The "Golden Hour" Standard

Trauma surgeons treating patient at Camp Taqaddam

U.S. Marine Corps (Jim Goodwin)

Transforming Combat Health Support

By GUY S. STRAWDER

Continuous improvement in immediate, life-saving treatment on the battlefield is an institutional obsession within military medicine. Combat medics, corpsmen, nurses, and surgeons return from contingency missions determined to save lives in future wars that were just beyond their reach in the last. At the heart of that conviction is the standard to which the entire brotherhood of military medicine must hold itself personally accountable: the *golden hour*, broadly the first 60 minutes following trauma or the onset of acute illness. The chances of survival are greatest if surgery or advanced trauma life support can be provided within that hour. While this standard may have formed the foundation of the Nation's civilian emergency medical service, it is forever rooted in the battlefield experiences of the military health system (MHS) in the previous century.

Military medicine's commitment to high standards and its mission, along with the experience derived in combat, has consistently produced major contributions to the larger body of medicine and increased understanding in advanced trauma care, burn

Lieutenant Colonel Guy S. Strawder, USA, is Director of the Prime Operations Division, TRICARE Management Activity.

therapy, and emergency surgery. According to the U.S. Surgeon General, Vice Admiral Richard Carmona, a former Special Forces medic in Vietnam:

Military medicine has led civilian medicine in many ways; particularly since World War II, when the generation before us first developed ways to provide combat casualty care as close to the battlefield as possible. . . . Military surgeons in all branches since the Civil War have led the way in improving the health of the Nation through their wartime experiences. From sanitation to infectious disease and combat casualty care, this country owes the military a huge debt of gratitude.[1]

More recent MHS efforts have emphasized advancements in communications, information technologies that facilitate decisionmaking, the miniaturization of diagnostic and therapeutic equipment to increase our capabilities in austere environments, and the advanced training of combat medics to enable them to function more independently in saving lives. Despite these profound enhancements in military medicine, however, there remains a disconnect between the increased sophistication of our treatment capabilities and the combat health support (CHS) system that employs them.

The current CHS architecture is generally planned and arrayed in five distinct levels for a contingency operation, which may extend from the forward line of troops (FLOT) all the way to the "brick-and-mortar" military and Veterans Affairs hospitals located in the United States. Each higher level represents an increased sