to CONUS?
- Are Army medical personnel prepared in capacity and capability for the traumatic wounds, and large number of them, likely with LSCO?
- How efficiently will medical personnel be resupplied in LSCO?

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## **I. (No) Large Scale Combat Operations**

The United States (US) prepared throughout the Cold War for a conflict on the scale of World War II. The imminent threat of attack from the Soviet Union allowed the US military to mentally and physically prepare for World War III. Smaller localized conflicts in Korea and Vietnam notwithstanding, the major strategic focus of the military was large scale combat operations (LSCO) in Europe against a superior adversary. US military forces in Europe prepared to fight outnumbered and win against an enemy expected to attack with little warning. After the Cold War, the possibility of large scale war seemed remote, and the United States drastically reduced its military arsenal. Those cuts fell especially heavily on the Army.

The nature of war also changed, as precision weapons ushered in what promised to be an era of “lightning” wars with very low casualties. Operation JUST CAUSE and Operation DESERT STORM (ODS) seemed to prove those points. The military spent most of the 1990s conducting peacekeeping operations in the Balkans, which also underscored the sedentary nature and relatively safe environment of modern combat zones. The 21st century opened with a Global War on Terror (GWOT), which emphasized small unit actions. Initial deployments into Afghanistan and Iraq called for quick and decisive actions by the Special Forces and smaller conventional forces that had been used during DESERT STORM. Better technology, precise intelligence, precision weapons, and small highly trained forces were supposed to destroy the enemy in short and violent combat. Casualties were expected, but a long duration operation was not. A returning LSCO threat means the Army needs what it had

medically for the Cold War, not GWOT. The Army, which has not fought a near peer/peer competitor since 1945, notes that traits of LSCO

include volume, lethality, precision, and tempo. Large-scale combat operations will require a volume of reinforcements, materiel, and equipment significantly greater than other types of operations. It will be more lethal than other types of operations generating mass casualties and replacement of personnel and equipment on a large scale.<sup>3</sup>

## Cold War Medical Planning

Though the Army transformed after Vietnam, the Army's medical capabilities did not receive attention until Vice Chief of Staff GEN Maxwell Thurman ordered a review in 1984. The move to an all-volunteer Army had changed the dynamics; if the Cold War went hot, an Army depleted by combat could not rely on a draft call to fill the ranks. More than ever, the Army would need the wounded to return to duty (RTD) faster, and life-saving remedies would need implemented earlier. Thus, among other changes, Soldiers received medical aid instruction at initial entry training.<sup>4</sup>

Cold War AirLand Battle (ALB) doctrine increased the tempo and lethality of combat. The extension of the battlefield under ALB stretched theater medical support to its limits, even with a robust medical infrastructure. Responsibilities of medical commanders included preserving fighting strength, efficiently evacuating the wounded to help maintain combat operations, and being prepared for mass casualties.

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<sup>3</sup> Department of the Army Field Manual (FM) 4-0, *Sustainment Operations*, July 2019, p. 5-1.

<sup>4</sup> Sanders Marble, "Larger War, Smaller Hospitals?," *Military Review*, July-August 2020, 27-29. In the Korean War, the Chinese forces had a massive ground army but were not as technologically sophisticated as the US forces.



Evacuation became the critical link in the continuum of care, and air medical evacuation (MEDEVAC) became indispensable.<sup>5</sup>

## Curse of DESERT STORM

The overwhelming success of ODS and the relatively small number of medical casualties led some military analysts to speculate that future wars would be bloodless. The Army Medical Department (AMEDD) reorganized to support Force XXI, which was based on the notion that all future wars would resemble DESERT STORM. The fall of the Soviet Union and the success of ODS encouraged those changes and the reduction in the size of the total Army. Because of these reorganizations to medical support on the battlefield, the Army is not prepared for casualties resulting from LSCO.<sup>6</sup>

In 1990, in support of Operation DESERT SHIELD, the Army sent 198 medical units, approximately 23,000 medical personnel, to the Middle East. Cold War doctrine from the 1980s stipulated that medical capacity was required to support two deployed corps and associated support units. The units supporting Operation DESERT SHIELD/DESERT STORM (ODS/DS) and the 300,000 deployed Soldiers included 44 hospitals (Mobile Army Surgical Hospitals [MASH], general hospitals, and field hospitals totaling over 13,000 Army beds; see Fig. 1), surgical teams, air and ground ambulance

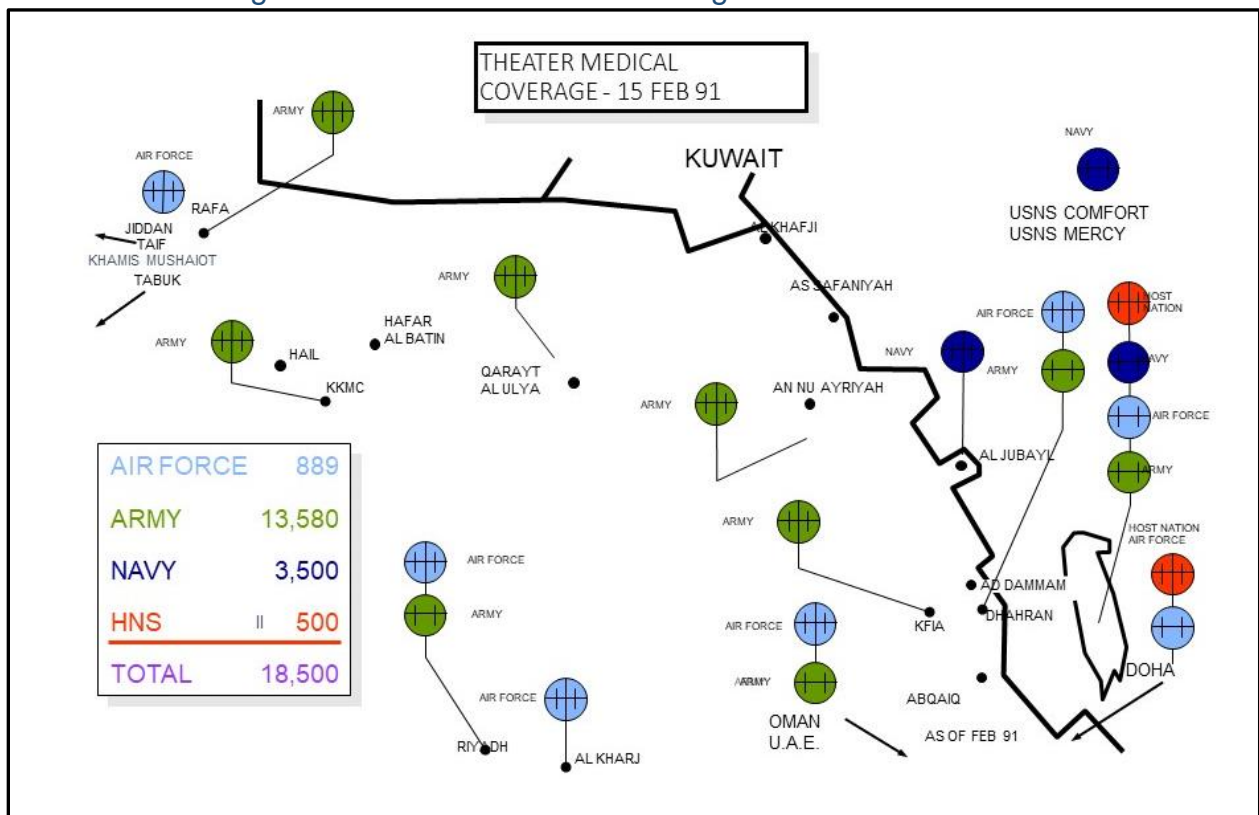
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<sup>5</sup> Darrel Whitcomb, *Call Sign – Dustoff: A History of U.S. Army Aeromedical Evacuation from Conception to Hurricane Katrina* (Fort Detrick, Frederick, MD: Office of The Surgeon General, Borden Institute, 2011), 117, 119. The ALB medical support concept was published in 1986, titled “Health Service Support for AirLand Battle.”

<sup>6</sup> Connie L. Reeves, *Department of the Army Historical Summary (DAHSUM): Fiscal Year (FY) 1996* (Washington, D.C.: Center of Military History, 2002), 123; Lewis Barger, “Cold War Health Service Support” (Fort Sam Houston, TX: Office of Medical History, AMEDD Center of History and Heritage, 2021), slide 12. Active Army strength went from 772,000 to 529,000 between 1989 and 1994, and in that same time frame, the Army Reserve shrank from 319,000 to 260,000. The National Guard went from 457,000 to 375,000 between 1989 and 1995 (Whitcomb, *Call Sign – Dustoff*, 176).

companies and detachments, and logistical support units. Active duty units deployed from the continental United States (CONUS) in August 1990, while active units stationed in Europe and Reserve Component units in the US deployed that November. Active duty comprised 45 percent of the medical personnel, and the Guard and Reserve 55 percent. The Army shipped medical equipment and supplies worth millions of dollars to the Middle East.<sup>7</sup>

Figure 1 - Theater Medical Coverage – DESERT STORM



Source: Lewis Barger, "Cold War Health Service Support" (Fort Sam Houston, TX: Office of Medical History, AMEDD Center of History and Heritage, 2021), slide 38. The lower left box indicates bed numbers.

<sup>7</sup> United States General Accounting Office (GAO), *Operation Desert Storm: Full Army Medical Capability Not Achieved* (Washington, D.C.: GAO, August 1992), 2, 11; Barger, "Cold War Health Service Support," slide 33; Marble, "Larger War, Smaller Hospitals?," 29. According to the GAO report, active duty nurses and doctors care for Army personnel, family members, and retirees until needed in combat situations (2).

In July 1990, US Central Command conducted a command post exercise, INTERNAL LOOK 90, which simulated an Iraqi invasion of Kuwait or Saudi Arabia. In the scenario, the XVIII Airborne Corps (101<sup>st</sup> Airborne, 82<sup>nd</sup> Airborne, and 24<sup>th</sup> Infantry) was tasked with deploying and stopping the incursion. The corps was successful, but incurred a 50 percent casualty rate in the process. These results may have factored into why there was so much medical capability deployed during ODS.<sup>8</sup>

The deployments were not without hiccups. Records identifying doctors and nurses in all Army components were not up to date, and many personnel lacked appropriate training. Some units did not have full manning numbers. Supplies were not delivered in a timely fashion, nor were all expected supplies delivered. Some Combat Support Hospitals (200 beds) and Mobile Army Surgical Hospitals (60 beds) reduced the available beds keep up with the Army's movements.<sup>9</sup>

Ground and air ambulances were hampered by the lengthy travel time to hospitals. Ground ambulances could not always handle the terrain, communicate, and navigate. Ambulance crews often simply went to hospitals they knew how to find, which led to patients arriving at hospitals unexpectedly, meaning hospitals were unprepared for the patients' particular needs. A General Accounting Office (GAO) study determined that, "If the war had produced more casualties, this unmanaged evacuation system could have led to the underuse of some hospitals and overwhelming of others." The desert climate contributed to issues as well. Not all hospitals were prepared for the heat, sand, and wind. A deputy medical commander from VII Corps also wondered if the US

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<sup>8</sup> Robert Scales, *Certain Victory: The US Army in the Gulf War* (Washington, D.C.: Office of the Chief of Staff, United States Army, 1993; reprint, Fort Leavenworth: U.S. Army Command and General Staff College Press, 1994), 44.

<sup>9</sup> GAO, *Operation Desert Storm*, 2-3, 13, 44.

industry would have been able to provide enough supplies for the hospitals if there had been a constant flow of casualties. The GAO concluded, “The Army’s ability to provide adequate care had the war started earlier or lasted longer or had the predicted number of casualties occurred would have been questionable.”<sup>10</sup>

An almost unchallenged air MEDEVAC capability and the very low casualty rate seemed to obviate the need for the large medical treatment capacity deployed. The Army of DESERT STORM was a Cold War Army that was manned, equipped, and postured to fight a worst case scenario. Prior to DESERT STORM, Iraq possessed the world's fourth largest military. Preparations for that conflict were rooted in generations of the Cold War. The end of the Cold War and the US military’s dominating performance in DESERT STORM led to drastic cuts to units and equipment. Moreover, these changes generated some baseline problems that may have tragic consequences in future LSCO:

1. Over-reliance on air evacuation - Improvements in en route care have made this over-reliance possible and cuts in deployed hospitals have made it necessary. However, air evacuation might be severely reduced in LSCO.
2. Reduction in medical capacity – The Army has absorbed huge reductions to medical capacity that will be needed during LSCO. Since only 467 US

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<sup>10</sup> GAO, *Operation Desert Storm*, 3, 5, 13, 33-34, 47. The DOD disagreed with some of the GAO study’s conclusions (5). The DOD’s response letter is published as an appendix to the study. From that letter: “General Schwarzkopf’s knowledge of how and when the campaign would commence is what dictated the priorities he assigned to medical throughout the buildup. Based on those priorities, the Army was able to provide the required medical capability to prosecute the war within the spectrum established by the Commander-in-Chief” (53).

Per Jeffery Charlston in *DAHSUM: FY 1999*, that year’s budget funded improvements in medical vehicles over what had been experienced in ODS/DS. Surplus Bradleys were adapted to ambulances and treatment vehicles (104-105). Also, the medevac UH-60Q, which had been through testing, began development phases in FY99 (105).

service members (354 Army) were wounded in combat and 143 killed in action (96 Army) in DESERT STORM, the deployed hospital numbers appeared excessive to some, and generated the false notion that future wars would be bloodless. This belief ignores the over 14,000 disease and non-battle injuries (DNBI), proving the need for high medical capacity even in a short war.<sup>11</sup>

## Future LSCO Casualty Estimates

Comparing ODS/DS-era doctrine and current doctrine on roles of care, medical evacuation, and mass casualties provides a picture of the decrease in the Army's preparedness for mass casualties from LSCO. COL Matthew Fandre, former Combined Joint Forces Land Component Command surgeon in Iraq, noted in "Medical Changes Needed for Large-Scale Combat Operations" that in preparing for LSCO, surgical and hospitalization resources within theater will need to be increased, as will ground and air MEDEVAC options—while keeping in mind there will be threats to air dominance, and ground travel may not be effortless either. The Army lacks adequate capacity to transport large numbers of casualties; more Soldiers will die of wounds if changes are not made. Soldiers came to expect quick evacuation in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) and thus getting quickly into surgery. According to Fandre, "Current structure and staffing lack sufficient capacity for far-forward extended casualty care to meet these medical demands." Additionally, not

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<sup>11</sup> Department of Defense, "U.S. Military Casualties - Persian Gulf War Casualty Summary DESERT STORM, Defense Casualty Analysis System, [https://dcas.dmdc.osd.mil/dcas/pages/report\\_gulf\\_storm.xhtml](https://dcas.dmdc.osd.mil/dcas/pages/report_gulf_storm.xhtml); Marble, "Larger War, Smaller Hospitals?," 29. According to AMEDD, of the 18,500 beds available in DESERT STORM, the majority—13,580—were Army (Barger, "Cold War Health Service Support," slide 37).

enough evacuation vehicles and medical personnel exist to keep up with mass LSCO casualties. Changes in doctrine over the last 30 years reinforce Fandre's points.<sup>12</sup>

The Army must now once again prepare for LSCO fighting a near peer/peer threat with potential overmatch across multiple domains, and the potential for mass casualties. Unclassified estimates for potential LSCO casualties are difficult to ascertain. Recent Warfighter exercises modeled a force of approximately 100,000 could sustain between 50,000 to 55,000 casualties over eight days. The estimate showed that 30,000 to 35,000 of those casualties would need to be evacuated, but the US Transportation Command has projected that only 250 to 1,000 casualties per day could return to the US during LSCO. Of the remaining casualties, 10,000 to 15,000 would be killed and an equivalent number RTD. Fandre argued that "although mass casualty situations will occur periodically across the battlefield, realistically, the entire operation will experience a continuous mass casualty environment." Additionally, DNBI, which often outnumber battle injuries, must be taken into account, both because of the demand on medical capabilities and the impact on fighting strength. The effects of the COVID-19 pandemic underscore the need to be prepared for DNBI cases.<sup>13</sup>

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<sup>12</sup> Matthew Fandre, "Medical Changes Needed for Large-Scale Combat Operations: Observations from Mission Command Training Program Warfighter Exercises," *Military Review*, May-June 2020, <https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2020/Fandre-Medical-Changes/>.

<sup>13</sup> FM 4-02, *Army Health System*, November 2020, p. 1-2; Matthew Fandre, "Medical Changes Needed for Large-Scale Combat Operations: Observations from Mission Command Training Program Warfighter Exercises," *Military Review*, May-June 2020, <https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2020/Fandre-Medical-Changes/>; F. Cameron Jackson, "Don't Get Wounded: Military Health System Consolidation and the Risk to Readiness," *Military Review*, September-October 2019, <https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/September-October-2019/Jackson-Military-Health/>. For context on DNBI: in ODS/DS, the US had 11,159 patients with disease and 3,371 with non-battle injuries (Barger, "Cold War Health Service Support", slide 40).

## II. Over-Reliance on Air Evacuation

### MEDEVAC Policy

Theater medical evacuation policy is set by the Secretary of Defense, with input from the Joint Chiefs of Staff and the combatant commander. A theater evacuation policy is the maximum number of days a patient is “noneffective”—hospitalized or recovering—but kept in theater, with the assumption of being able to RTD within the given time frame. The medical commander may recommend changes to the policy when circumstances require. The level of medical support in a theater is determined by the policy, which is established by multiplying the number of casualties by the length of stay. If LSCO drives up the number of casualties, MEDEVAC becomes even more critical. If MEDEVAC is impossible or degraded due to combat action, some patients’ conditions will deteriorate and space for more wounded will be reduced.<sup>14</sup>

Flexibility in the theater evacuation policy may be critical for LSCO. Army Techniques Publication (ATP) 4-02.2 *Medical Evacuation* also notes that the number of casualties may increase due to an epidemic or intense combat, which may require an adjustment to the policy to allow for more Soldiers to be evacuated. That ATP details consideration of long and short evacuation policies:

Operations of long duration with significant combat operations could require a longer evacuation policy in order to return as many personnel to duty in theater as possible as opposed to evacuating the patients out of theater. A longer evacuation policy has a reduced demand on evacuation assets. . . . As a result of a longer theater evacuation policy, there is a greater requirement for bed space and medical treatment at Role 2 and Role 3, which reduces the mobility and capabilities of the MTFs [medical treatment facility].

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<sup>14</sup> FM 8-10, *Health Service Support in a Theater of Operations*, 1 March 1991, p. 4-1; FM 4-02, *Army Health System*, pp. 11-1 to 11-2; Sanders Marble, comment on draft of this study (22 June 2021), 26.

Regarding short evacuation policies:

A shorter theater evacuation policy will increase the demand on evacuation assets but reduce occupancy of hospital beds which increases the mobility of MTFs and provides holding capability in preparation of major operations. When the majority of anticipated patients are from combat related trauma, a shorter evacuation policy may be required in order to quickly move patients out of theater and sustain mobility. This is especially true when the number and capabilities of Role 2 and 3 MTFs would be quickly exhausted.<sup>15</sup>

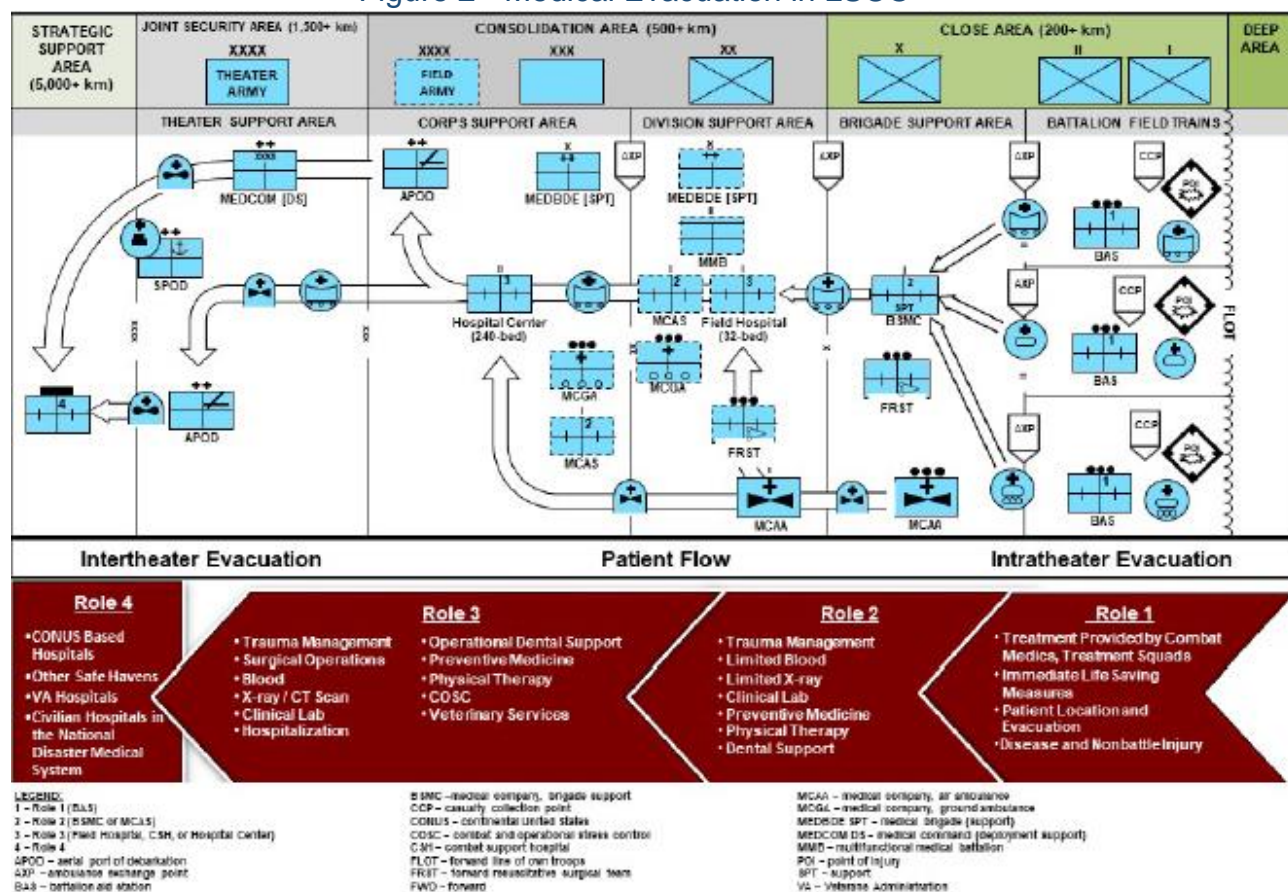
Regardless of the theater policy, the doctrine and force structure will drive how evacuation is actually conducted. Cold War doctrine included echelon (role) evacuation to the equivalent level of care. Current doctrine differs only in the placement of the role 4 hospital (discussed later in this paper). See Figure 2 for how medical evacuation would look in LSCO, Appendix A for a table of 1991 and current MEDEVAC Modified Tables of Organization and Equipment, and Appendix B for roles of medical evacuation in 1991.

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<sup>15</sup> ATP 4-02.2, *Medical Evacuation*, July 2019, pp. 4-1 to 4-3.



Figure 2 - Medical Evacuation in LSCO



Source: ATP 4-02.2, *Medical Evacuation*, July 2019, p. D-4.

The medical system depends on ground and air evacuations flowing smoothly between all roles, and en route medical care ensures Soldiers moving through the medical system go to the appropriate MTF. Commanders and their Soldiers demand and expect the best possible medical care for the wounded.<sup>16</sup>

The Army provides joint intratheater aeromedical evacuation (AE) and is the only service with dedicated air ambulances. The Air Force provides long-range medical transport (fixed wing) and support, including returning patients to the US. The system depends upon having robust MEDEVAC capability, and even more crucially, upon US

<sup>16</sup> ATP 4-02.2, *Medical Evacuation*, pp. 1-1 and 2-10.

air superiority—“the degree of control of the air by one force that permits the conduct of its operations at a given time and place without prohibitive interference from air and missile threats.” Current doctrine calls for air evacuation as the preferred method, but air superiority and environmental factors such as visibility and wind can reduce its availability. Projections for LSCO indicate that the US will not be able to establish air supremacy (“The degree of control of the air wherein the opposing force is incapable of effective interference within the operational area using air and missile threats”), and air superiority will be limited by location and duration. Limitations to air superiority as well as other combat conditions might severely limit the ability of units to evacuate casualties by air from point of injury to MTF. These limitations are most likely to affect rotary wing MEDEVAC operations, but in extraordinary circumstances, fixed wing medevac might also be affected.<sup>17</sup>

Reliance on en route care and air evacuation worked in operations in the Middle East, but since Russia and China are more advanced technologically than forces encountered in ODS, OIF, and OEF, air evacuation of mass casualties, though ideal, will be challenged in LSCO. Since air space will be contested in LSCO with a near-peer adversary, routine US military air supremacy is unlikely. Air evacuations will have to occur in windows of opportunity during air superiority or during times of a lower level of control, referred to as air parity.<sup>18</sup> More beds will be needed to hold the many wounded

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<sup>17</sup> FM 4-02, *Army Health System*, p. 1-7 and 4-8; Department of Defense Directive Number 5100.01, “Functions of the Department of Defense and Its Major Components,” Incorporating Change 1, December 21, 2010, p. 35; Department of Defense, *DOD Dictionary of Military and Associated Terms* (Washington, D.C.: Government Printing Office, 2020), 14-15.

<sup>18</sup> According to the Center for Army Lessons Learned (CALL): “The loss of constant friendly air superiority is arguably a critical difference between the current deployment-related environment and the expected LSCO operating environment. . . . Today’s BCTs have minimal practical experience with

awaiting further evacuation; 15-ship air ambulance companies, one allocated per division, will be stretched to handle the estimated 30,000 to 35,000 evacuees per 100,000 troops Fandre estimated. (What cannot be ignored in this discussion is that utilizing ground evacuation as a supplement to air evacuation has been neglected in the last couple decades.) Even if the Army were to increase the number of hospital beds in theater to reduce reliance on air evacuation, a peer adversary might not respect the Geneva Conventions and find hospitals a tempting target. Or, hospitals could be collateral damage in other strikes. No easy solution currently exists; senior leaders must increase capacity to care for LSCO-level numbers of wounded Soldiers, and find the right balance between relying on casualty evacuation (CASEVAC) and establishing hospitals with larger footprints in theater. Contrary to US tendencies, a certain amount of risk regarding prompt care of wounded Soldiers and heavy casualties must be accepted.<sup>19</sup>

MEDEVAC (medical treatment in a dedicated medical vehicle) and CASEVAC (nonmedical transport without en route care) will be required to communicate regarding transporting large numbers of casualties since both ground and air MEDEVAC may be overwhelmed. Additionally, as combat moves, lines of transport will lengthen, shorten, or be more disrupted. Finally, role 3 hospitals (resuscitation, initial wound surgery, damage control treatment, post-op treatment, etc.) might need to evacuate patients

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planning to mitigate significant fixed-wing close air support and rotary-wing (RW) attack assets” (CALL, *National Training Center: Preparing for Large-Scale Combat Operations* [Fort Leavenworth: CALL, January 2021], 7).

<sup>19</sup> Whitcomb, *Call Sign – Dustoff*, 104; Fandre, “Medical Changes Needed,” online; Brian Downs, comment on draft of this study (22 June 2021), 13; Marble, comment on draft, 13.

further to open beds for more wounded—which requires the capacity to evacuate to the rear. See Figure 3 for another loss of dominance that could compromise evacuation.<sup>20</sup>

### Figure 3 - Cyber/Networks

Not only will air dominance compromise evacuation and care of Soldiers, but also loss of cyber dominance. Neither air nor cyber dominance will be totally lost, but even a brief loss at the wrong time could lead to deaths of US Soldiers. Cyber attacks could disrupt medical networks and communications. In the 1990s, developments in telemedicine were seen as vital to AMEDD's future ability of treating Soldiers wounded in combat. Specialists in the rear and even around the globe now can provide input to those on the front. Today, those well-developed virtual health capabilities could be critical in LSCO—if systems function properly and are not interfered with by the adversary—to cover a shortage of medical personnel, an inability to evacuate, etc.

Sources: Sanders Marble, comment on draft of this study (22 June 2021), 13; Headquarters, US Transportation Command (USTRANSCOM), DRAFT “USTRANSCOM Continental United States (CONUS) Patient Distribution Plan 9008-18,” January 2018, 3; Connie L. Reeves, *Department of the Army Historical Summary (DAHSUM): Fiscal Year (FY) 1996* (Washington, D.C.: Center of Military History, 2002), 123.

## Medical Re-Structuring and MEDEVAC

Army doctrine and restructuring at the end of the Cold War called for smaller combat hospital footprints. The FORCE XXI transformation beginning in the 1990s mandated “a smaller, faster, and more flexible force.” Medical Force 2000 (MF2K) emphasized forward care to sustain the AirLand Battle. In order to reduce medical capacity and increase mobility as required by MF2K, AMEDD tested a 30 bed Mobile Army Surgical Hospital (MASH) because of concerns about the mobility of 60 bed MASHs. AMEDD found the 30 bed version deficient for the current needs of “the new power-projection Army.” AMEDD recommended small, mobile forward surgical teams (FST) to replace MASHs. According to AMEDD's *Medical Bulletin* in 1989, with all these

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<sup>20</sup> ATP 4-02.2, *Medical Evacuation*, p. 2-16, 2-17, 2-19; FM 4-02, *Army Health System*, pp. 1-6, 1-7. If possible, CASEVAC should be used for minor injuries.

changes, MF2K would deliver “the highest quality of health service while reducing requirements for in-theater hospital beds.” MF2K stressed returning Soldiers to duty, in what was expected to be “a people-poor war,” by getting trauma care as far forward as possible. At the time of DESERT STORM, AMEDD was close to executing MF2K’s recommended structure.<sup>21</sup>

By the late 1990s, the Air Force offered the equivalent of intensive care in flight with its Critical Care Air Transport Teams (CCATT). Improvements in MEDEVAC care and the expectation of patients being flown to Landstuhl Regional Medical Center, Germany (the only role 4 hospital remaining overseas), or the US drove a greater reliance on evacuation over hospitalization. With care like that available, service members could be evacuated from theater earlier than in past conflicts. Consequently, fewer hospital beds were needed, thus many hospital units were eliminated.” Medical care began to rely on en route capabilities and unconstrained evacuation.<sup>22</sup>

The Medical Reengineering Initiative (MRI), begun in the early 1990s to comply with the post-Cold War downsizing, saw the Army transfer functions between the National Guard and the Army Reserve. MRI plans reorganized AMEDD above division level and made adjustments in both active Army and Reserves units to push battlefield medical care as far forward as possible. MRI focused on:

- enhancing split-based capability

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<sup>21</sup> Marble, “Larger War, Smaller Hospitals?,” 23; Center of Military History (CMH), *DAHSUM: FY 1997* (Washington, D.C.: CMH, 2005), 177; W. Blair Haworth, *DAHSUM: FY 2000* (Washington, D.C.: CMH, 2011), 97; “AMEDD Stockholders Report,” *Medical Bulletin of the US Army Medical Department*, May/June 1989, 15; Whitcomb, *Call Sign – Dustoff*, 141.

<sup>22</sup> Marble, “Larger War, Smaller Hospitals?,” 23, 29.

- improving tactical mobility
- reducing the medical footprint
- improving communications and exploiting technology<sup>23</sup>

The changes produced a lot of personnel turmoil. The National Guard transferred 12,000 positions, including medical, to the Reserves. The National Guard received 14,000 positions from the Reserves, primarily combat arms and rotary wing aviation.<sup>24</sup>

In short, despite different names, these force structure initiatives all focused on “deploying a smaller hospital system while relying more on [strategic] air evacuation. It would take several years to implement providing only ‘essential care in theater’ and evacuating most patients in only a few days, but it was clear doctrine in 2001.” That reliance on evacuation now is a limitation.<sup>25</sup>

### III. Reduction in Capacity

#### Diminishing Capacities

While the Army’s medical *capabilities*—skills in providing health care—have improved with medical advances, its medical *capacities*—amounts, such as hospital beds and operating room tables—have decreased, which must be considered in case competition with a near-peer/peer turns into conflict.

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<sup>23</sup> Haworth, *DAHSUM: FY 2000*, 97; Army Medicine, “Army Medical Re-engineering Initiative Began (1993),” Army Medicine Innovations, <https://armymedicine.health.mil/Innovations/1993ArmyMedicalReEngineering>.

<sup>24</sup> Whitcomb, *Call Sign – Dustoff*, 176-177.

<sup>25</sup> Scott Woodard and Sanders Marble, “Organizing Medical Command and Control,” *The AMEDD Historian* 32 (Winter 2020): 18. [https://history.amedd.army.mil/newsletters/2020/AMEDD\\_history\\_newsletter\\_32\\_winter2020.pdf](https://history.amedd.army.mil/newsletters/2020/AMEDD_history_newsletter_32_winter2020.pdf).

Changes to theater hospitals during the Cold War included a focus on quickly identifying what Soldiers could RTD. The number of hospitals decreased while operating room “table-hours” grew. Corps-level hospitals consisted of MASHs with 60 beds for Soldiers unable to RTD and Combat Support Hospitals (CSH) with 300 beds for Soldiers expected to RTD. Two types of hospitals existed in the communication zone (COMMZ; in the rear): general hospitals with 1,000 beds for patients returning to the US, and field hospitals with 500 beds for Soldiers who would RTD. That zone also included medical holding companies, each with 1,200 cots for patients convalescing before RTD. The Army believed fewer beds were needed because not as many Soldiers required hospitalization for sickness, due to medical advances. En route care in strategic evacuation had not advanced sufficiently at this time to be an option comparable to the capabilities at theater hospitals.<sup>26</sup>

These changes in the late 1980s to Army medical capabilities were implemented with the expectation of 360 casualties in a division per day, with 143 of those needing more substantial medical attention behind the division rear boundary. Considering the number of divisions expected to be involved in combat in Europe (six ready, three reinforcing) taking 143 severe casualties each, plus casualties at the corps and theater level, about 1,500 Soldiers a day would be taken to the rear for advanced medical attention. Those Soldiers would then require time to stabilize before strategic evacuation. Enough hospital beds would be required for those accumulating casualties—12,000 estimated.<sup>27</sup>

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<sup>26</sup> Marble, “Larger War, Smaller Hospitals?,” 28-29.

<sup>27</sup> Marble, “Larger War, Smaller Hospitals?,” 29.

## Changes to Roles of Care

Also, since ODS, changes have been made to roles of care. The Army's medical structure during ODS followed the AirLand Battle doctrine and was prescribed in Field Manual (FM) 8-10 (March 1991), *Health Service Support in a Theater of Operations*. A glaring difference between 1991 roles of care (then called echelons of care) and 2020 roles of care is that in 1991, role 4 consisted of general hospitals, COMMZ facilities, and evacuation to CONUS. Locations of hospitals in ODS included the 47<sup>th</sup> Field Hospital in Bahrain, the 300<sup>th</sup> Field Hospital about 125 miles south of the Kuwait border, the 382<sup>nd</sup> Field Hospital and 316<sup>th</sup> Station Hospital at the Saudi Arabian National Guard Hospital in Riyadh, and the 50<sup>th</sup> General Hospital at the Riyadh Al Kharj Hospital (see App. C for descriptions of those types of hospitals). Today, in any forthcoming LSCO, mass casualties who need treatment beyond role 3 will need to be evacuated to CONUS or a safe haven.<sup>28</sup>

If Soldiers can RTD after role 4 care, perhaps desperately needed to rebuild fighting strength, they may need to vie for room on a transport. The potential of RTDs from role 4 should not be discounted. In late 1944 during World War II and the drive into Germany, US First Army hospitals admitted over 88,800 patients. About 59,500 needed higher care and were evacuated. Just over 24,400 of those evacuated were able to RTD, providing quicker replacements to the combatant commander than waiting for trainees. The push of role 4 care to CONUS and safe havens was predicated on the thought in the 1990s that future war would be short. Also of note, small surgical teams were a critical part of role 2 in Iraq and Afghanistan, especially in executing the "golden

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<sup>28</sup> FM 4-02, *Army Health System*, p. 1-13; Lewis Barger, email to author, 27 June 2021.



hour.” See Table 1 to compare 1991 and 2020 roles of care, and Figures 4 and 5 for graphics depicting those roles of care.<sup>29</sup>

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<sup>29</sup> Barger, “Cold War Health Service Support,” slide 24; Scott Woodard, “Health Service Support: Conflict (Medical Treatment, Hospitalization and Medical Evacuation, Hürtgen Forest, 1944,” vignette, p. 1, emailed to author); Paula C. Lodi, “The Army Medical Department and Full Spectrum Operations” (monograph, School of Advanced Military Studies, 2003), 12-13.

The “golden hour” is the concept, held firmly by some starting in 2001 and refuted by others, that the likelihood of a Soldier dying of wounds increased markedly if he or she does not receive proper care within the first hour. Secretary of Defense Robert Gates made the golden hour an official goal in 2009 (Bernard Rostker, *Providing for the Casualties of War: The American Experience Since World War II* [Santa Monica, Calif.: RAND Corporation, 2020], 278).

Table 1 - Comparison of 1991 Echelons of Care and 2020 Roles of Care

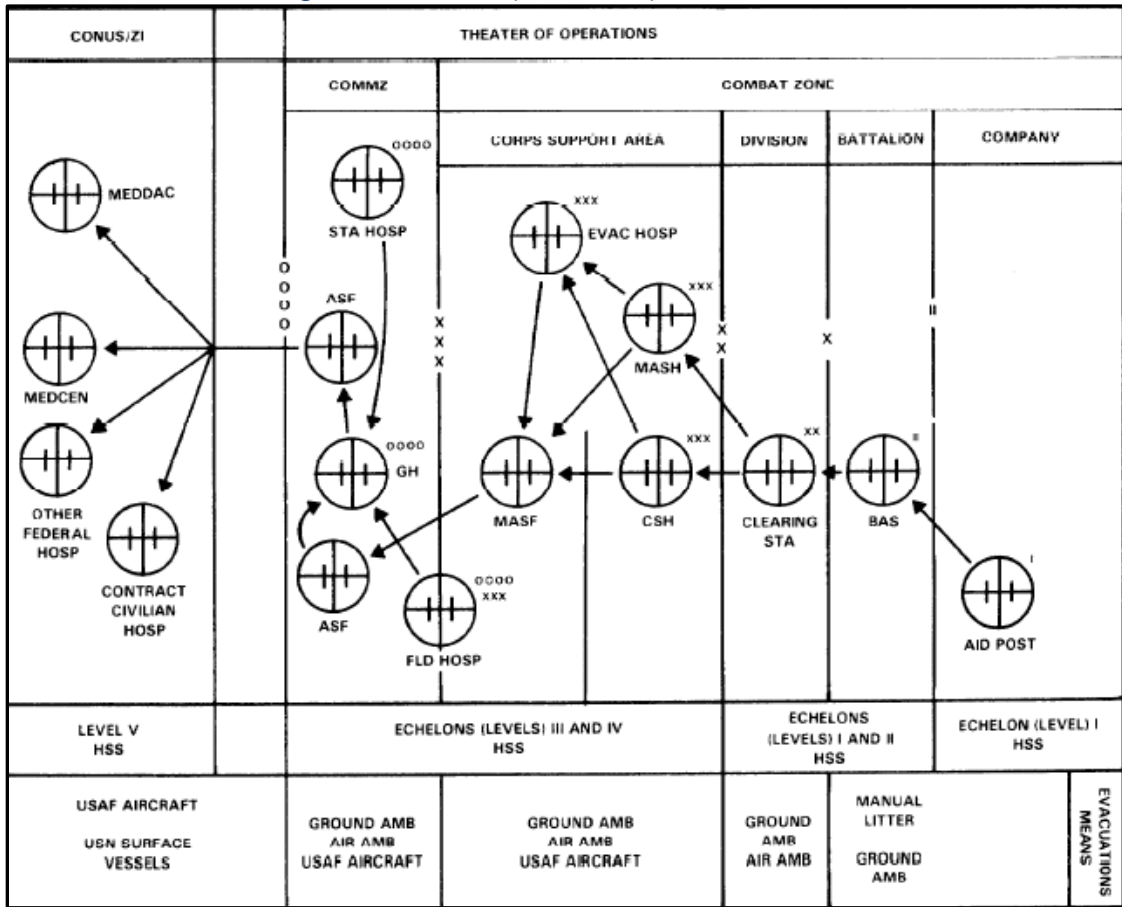
	1991	2020
	<b>Role 1</b>	
<b>Responsibility</b>	Immediate life-saving measures	Immediate life-saving measures
Evacuation	Evacuation to supporting medical treatment	Evacuation to supporting medical treatment facility (MTF)*
Treatment	Treatment by self, buddy, combat lifesaver or medic, or treatment squad (Battalion Aid Station [BAS])	Treatment by combat medic or treatment squad, flight medic, BAS/role 1 MTF personnel
Hold	Major emphasis on stabilizing for evacuation to role 2; RTD those not needing role 2	Major emphasis on RTD or stabilizing for evacuation to role 2
	Health Service Support (HSS) provided by medical platoons/sections of combat and combat support battalions, by division medical companies, by corps areas support medical companies, and by other corps medical units	The medical platoon, also referred to as BAS, coordinates the Army Health System (AHS) support operations for the battalion commander. The BAS is the forward-most medically staffed treatment location organic to a maneuver battalion. At echelons above brigade (EAB), role 1 support is provided by the medical company (area support) in the division, corps, and theater areas of responsibility.
	<b>Role 2</b>	
	Provided at clearing station, operated by the area support section of the treatment platoon of the med company	Rendered at MTF operated by area support squad, medical treatment platoon of medical companies
	Patient evaluated for RTD or evacuation priority	Patient evaluated for treatment and evacuation precedence
	Provides HSS in area of responsibility; normally operates in brigade support area (SA), division SA, and high concentrations of troops in corps SA and COMMZ	Assets are located in medical company (brigade support) assigned to modular brigades and in medical company (area support) which is an EAB that provides direct support to the modular division and support to EAB units
	Area support and patient holding squads incapable of independent operations	
	Patient holding capability (up to 40 patients, and if patient can RTD in 24-72 hours)	Patient held if can RTD within 72 hours
	Performed by medical companies organic to support battalions of separate maneuver brigades, support squadrons of armored cavalry regiments, support battalions of division support commands (DISCOMS) (heavy division), medical battalions of	Forward Resuscitative and Surgical Detachments, which contain Forward Surgical Teams.

	DISCOMS (airborne and air assault), and nondivisional med battalions (corps and COMMZ)	
<b>Role 3</b>		
	Provide care in an MTF	Patient treated at MTF
	Provide support on an area basis to units without organic medical units	Provide support on an area basis to units without organic medical units
	Surgery if patient cannot endure further evacuation over long distances	Surgery if patient cannot endure further evacuation over long distances
	MASH, CSH, evacuation hospitals (usually two evacuation hospitals per division)	CSH, Hospital Center
	Tactical situation and terrain will determine location of role 3 units, perhaps even offshore, at third country support bases, or in the COMMZ	
	Facilities available for RTDs	
<b>Role 4</b>		
	General hospitals or other COMMZ-level facilities offering general and specialized medical and surgical care	<b>CONUS hospitals and other safe havens (to include robust overseas MTFs)</b>
	<b>Stabilize those evacuating to CONUS</b>	If more capacity is needed, Veterans Affairs and civilian hospital beds in the National Disaster Medical System are added to meet the demand.
	HSS to Soldiers in COMMZ	
<b>Zone of Interior (level 5)</b>		
	Most definitive care in AMEDD HSS system	
	Fixed hospitals in CONUS to include US Army medical centers; US Army Medical Department activities; Navy, Air Force, and Veterans Administration hospitals; and contract civilian facilities	

\*A MTF is any facility, fixed or not, which provides medical treatment; role 1 and role 2 MTFs are *not* hospitals, which are defined as MTFs providing in-patient care (ATP 4-02.10, *Theater Hospitalization*, August 2020, p. 1-1).

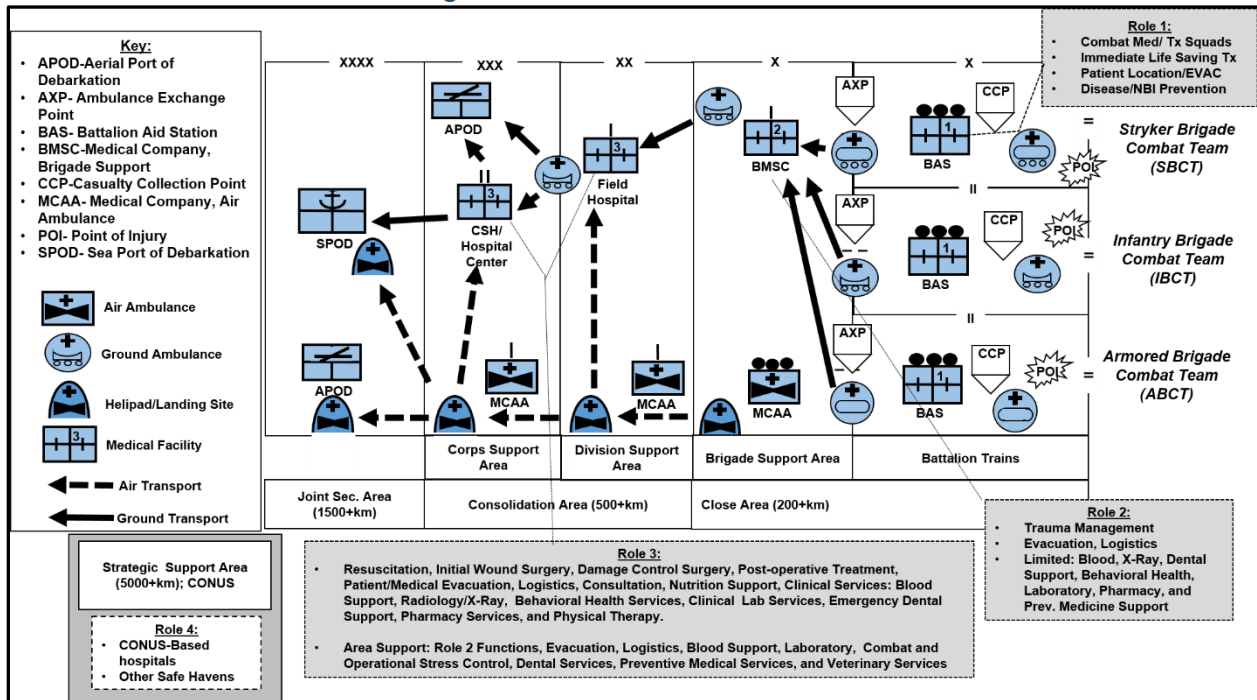
Sources: FM 8-10, *Health Service Support in a Theater of Operations*, 1 March 1991, pp. 3-3 to 3-5, 5-12 to 5-13; FM 4-02, *Army Health System*, November 2020, pp. 1-11 to 1-13; ATP 4-02.10, *Theater Hospitalization*, pp. 4-4, 4-7 to 4-8; ATP 4-02.4, *Medical Platoon*, May 2021, p. 1-1.

Figure 4 - Roles (Echelons) of Care, 1991



Source: FM 8-10, *Health Service Support in a Theater of Operations*, 1 March 1991, p. 5-13.

Figure 5 - Roles of Care, 2020



Source: This figure is a simplified version of a chart in FM 4-02, *Army Health System*, November 2020, p. 2-4.

## Modularity's Effect on Hospital Capacity

Doctrine from the ODS era and today relates to hospital capacity. From 2003 to 2005, to increase agility and deployability, the Army went from a division-centric structure to a brigade-centric structure, with Brigade Combat Teams (BCTs) able to deploy independently. The pivot to modularity included shrinking the capacity (number of beds) of Army hospitals sent to theater, which included the ongoing replacement of CSHs with hospital centers. All active component CSHs have converted, and two remaining Reserve Component CSHs will convert by September 2022.<sup>30</sup>

FM 4-02, *Army Health System*, noted the benefits of modularity:

<sup>30</sup> Army Techniques Publication (ATP) 4-02.10, *Theater Hospitalization*, August 2020, p. vii; Brian Downs, email to author, 28 July 2021.

The modular design of the hospital provides the capability to tailor and deploy capabilities as modules or multiple individual capabilities that provide incrementally increased medical services. The theater hospitals may be augmented by one or more medical detachments, hospital augmentation teams, or medical teams designed to enhance the hospital's capabilities to provide HSS [health service support] to the AO [area of operations].<sup>31</sup>

Due to the threat of near-peer/peer conflict, the planned elimination of CSHs and the capacities of hospital centers must be examined to determine the Army's level of preparedness for LSCO. See Table 2 to compare CSHs and hospital centers and Table 3 for a breakout of hospital centers.

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<sup>31</sup> FM 4-02, *Army Health System*, p. 10-3.

Table 2 - Comparison of CSHs and Hospital Centers

	<b>CSH</b>	<b>Hospital Center (HC)</b>
	Role 3; provide area support for RTD or further evacuation	
Beds	248 (84-bed and 164-bed companies)	Up to 240*
OR tables	6 (in 3 shelters)	6 (2 per field hospital, 1 in augmentation)
OR table staffing	96 operating table hours per day	108 hours per day
Early entry element/first deployed	44 beds (from 84 bed company; can go 72 hours without logistical support)	32 bed field hospital (can go up to 72 hours with initial supplies)
Augmentation	40 beds; unites with early entry (44 bed) to form the 84-bed hospital	Expand incrementally with the augmentation detachments (see Table 3)
Deployability	Preferably as a whole; in parts if necessary	In whole or in part
84-bed co.	Critical care: two wards for up to 24 patients total; intermediate: three wards for up to 60 patients total; OR: two tables staffed for 36 operating hours per day	See Table 3 for augmentations to HC
164-bed co.	Critical care: two wards for up to 24 patients total; seven wards with intermediate care for up to 140 total; OR: 4 tables staffed for 60 operating hours/day	
Assigned to	Medical brigade (support), medical command (deployment support), or joint/combined task force	
		*does not include augmented 120 minimal care beds

Sources: FM 4-02, *Army Health System*, pp. 10-3 to 10-5; ATP 4-02.10, *Theater Hospitalization*, pp. 2-1, 2-2, 2-5, 2-9, 2-11 to 2-13, 3-1, 3-11, 3-13, 3-30.

Table 3 - Hospital Center Configuration (maximum 240 beds) in Support of Full Range Military Operations

<i>Hospital units</i>	<i>Intensive care beds</i>	<i>Intermediate care beds</i>	<i>Minimal care beds</i>	<i>Surgical tables</i>	<i>Surgical hours per 24 hours</i>
Field Hospital, (32 Bed)	12	20	0	2	36
Field Hospital, (32 Bed)	12	20	0	2	36
Hospital Augmentation Detachment, (Surgical 24 bed)	24	0	0	2	36
Hospital Augmentation Detachment, (Medical 32 bed)	12	20	0	0	0
Hospital Augmentation Detachment, (Intermediate Care Ward 60 bed)	0	60	0	0	0
Hospital Augmentation Detachment, (Intermediate Care Ward 60 bed)	0	60	0	0	0
<b>TOTALS</b>	<b>60</b>	<b>180</b>	<b>0</b>	<b>6</b>	<b>108</b>

Source: FM 4-02, *Army Health System*, p. 10-9.

ATP 4-02.10, *Theater Hospitalization*, addressed what was lacking in CSHs and what was to gain from hospital centers: The hospital center’s ability to split capabilities based on a mission corrected a perceived weakness of CSHs. Additionally, the potential for LSCO drove the decision to shift to hospital centers. If, as estimated for LSCO, 3,000 casualties need to be hospitalized for one day, ten CSHs or hospital centers would be required. Additionally, reserve units must complete training before mobilizing, so active units will bear the initial brunt of caring for casualties.<sup>32</sup>

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<sup>32</sup> ATP 4-02.10, *Theater Hospitalization*, pp. vii, ix; Fandre, “Medical Changes Needed,” online. Also, formulas are provided on pp. 3-29 to 3-30 in chapter 3 of ATP 4-02.10, *Theater Hospitalization*, for calculating field hospitals and detachments needed based on how many WIA and DNBI will fill beds.



Additionally, according to Fandre, the US Transportation Command is not capable of evacuating casualties in an efficient manner; therefore, “bolstering the capacity and capability of the hospitals should be prioritized.” At the start of the Korean War, the 60 bed MASHs needed to be expanded to 200 beds to meet an urgent need. In Vietnam, 60 bed MASHs operated with as many as 170 beds. The same expansion might be necessary, on a larger scale, in LSCO if the Army is unprepared. In contrast to undersized hospitals, hospitals utilized in ODS/DS had much greater capacity. See App. C for a table with numbers and types of hospitals deployed in ODS.<sup>33</sup>

Also necessary to consider: measuring capacity should not just focus on hospital beds. Flow of patients matters, and that depends on hospital staff and evacuation capacity. Full staffs that are well trained and well equipped can keep Soldiers moving to the next role or to RTD status. Likewise, uninterrupted evacuation will play a role in keeping those Soldiers moving and reducing the need for a high number of beds. However, if as is likely in LSCO, air evacuation is unpredictable, more beds will be needed.<sup>34</sup>

The more mobile hospitals are not perfect. Not all would be ready to deploy immediately. Supplies are stored in various locations and cannot be maintained at war-time levels due to dated items, etc. An additional issue: even with their vaunted mobility, hospital centers cannot move from one location to another in theater and be fully

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<sup>33</sup> Fandre, “Medical Changes Needed,” online. The Army only provides intratheater evacuation; US Transportation Command evacuates at the strategic level (FM 4-02, *Army Health System*, p. 11-2). Brian M. Downs, “The Application of Operational Art to Health Service Support: A Case Study of the Korean and Vietnam Wars” (monograph, School of Advanced Military Studies, 2017), 29-30; Sanders Marble, “The Evolution and Demise of the MASH, 1946-2006: Organizing to Perform Forward Surgery as Medicine and the Military Change,” *Army History* 92 (Summer 2014): 29.

<sup>34</sup> Edward Chan, comment on draft of this study (27 June 2021), 24.

functioning in a matter of days—it could take weeks. Availability of external support and resources, transportation, movement of patients, and the logistics of disassembling, containerizing, moving, and reassembling must be considered. However, minimal services could be available 72 hours after a move. And where will hospitals fall in the demand for movement of troops, vehicles, and other supplies? For a historical example of mobility challenges, in the Korean War, lines of evacuation extended nearly 300 miles when UN forces broke from the Pusan Perimeter, and hospitals did not have time to move. That evacuation distance stressed the system and jeopardized the care of the wounded.<sup>35</sup>

## OEF/OIF and Capacity

OEF and OIF differed in the amount of hospitals required. With no more than 15,000 deployed at a time, OEF did not require numerous hospitals; sufficient medical capabilities existed.<sup>36</sup> OIF deployed hospitals for the invasion of Iraq. Those hospitals consisted of the last operational MASH, six CSHs, a field hospital, and “Navy facilities.” The forward airfields could not accommodate C-17 platform used by the CCATTS, and CCATTS had never trained in C-130s and thus were unable to work in them. After the invasion, “two split-based combat support hospitals located near airfields” covered medical needs throughout the occupation. By the time of the surge (2006-2007), evacuation capabilities by air had improved; additional hospitals were not required.<sup>37</sup>

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<sup>35</sup> Fandre, “Medical Changes Needed,” online; ATP 4-02.10, *Theater Hospitalization*, pp. 3-30 to 3-31; Downs, “The Application of Operational Art to Health Service Support,” 47.

<sup>36</sup> Marble, “Larger War, Smaller Hospitals?,” 30.

<sup>37</sup> Marble, “Larger War, Smaller Hospitals?,” 30.

In fiscal year (FY) 2017, the Army made changes in reaction to ongoing operations, where the size of full combat support hospitals made them too difficult to deploy. CSHs contained 248 beds. New, more-mobile field hospitals contained 32 beds, with three possible augmentation detachments: surgical (24 beds), medical (32 beds), and an intermediate care ward (60 beds). The “trade-off” in going from CSH to hospital centers was reduced capacity, which especially is a loss if the flow in (injuries) and flow out (evacuation) is not balanced—likely in LSOC with deadly weapons used on a large scale against US Soldiers and against MEDEVAC. Frequency of evacuation flights will have an impact on the flow rate if there are more than 32 patients requiring beds.<sup>38</sup>

The organization of hospital centers reflected how the combat support hospitals had deployed in parts. While the transition from CSHs to field hospitals would give the Army 4,000 deployable beds (between the active and Reserve Components), this is a drastic reduction from the 13,000 beds deployed in DESERT STORM.<sup>39</sup>

## Field Hospitals

The 32-bed field hospital (see Fig. 6), a component of the hospital center (see Fig. 7), is considered “the cornerstone of the deployed hospital.” It deploys first and “is deliberately designed to be self-supporting while remaining light, highly mobile, and expandable.” Yet, 32 beds per field hospital, even if there is one field hospital per BCT,

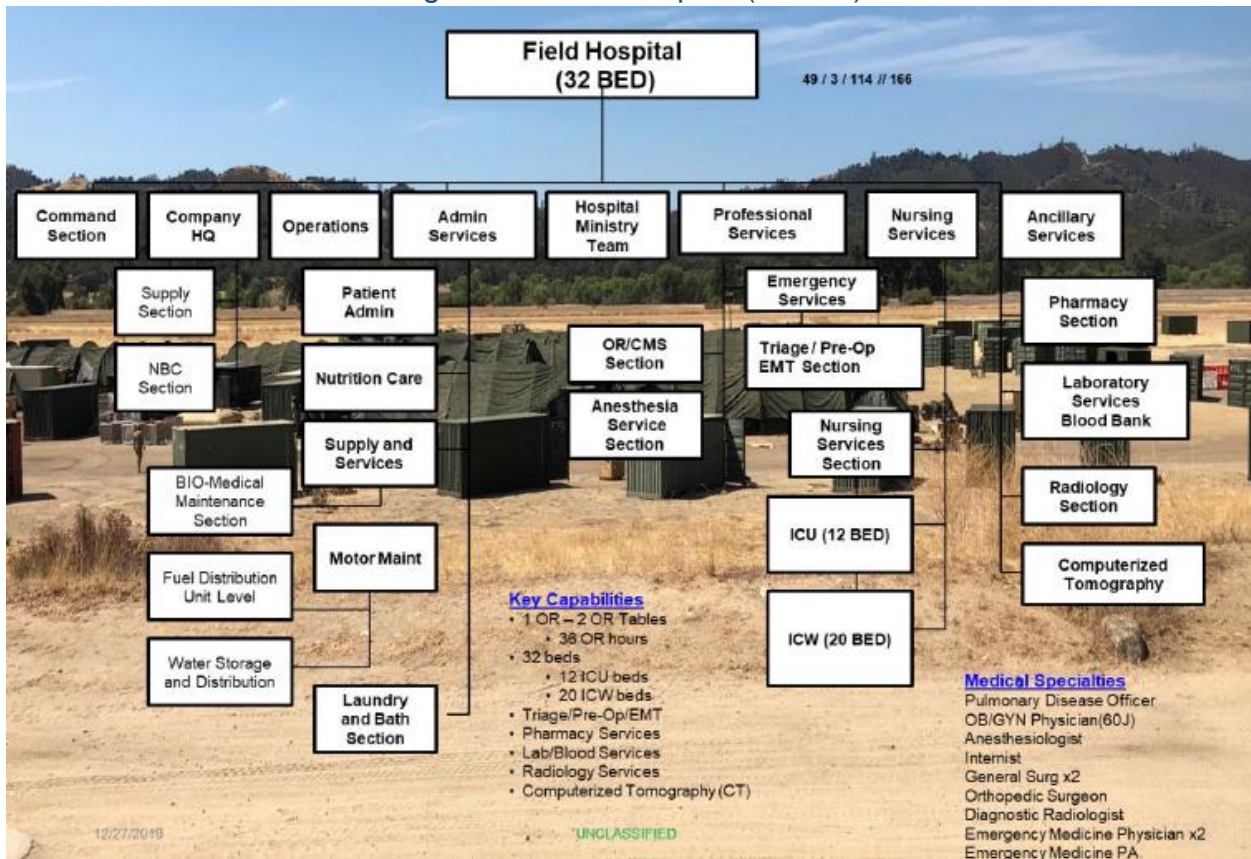
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<sup>38</sup> William M. Donnelly, ed., *DAHSUM: FY 2017* (Washington, D.C.: CMH, 2020), 69-70; Chan, comment on draft, 21.

<sup>39</sup> Donnelly, ed., *DAHSUM: FY 2017*, 70; Marble, “Larger War, Smaller Hospitals?,” 30. The 4,000 deployable beds is as of FY 2021.

is not enough to absorb the mass casualties expected in LSCO. How long might a field hospital support a BCT in LSCO? Perhaps less than a day.<sup>40</sup>

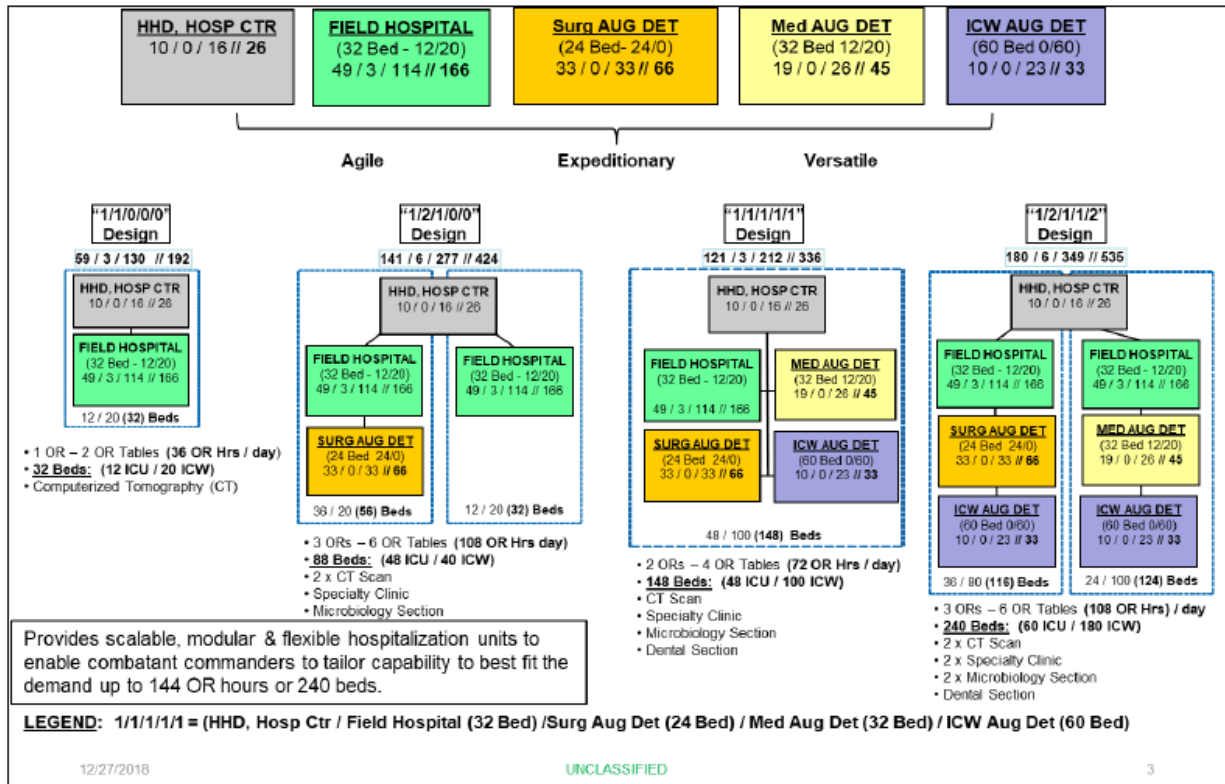
Figure 6 - Field Hospital (32 bed)



Source: Army Health System Doctrine Smart Book, 91.

<sup>40</sup> FM 4-02, *Army Health System*, p. 10-6; Marble, comment on first draft of this study (9 February 2021), 14. While a field hospital is defined as “self-supporting,” it relies on other units for logistics, transport, food, security, etc. (Craig McFarland, comment on draft of this study [27 June 2021], 25).

Figure 7 - Hospital Center (240 bed)



Source: Army Health System Doctrine Smart Book, 83.

The field hospital cannot divide operations for a length of time and has the following capabilities and limitations:

Table 4 - Hospital Center Capabilities and Limitations

<b>Capabilities</b>	<b>Limitations*</b>
<ul style="list-style-type: none"> <li>• Smallest unit; provide same clinical capabilities as role 3 MTF</li> <li>• 1 Intensive Care Ward (12 patients)               <ul style="list-style-type: none"> <li>• 10 “fully equipped [beds] for patients requiring the most intensive monitoring/care”</li> </ul> </li> <li>• 1 Intermediate Care Ward (20 patients)</li> <li>• 2 Operating Tables               <ul style="list-style-type: none"> <li>• “Staffed for 36 operating table hours per day”</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• 20 percent dispersion allowance (percent of beds that should remain empty)               <ul style="list-style-type: none"> <li>• Permits ease of movement in following forces</li> <li>• “A totally full hospital system is not feasible”</li> </ul> </li> <li>• Follows rules of allocation based on patient type               <ul style="list-style-type: none"> <li>• 32-bed field hospitals (per 1000 patients)                   <ul style="list-style-type: none"> <li>• 12.40 WIA</li> <li>• 5.56 DNBI</li> <li>• 3.27 Nerve</li> <li>• 1.56 Blister</li> </ul> </li> </ul> </li> </ul> <p style="font-size: small; margin-top: 10px;">*Based on not having chemical, biological, radiological, and nuclear (CBRN) casualties.</p>
<p><i>Sources: FM 4-02, Army Health System, p. 10-6; ATP 4-02.10, Theater Hospitalization, p. 3-28.</i></p>	

Those field hospital wards and operating tables could be quickly overwhelmed in LSCO. There are fewer beds and operating tables than needed, and some must remain empty to allow the field hospital to remain sufficiently mobile. Commanders and medical personnel will need to assess and balance the need for mobility and caring for Soldiers. See Fig. 8 for the broader picture of Army Health System Support in LSCO. Note again where role 4 is today. The mobile Forward Resuscitative and Surgical Detachments (FRSD) at role 2 will be critical, considering the reduced number of hospital beds, operating tables, and evacuation capabilities today.

Figure 8 - Army Health System Support in LSCO

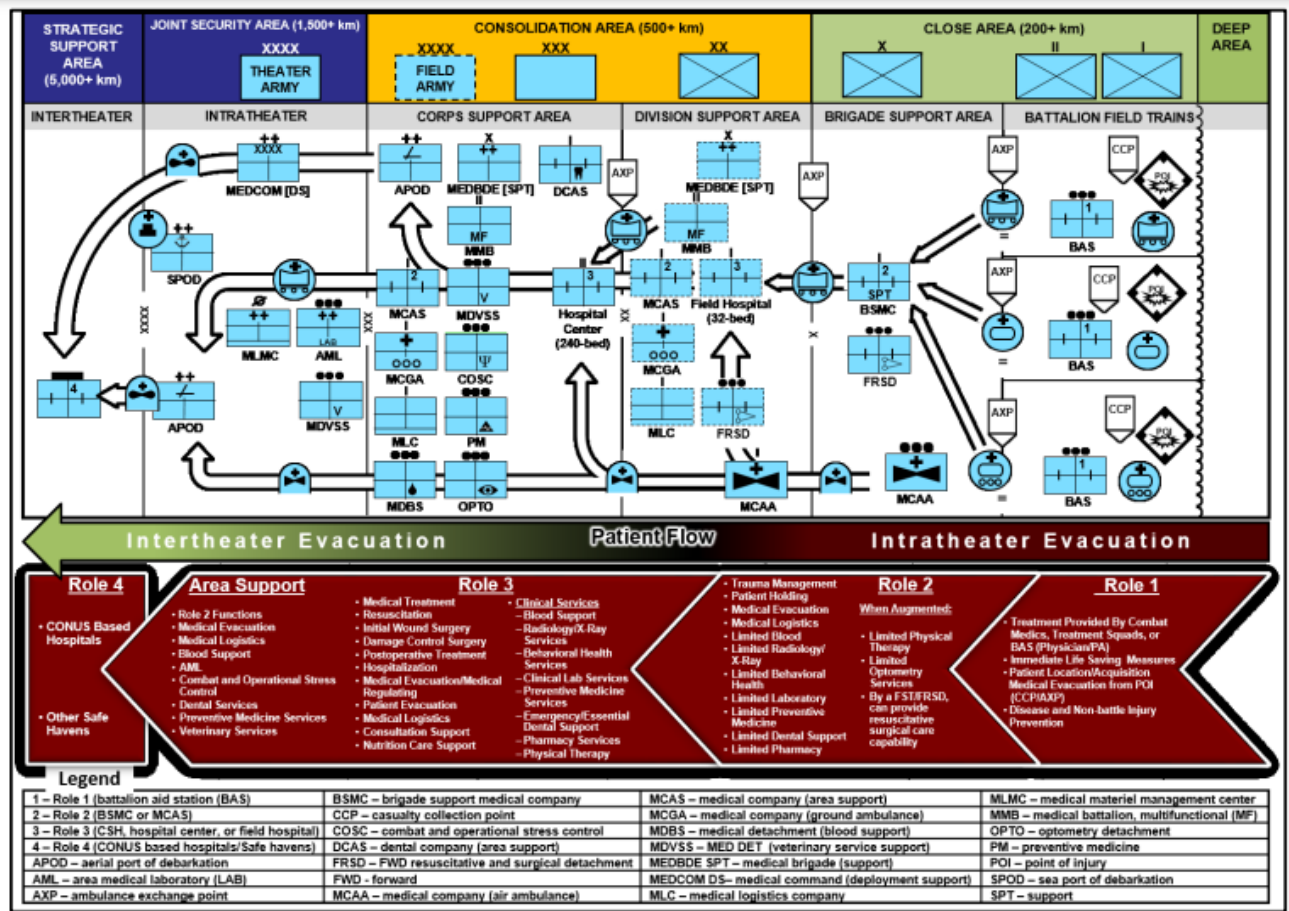


Figure A-3. Army Health System support during large-scale ground combat operations

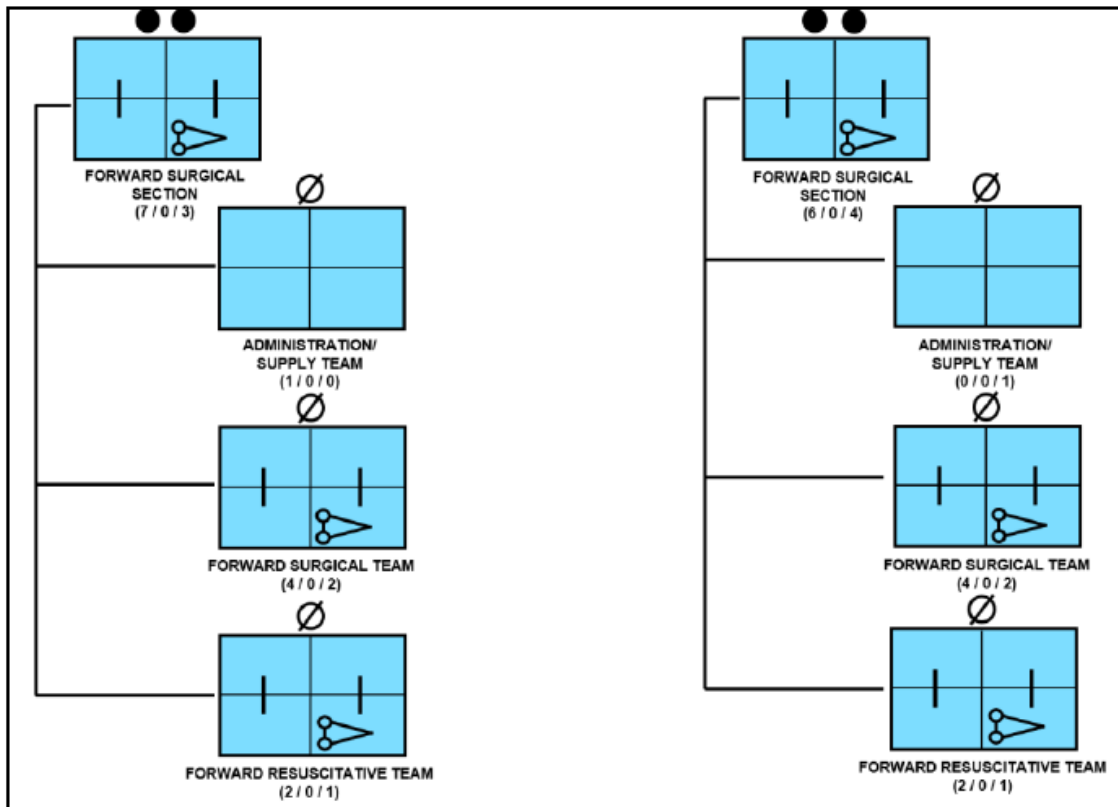
Source: FM 4-02, Army Health System, p. A-5.

## Forward Resuscitative and Surgical Detachments

FRSDs, composed of 20 personnel, can be attached to a hospital center when not employed in operations and attached to a forward medical company. When appropriately supported at role 2, an FRSD can perform initial surgery on patients who are not in a condition to be transported. FRSDs are smaller than the surgical element at a role 3 MTF; FRSDs can augment role 3. FRSDs have two surgical elements that can support operations lasting under 24 hours. One element can care for 4 patients. An

FRSD can be transported in a single lift, with organic transport. Also, an FRSD can be split into two sections (see Fig. 9).<sup>41</sup>

Figure 9 - Split-Based Forward Resuscitative and Surgical Detachment



Source: *Army Health System Doctrine Smart Book*, 112.

Forward Surgical Teams (FSTs) are now the foundation of FRSD. FRSDs were established to overcome deficiencies of FSTs. The FSTs utilized in Iraq were effective in role 2. Those surgeons prioritized “damage control” and sending the patient to a CSH at role 3. Proving their mobility, FSTs could in some cases be operational in under 30 minutes; in other instances, FSTs occupied a particular location less than 12 hours. Air superiority and control of roads are critical to the success of caring for those wounded.

<sup>41</sup> *Army Health System Doctrine Smart Book*, pp. 109-111.



Casualties at a CSH who needed treatment beyond three days were transported to a level 4 hospital—either Kuwait, Spain, or Landstuhl, Germany. Casualties needing 30 days to recover were sent to CONUS, usually Walter Reed National Military Medical Center or Brooke Army Medical Center. As the war in Iraq matured, some CSHs established themselves as fixed facilities. For example, one CSH occupied a hospital in Baghdad.<sup>42</sup>

## Mass Casualty Operations

Planning for mass casualties is noted in both 1991 and current doctrine. FM 8-10, *Health Service Support in a Theater of Operations* (1991), covers adjusting HSS to such a situation; triage; and nuclear, biological, or chemical (NBC) mass casualty situations. In a mass casualty scenario, according to FM 8-10, “the number of patients requiring medical care exceeds the medical capability to provide treatment in a timely manner.” Medical units must be prepared to adapt and to “*provide the greatest good for the greatest number and to return soldiers to duty as soon as possible*” (emphasis in original). While focusing on the greatest good is a shift from “*the most critical come first,*” each patient is treated; none are ignored (emphasis in original). Triage, which is conducted by an expert medical professional, guarantees the greatest good principle is followed and ensures those with the highest chance of survival receive the available treatment. Command surgeons were responsible for forming a mass casualty plan, which included determining alternates to the standard evacuation policy, treatment

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<sup>42</sup> ATP 4-02.25, *The Medical Detachment, Forward Resuscitative and Surgical*, December 2020, pp. v and 2-1; Atul Gawande, “Casualties of War — Military Care for the Wounded from Iraq and Afghanistan,” *The New England Journal of Medicine* 351, no. 24 (December 9, 2004): 2473-2474; Rostker, *Providing for the Casualties of War*, 269.

locations, and evacuation routes; handling NBC casualties; and supplies and resources.<sup>43</sup>

ATP 4-02.10, *Theater Hospitalization* (2020), defines a mass casualty situation basically the same as in FM 8-10 (1991) as when “any large number of casualties [are] produced in a relatively short period of time, usually as the result of a single incident such as a military aircraft accident, hurricane, flood, earthquake, or armed attack that exceeds local logistics support capabilities.” ATP 4-02.3, *Army Health System Support to Maneuver Forces* (2014), covers mass casualty situations, including noting that “nonmedical vehicles” might need to transport casualties, meaning those individuals might not receive appropriate medical care while in transport nor be transported to an ideal MTF. The ATP contains information on executing triage and a figure for an outdoor mass casualty station.<sup>44</sup>

FM 4-02, *Army Health System* (2020), addresses large scale combat operations (and includes this confident sentence: “During large-scale ground combat operations, Army forces defeat the enemy”). Because of the increased lethality in LSCO, including the potential for weapons of mass destruction, medical units must anticipate mass casualty situations. Evacuations will have to be well coordinated, occur simultaneously with combat, and have other resources in mind for use. Figure 10 provides an example of a mass casualty scenario within the last decade. Figures 11 and 12 depict the flow of medical treatment and hospitalization in LSCO.<sup>45</sup>

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<sup>43</sup> FM 8-10, *Health Service Support in a Theater of Operations*, pp. 14-1 to 14-2.

<sup>44</sup> ATP 4-02.10, *Theater Hospitalization*, p. 5-15; ATP 4-02.3, *Army Health System Support to Maneuver Forces*, June 2014, p. 2-11.

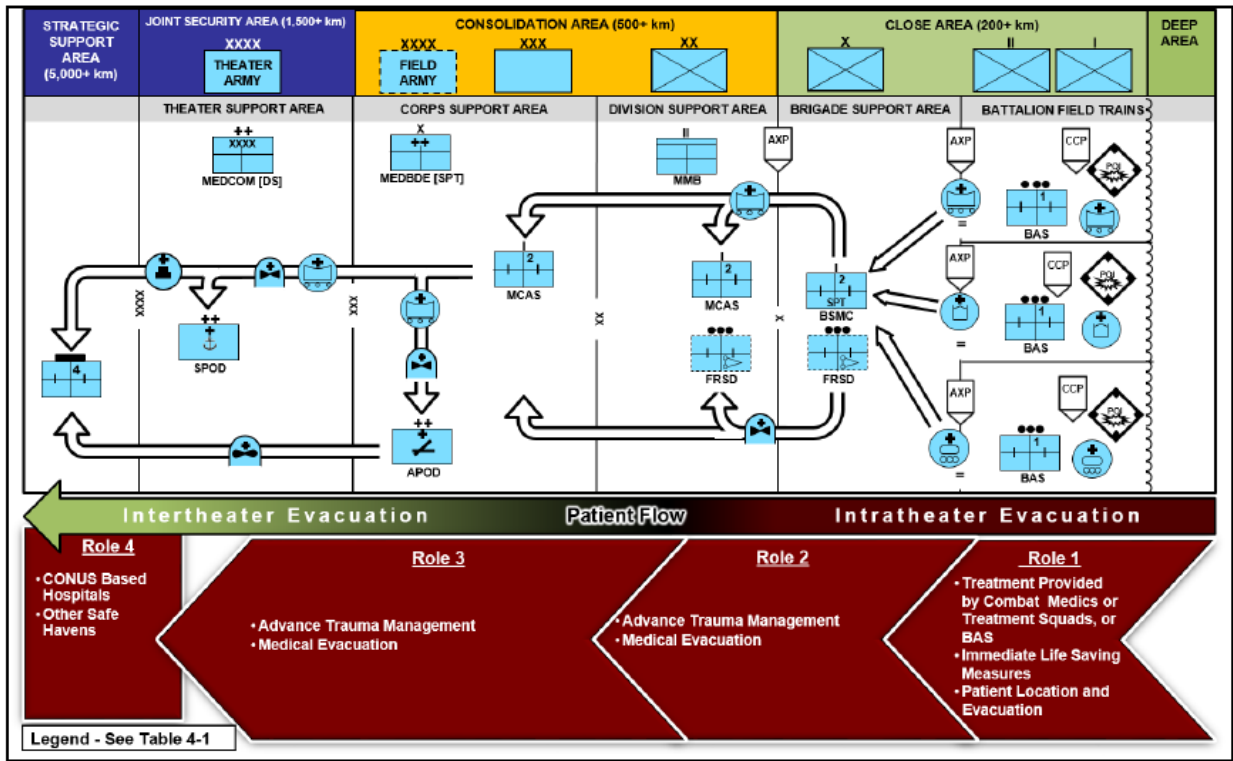
<sup>45</sup> FM 4-02, *Army Health System*, pp. A-3 to A-4.

### Figure 10 - Zelenopillya Rocket Attack

At 0440 on 11 July 2014, Russian forces massed on the border with Ukraine fired a barrage of 122mm rockets over the border into Zelenopillya, Eastern Oblast, Ukraine. The final casualty numbers are uncertain, but Ukrainian officials confirmed 19 dead and another 93 wounded during the attack. The number of casualties without context is somewhat misleading; the targets included four transport trucks full of troops. During an attack that lasted only three minutes, the 1<sup>st</sup> Battalion, 79<sup>th</sup> Mykolaiv Airmobile Brigade was completely destroyed. The dead included the state commander of the Border Guards.

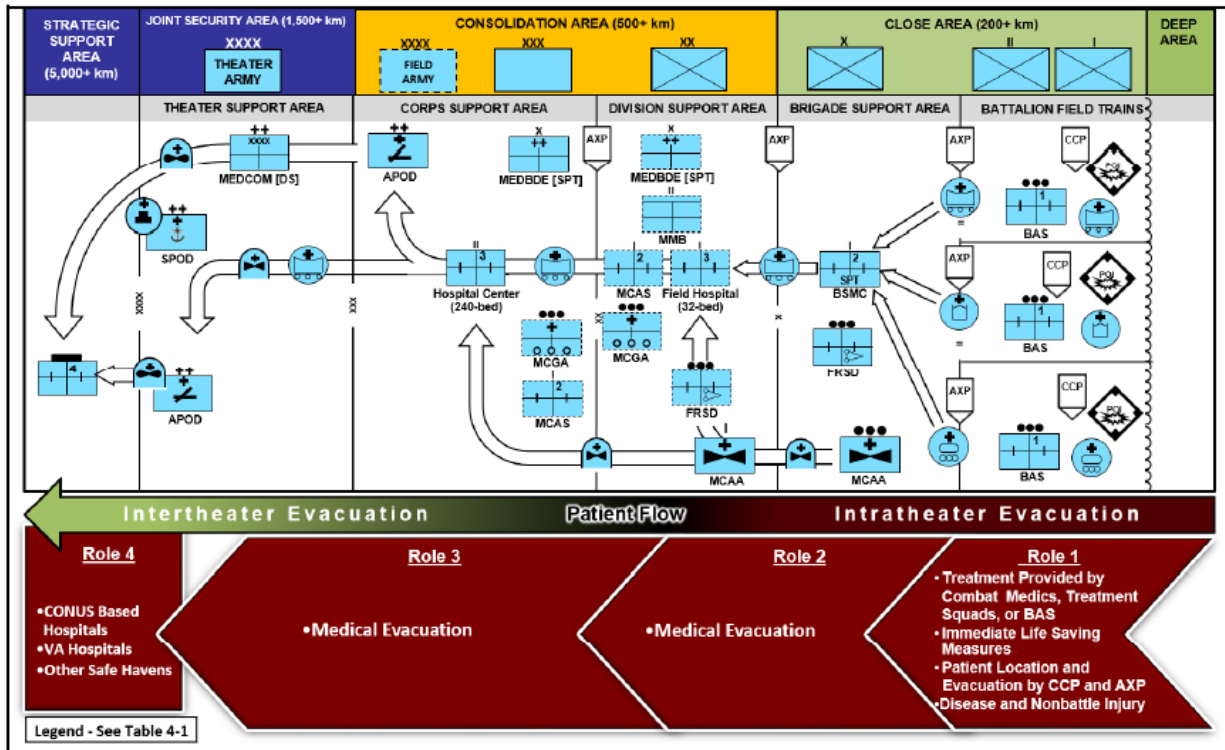
Source: Shawn Woodford, "The Russian Artillery Strike That Spooked The U.S. Army," *Mystics and Statistics*, 29 March 2017, <http://www.dupuyinstitute.org/blog/2017/03/29/the-russian-artillery-strike-that-spooked-the-u-s-army/>.

Figure 11 - Medical Treatment in LSCO



Source: Army Health System Doctrine Smart Book, 176.

Figure 12 - Hospitalization in LSCO



Source: Army Health System Doctrine Smart Book, 177.

Mass casualties have been treated and transported in previous American wars.

### Figure 13 - Mass Casualties in the World Wars

#### *The World Wars*

The Army needed large hospitals in France in World War I. Ships took approximately 10 days to travel between New York City and France, and hospital ships faced the threat of submarines and also did not have abundant resources for care of Soldiers. Soldiers who were expected to recover within 120 days remained in France. Thus, all the base hospitals put together had 157,000 beds, and camp hospitals had 25,000 beds total. Convalescent facilities had 20,000 cots in all. Also of note, influenza, not just battlefield casualties, filled those beds.

World War II ships faced threats from the air, not just the sea. Only nineteen percent of Soldiers needing medical attention (121,000) were flown back to the US (they were carefully selected due to limited medical support available on airplanes); 518,000 returned home by ship. Like World War I, Soldiers who could recover in 120 days remained overseas. The European Theater of Operations had over 100,000 “fixed beds” and the Pacific Theater the same and (the Pacific had more complexity in transport because of the great distances). The Mediterranean Theater had about 50,000. In the US, 153,000 beds were available in general hospitals for the more severely wounded and 101,000 at station hospitals for those who needed less attention.

Source: Sanders Marble, “Larger War, Smaller Hospitals?,” *Military Review*, July-August 2020, 23-25.

### Figure 14 - Mass Casualties in Korea and Vietnam

#### *Korea and Vietnam*

During the wars in Korea and Vietnam, wounded Soldiers could be evacuated by helicopter in country. (One cannot mention Korea and neglect MASHs, established in far forward locations, but beyond the range of enemy artillery. MASHs filled a gap seen in World War II, between the division clearing stations and theater hospitals in the rear.) Many wounded Soldiers needing advanced care in Korea were flown by plane to hospitals in Japan, which had been established during the post-World War II occupation. Thus, large hospitals were not needed in Korea. En route care had not advanced adequately to allow for airplanes to fly patients rapidly back to the US, so Soldiers had to be stabilized in Japan before returning home. When combat was minimal, the 120-day evacuation policy came into effect.

Large in-country hospitals were not needed in the Vietnam War either. Due to the irregular nature of combat in Vietnam, medical personnel shifted around to hospitals at stationary bases closest to the combat, more than combat hospitals themselves were moved. Out-of-country hospitals supporting combat operations, in addition to those in Japan, included one in the Philippines (Air Force), and one in Okinawa. En route capability remained the same as during the Korean War, while the evacuation policy was cut to 30 days. Soldiers who could recover within that time frame stayed in Vietnam. (Patients in Japan faced a longer evacuation policy—if recovering within 60 days, they would be sent back to Vietnam.)

Sources: Marble, “Larger War, Smaller Hospitals?,” 26-27; Brian M. Downs, “The Application of Operational Art to Health Service Support: A Case Study of the Korean and Vietnam Wars” (monograph, School of Advanced Military Studies, 2017), 29.

## Additional Considerations for Hospitals - Extended Stays, Workloads, and Prisoners of War

Several conditions may require a patient stay longer at an MTF during LSCO, including overwhelming casualty numbers, lengthy transport distances, and the patient's condition. In acknowledging the difficulties that will come with LSCO, ATP 4-02.10, *Theater Hospitalization*, stated that LSCO "may necessitate that patients receive care at each role of care to maintain their physiologic status and enhance the chances of survival." Lack of air superiority could also require casualties remain at a particular role of care longer than expected. Another complicating factor: patients exposed to bioagents may need to be held in theater for an extended time to prevent the agent from being brought to the US or even just across the border of another country. That situation could require additional personnel and isolation facilities.<sup>46</sup>

Additionally, in great power competition, the US may need to disburse its hospitals because the enemy will have more accurate missiles. If disbursed, those smaller medical facilities would not be able to take advantage of economies of scale, and require more resources and be less efficient. Many factors come into play when determining what kind of workload will exist at various roles of care in LSCO. The Army must have an adequate number of facilities, and the facilities must be fully staffed. Neither of these imperatives is assured.<sup>47</sup>

The pushing of role 4 hospitals farther from combat not only limits the level of care US Soldiers can receive in proximity to combat, but also the care enemy prisoners

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<sup>46</sup> ATP 4-02.10, *Theater Hospitalization*, pp. 1-3 and 5-13.

<sup>47</sup> Chan, comment on draft, 20; McFarland, comment on draft, 20.

of war (POWs) receive. Per the Geneva Conventions, enemy POWs must be given the same care as friendly forces. In addition to potential POWs, injured civilians might also require treatment. One of the challenges medical personnel faced in ODS, even with an overabundance of beds, was considerable numbers of refugees and prisoners of war. That could be a challenge in the next war.<sup>48</sup>

#### **IV. Conclusion**

The Army Health System's goals in supporting LSCO include removing casualties from the combat area so troops can maneuver and returning Soldiers to duty as close to the front as possible. Breakdown at any point in the Army's medical battlefield treatment system—perhaps due to an inability to evacuate in an expected timeframe, or a lack of capacity to care for overwhelming casualties—would have repercussions. Wounded Soldiers might not receive care in a timely manner and could face longer recoveries or even death; those casualties accumulating without care could cause potential RTD Soldiers to become non-RTD, thus reducing combat strength; Soldiers having to return to CONUS for care previously received near the theater would further reduce the ability to rebuild combat power; and loss of Soldier morale and national support could occur if Soldiers appear to suffer or die due to perceived lack of medical capability and preparedness.<sup>49</sup>

As the Army modernizes combat power to prepare for LSCO, Army leaders must also address the lack of capacity in hospital beds, operating tables, and evacuation for the mass casualties that will come with LSCO. The medical community must assess its

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<sup>48</sup> ATP 4-02.10, *Theater Hospitalization*, p. 6-1; Lodi, "The Army Medical Department and Full Spectrum Operations," 12.

<sup>49</sup> FM 4-02, *Army Health System*, p. 2-2.



options and create a system flexible enough to move with LSCO, yet large enough to support mass casualties. The Army Health System must prioritize increasing its capacity to provide wounded Soldiers the care they deserve.

## V. Key Points and Recommendations

- Recognize that what worked for OEF and OIF will not work for LSCO. The over-reliance on air evacuation could come to haunt the US in LSCO.
- Understand that with the current medical set-up, there may not be enough hospital beds or operating tables for the wounded.
- Increase the number of small surgical teams, like FRSDs, capable of operating close to the front.
  - These mobile groups can fill in the gap when evacuation is difficult. (The groups do become less mobile as they accumulate more patients. Careful coordination is required to determine which medical facility should move to where needed in LSCO.)
  - Due to the critical nature of their duties and the necessity of teamwork, “The Army must develop and employ these specialized [surgical] teams much the same way as special operations teams are developed and employed now.”<sup>50</sup>
- Develop new hospital formations that merge 21<sup>st</sup> century medical advancements with a holding capacity similar to the field army and theater hospitals of World War II and Korea.<sup>51</sup>
- Have surgical hospitals that will hold the wounded in the short-term at division level.<sup>52</sup>

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<sup>50</sup> Leona C. Knight, “Casualty Evacuation in the Contemporary Operating Environment (monograph, School of Advanced Military Studies, 2002), 46.

<sup>51</sup> Downs, comment on draft of this study (23 June 2021), 37.

<sup>52</sup> Marble, comment on draft, 35.

- Utilize Patient Care Augmentation Detachments (PCAD): three-person teams (10 teams per PCAD) that could go as far forward as a battalion aid station, which would allow longer patient holds since delayed evacuations are anticipated. The teams could also accompany WIA being evacuated via CASEVAC.
- Employ unmanned aircraft systems for CASEVAC, or a medic and patients.<sup>53</sup>
- Reinforce first aid training for all Soldiers—“If great numbers of extensive facilities cannot be had, the Army must make up the lifesaving potential by pushing skills and resources further downward. Thus, the keys to casualty survival will be effective first aid and lifesaving emergency surgery on the battlefield.”<sup>54</sup> Options include:
  - Tactical Combat Casualty Care: <https://jamanetwork.com/journals/jamasurgery/fullarticle/1107258>
  - Prolonged Field Care: [https://mrhc.amedd.army.mil/index.cfm/media/articles/2017/prolonged\\_field\\_care\\_the\\_new\\_normal](https://mrhc.amedd.army.mil/index.cfm/media/articles/2017/prolonged_field_care_the_new_normal)
- Assess risk routinely. Large hospitals may be required for mass casualties, though those hospitals may be a target. Air evacuation will be more challenging in LSCO; the potential loss of MEDEVAC flights may need to be accepted.
- Avoid the “Walker Dip” of losing medical lessons from previous wars. In this round of adjusting for the next conflict, learn from what was done right and wrong in previous wars and operations.<sup>55</sup>

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<sup>53</sup> Marble, comment on draft, 35.

<sup>54</sup> Knight, “Casualty Evacuation in the Contemporary Operating Environment,” 45.

<sup>55</sup> Named for Surgeon Commodore Alasdair Walker, Medical Director of the United Kingdom’s Military Health Services, who at a 2013 symposium described how between wars since the Crimean War, the British failed to hold onto medical lessons learned and improvements through the next war. Americans have suffered from the same dips from Civil War to Afghanistan and Iraq (Robert L. Mabry,

## VI. Considerations beyond the Scope of this Study

### Personnel

- What percentage of medical units and personnel are in the Reserve Component? Unless extenuating circumstances dictate otherwise, most will not be available until 4-6 weeks after mobilization due to training requirements, and the duration of their active service may be limited. In ODS, over 50% of the medical units deployed were Guard and Reserve.<sup>56</sup>
- Reserve Component call ups could deplete numbers in DOD, Veterans Affairs, and National Disaster Medical System hospitals. In DESERT STORM, active duty medical officers who deployed were replaced at their military hospitals by reservists. Reservists filled the remaining openings in deploying units with the Professional Officer Filler System (PROFIS). Over 87,000 medical personnel were on active duty by February 1991, the most since World War II. Yet, “these actions notwithstanding, the growing deployment stretched the medical establishment *nearly* to the breaking point, especially in Europe.” In LSCO, how soon will the medical community reach its breaking point in filling slots for deployment and stateside medical responsibilities for Soldiers and families?<sup>57</sup>
- How ready will the civilian world be to fill gaps left by those Reserve officers leaving or retirees being recalled?

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“Challenges to Improving Combat Casualty Survivability on the Battlefield,” *Joint Forces Quarterly* 76 [1<sup>st</sup> Quarter 2015]: 83-84; Stephanie A. Kwornik, “A Dedicated Army Medicine Trauma Care System” [strategy research project, Army War College, 2017], 2-3).

<sup>56</sup> Barger, “Cold War Health Service Support,” slide 37.

<sup>57</sup> Headquarters, US Transportation Command, DRAFT “USTRANSCOM Continental United States (CONUS) Patient Distribution Plan 9008-18,” January 2018, vi; Rostker, *Providing for the Casualties of War*, 196.

- Increase direct commission opportunities for medical personnel, to fill needs.

## Training

- While many Reserve medical Soldiers are professionals and paraprofessionals in their civilian roles, concern exists that some do not get sufficient relevant clinical time because they are not working in positions with responsibilities applicable to their war-time military employment. “Just-in-time” trauma training serves as the current fix. Is that training adequate? If not, what should be added, and at what cost?
- Invest in clinicals and training for those who will be on the frontlines. What good are the evacuation and equipment if personnel are not properly trained in trauma care?
  - During the recent operations in the Middle East, “not every deployed FST received such training [at an Army trauma center, both refresher and new], and many of the deployed surgeons felt they were not adequately prepared to operate in the combat environment.” The Army has plenty of combat medics, but doctors and nurses trained for field hospital work (v. CONUS hospital work) tend to be in short supply.<sup>58</sup>
  - Prehospital deaths decreased in OEF and OIF, while the percent who died of wounds (died after arriving at a treatment facility) increased, both during those operations and compared to other wars. The ability to quickly evacuate is one reason. Another consideration: “Some inpatient providers and their teams may have been inadequately

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<sup>58</sup> Rostker, *Providing for the Casualties of War*, 427.

prepared to care for the extreme multiple-injury casualties encountered during these conflicts.”<sup>59</sup>

- The Center for Army Lessons Learned determined that, “Commanders at the brigade, division, and even installation levels need to relieve their medical personnel from the garrison architecture for certain periods to accomplish the necessary tactical training and prepare for LSCO. . . . Company- or BN [battalion]- level training creates medical training opportunities that are generally underused.”<sup>60</sup>
- Efficiently track training and clinical currency through the Individual Critical Task List (ICTL), or a similar tracking system such as the Digital Training Management System (DTMS). Some personnel need to maintain a high level of readiness, while others could be up-skilled as needed. These systems would aid in tracking the level of readiness of medical personnel.
- The Army does not have enough surgeons (27 trauma surgeons and 80-90 general surgeons as of April 2021). Additionally, many surgeons do not get enough trauma surgery experience to be prepared for deployments. Some are not even appropriately used by the Army: general surgeons have been assigned to MTFs when not needed for training or deployment. They should be assigned to level 1 trauma centers. According to COL Fandre in 2020, “The current manning of board-certified orthopedic and general surgeons

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<sup>59</sup> Jeremy W. Cannon and others, “Comprehensive analysis of combat casualty outcomes in US service members from the beginning of World War II to the end of Operation Enduring Freedom,” *Journal of Trauma and Acute Care Surgery*, 89, no. 2, supp. 2 (Aug 2020): 13.

<sup>60</sup> CALL, *National Training Center: Preparing for Large-Scale Combat Operations*, 154.

(active and reserve) is around 30 percent.” He noted that senior leaders and decision makers “need to be prepared for probable need of a medical draft when LSCO occurs.”<sup>61</sup>

## Infrastructure and Supplies

- Consider utilizing unmanned aircraft systems (UAS) for prolonged field care medical resupply, since medical resupply tends to be interconnected with resupplying Soldiers with food and ammunition. With UAS, there would be less fight for priority.<sup>62</sup>
- Since the military has followed the civilian healthcare model of shifting to outpatient care over inpatient, the pool of available beds in CONUS has diminished. How quickly will civilian and military CONUS hospitals fill with mass casualties due to providing role 4 care for wounded Soldiers? According to COL Fandre, “Military treatment facilities and Veterans Affairs hospitals do not have the capacity to house a large number of casualties. In order to correct this problem, there must be a nationwide effort to coordinate efforts through the U.S. Department of Health and Human Services and the National Disaster Medical System.”<sup>63</sup>
- In ODS, Saddam Hussein allowed a buildup of supplies, equipment, people, etc. Future adversaries likely will not allow that, and the US may need the element of surprise. The lack of air superiority in near-peer/peer conflict will challenge the

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<sup>61</sup> Craig McFarland, “Sharpening the Scalpel: General Surgeon Management for the 21st Century,” (Research Project, US Army War College, 2021), 5, 21; Fandre, “Medical Changes Needed,” online.

<sup>62</sup> Downs, “The Application of Operational Art to Health Service Support,” 30.

<sup>63</sup> Barger, “Cold War Health Service Support,” slide 50; Fandre, “Medical Changes Needed,” online.

Army's ability to re-supply hospitals, especially those not in secure areas. The US medical supply system must prepare to meet the demand in LSCO/mass casualties. The dearth of personal protective equipment at the start of the COVID-19 pandemic provides an example.

### **CBRN Preparedness**

- Is the Army prepared for LSCO-level CBRN injuries?



## Appendix A - 1991 and Current MEDEVAC Modified Tables of Organization and Equipment

MEDEVAC	1991	current doctrine (2014)	
<b>Medical Ambulance Company</b>	Headquarters and 3 ambulance platoons with 12 ambulances each	<b>Maneuver battalion medical platoon ambulance squad</b>	From point of injury, casualty collection point, or ambulance exchange point to BAS
	Single lift capability: 144 litter patients or 288 ambulatory from division medical units		Supporting maneuver force company
	Assigned to the corps medical brigade on the basis of one per division supported		Four teams of two ambulances (Stryker BCT has four-wheeled evacuation vehicles and Armored BCT has eight tracked)
	Option of 18 buses (36-45 passengers) instead of 36 ambulances, which increases single lift capability to 324 litter and 792 ambulatory	<b>Medical company (brigade support battalion), evacuation platoon</b>	Ground medical evacuation for maneuver battalions of the BCTs
<b>Medical Company (Air Ambulance)</b>	Support combat zone (CZ); allocated to the corps based on one per four divisions and one per task force not supported by other air evacuation assets		10 evacuation teams, using a wheeled ambulance (tracked ambulances for armor BCTs)
<b>Medical Detachment (Helicopter Ambulance) and Medical Detachment (Ground Ambulance), Medical Evacuation Teams</b>	Evacuate to and between MTFs or to a location for evacuation out of theater	<b>Medical company (air ambulance) (HH-60)</b>	MEDEVAC for an AO
	<i>Team RA, Air Ambulance (UH-1V)</i> - 6 UH-1Vs (4 litter and 4 ambulatory each, or 6 or 9 ambulatory); 2 teams per division supported, 1 team per separate brigade-size task force, 1 per hospital center		4 forward support medical evacuation platoons (3 HH-60s each)
	<i>Team RG, Air Ambulance (UH-60A)</i> - 6 UH-60As (4 litter and 1 ambulatory each, or 6 litter and 7 ambulatory, or 13 ambulatory); 2 per division, 1 per separate brigade-size task force, 1 per hospital center	<b>Medical Company (Air Ambulance) (Light Utility Helicopter)</b>	Assigned to expeditionary Combat Aviation Brigade

	<i>Team RE, Ground Ambulances</i> - Six 1¼ ton vehicles; 4 litter or 6 ambulatory patients each; could operate 3 bus ambulances with 18 litter or 42 ambulatory each; 1 team per division or approx. 40,000 CZ troops		2 medical evacuation flight platoons (each with 4 UH-72As)
	Assigned to US Army Medical Command (MEDCOM) or medical brigade; could be attached to other AMEDD command and control units as required		Total lift capacity: 16 litter patients or 40 ambulatory, or combination of 8 litter and 24 ambulatory
<b>Medical Company (Air Ambulance) (UH-1V or UH-60A)</b>	Provide AE and support within theater of operations	<b>Medical Evacuation Flight Platoon</b>	Assigned to an AO (normally within the US)
	Assigned to the medical brigade and usually also headquarters and headquarters detachment, medical battalion (evacuation)		4 UH-72As
	15 helicopter ambulances - UH-1Vs in single lift: 90 litter patients or 135 ambulatory; UH-60As: 90 litter or 105 ambulatory, or 195 ambulatory	<b>Medical company (area support) ambulance platoon</b>	Wheeled
	Evacuates from as far forward as possible to division MTFs and corps-level hospitals.		From units and organic aid stations within the medical company's AO
	1 in direct support of each division or equivalent force without RA or RG teams, and 1 supporting the corps per two divisions or fraction thereof without evacuation support		4 ambulance squads able to be split into 8 ambulance teams
<b>Medical Company (Ground Ambulance)</b>	Evacuation within theater of operations	<i>Sources: FM 8-10, Health Service Support in a Theater of Operations, pp. 4-5 to 4-9; ATP 4-02.3, Army Health System Support to Maneuver Forces, June 2014, pp. 2-11 to 2-12, 2-23, 2-29 to 2-30; ATP 4-02.2, Medical Evacuation, p. 3-8.</i>	
	Assigned to medical brigade and further attached to a headquarters and headquarters detachment, medical battalion (evacuation)		
	40 truck ambulances; single-lift: 160 litter or 320 ambulatory		
	1 per division or equivalent, 1 per theater Army and corps supported, and as needed in COMMZ		

## **Appendix B - 1991 Echelons (Roles) of Evacuation**

- Echelon 1
  - By comrades and litter to a company aid post or collecting point.
  - Further evacuation to battalion aid station (BAS) by medical platoon ambulance.
- Echelon 2
  - By ambulance platoon of the medical company, from forward BAS and other BASs and units within the brigade area and division rear area.
  - By air ambulance from the forward support evacuation teams of the direct support air ambulance company (usually in brigade support area with the forward support medical company) from as far forward as capable.
- Echelon 3
  - By ground and air from division and corps facilities.
  - Must be efficient to avoid overwhelming numbers.
  - Corps-level evacuations, by ground and air, are of patients from division clearing stations, separate clearing stations, nondivisional dispensaries, and aid stations, to corps hospitals. The corps-level units are evacuation battalions, medical ambulance companies, medical companies, air ambulance, and air ambulance detachments.

- Echelon 4
  - From the CZ to COMMZ, or within COMMZ, for patients to have more definitive care.
  - By ground and air, perhaps US Air Force (USAF). (USAF usually evacuates from COMMZ to Zone of the Interior.)

*Source: FM 8-10, Health Service Support in a Theater of Operations, pp. 4-3 to 4-5.*

## Appendix C - Hospitals Deployed in ODS

deployable hospitals	
<b>MASH</b>	Corps level
	1 per division; 1 per separate brigade when no CSH support
	<i>8 in ODS</i>
	Resuscitative surgery and treatment of those who need to be evacuated
	Intensive care for up to 60 patients for 24 hours
	Four operating rooms (first shift, then two on second)
	Only hospital facility considered 100-percent mobile
<b>CSH</b>	Corps level
	1 per division or equivalent, or 1 per separate brigade
	<i>9 in ODS</i>
	Hospitalization in the CZ
	Assigned to the medical brigade and normally attached to a medical group
	Resuscitative surgery and treatment for those in critical condition who need further evacuation
	Surgical and medical services for patients remaining there
Intensive, intermediate, and minimal care for up to 200 patients (40 intensive, 80 intermediate, and 80 minimal)	
Routinely employed farther to the rear of the division boundary than the MASH	
<b>Evacuation Hosp.</b>	Corps level
	2 per division, assigned to medical brigade and normally attached to a medical group
	<i>22 in ODS</i>
	Most definitive care in CZ
	Resuscitative surgery and treatment for those in critical condition who need further evacuation
	Intensive, intermediate, and minimal care ward nursing for 400 (four intensive care wards for care up to 40, eight intermediate for up to 160, and 10 minimal for up to 200)
	Located in corps rear; patients from CZ
<b>Field Hospital</b>	CZ
	400 beds [ <b>much larger than today's modular field hospital</b> ]
	<i>3 in DESERT STORM</i>
	Hospitalization and treatment
	Could be divided into three 100 bed hospitalization units (HU), operating at separate locations for a limited time

	<ul style="list-style-type: none"> <li>• Each HU can provide intensive care for 10, intermediate for 60, and minimal for 30</li> </ul>
	<ul style="list-style-type: none"> <li>• Each HU is prepared for mass casualties--receiving and sorting patients, providing emergency medical and surgical care, and preparing patients for further evacuation</li> </ul>
<b>Station Hospital</b>	CZ
	300 or 500 bed
	<i>1 in ODS (being phased out at the time)</i>
	Hospitalization and limited outpatient services for a geographical area
	Assigned to the MEDCOM and normally attached to a medical group; may be attached to the hospital center
	300 bed configuration: 30 intensive care, 180 intermediate 90 minimal
	500 bed configuration: 50 intensive care, 300 intermediate, 150 minimal
	4 operating rooms in first shift and 2 in second
	Operate in semipermanent or permanent facilities and receive all classes of patients in their assigned geographical areas of responsibility; may take in overflow from general hospitals or CZ hospitals
	Patients who cannot be treated here evacuated to a general hospital; patients not RTD evacuated to CONUS via USAF
<b>General Hospital</b>	CZ
	1,000 bed <b>[no equivalent on today's battlefield]</b>
	<i>1 in DESERT STORM</i>
	Specialized and definitive hospitalization to theater army
	Assigned to the MEDCOM and normally attached to a hospital center; primary recipients of patients from all hospitals in theater
	Includes specialized care and treatment, and standard medical and surgical specialties
	Permanent facilities, rarely moved
	Patients may be RTD, moved to convalescence, transferred to another general hospital, or evacuated to CONUS; serves as the major link in the chain of evacuation and treatment for patients who cannot RTD in the CZ
	1,000 beds broken out to 100 intensive care, 600 intermediate, and 300 minimal
	6 operating rooms on first shift and two on second
<b>Medical Company (Clearing)</b>	Nonhospitalization facility with inpatient care
	Provides temporary holding

	Attached to corps or medical battalions and receives patients from nondivisional areas
	Maximum 240 patients
<b>Convalescent Center</b>	Nonhospitalization facility with inpatient care
	Which may be assigned to the medical brigade (for rapid RTD)
	In the CZ or COMMZ
	Prevent unnecessary evacuation of patients who require only convalescent care and physical reconditioning before RTD
	<i>Sources: FM 8-10, Health Service Support in a Theater of Operations, pp. 5-3 to 5-7; Barger, "Cold War Health Service Support," slide 36; Lewis Barger, comment on first draft of this study (11 February 2021), 25.</i>



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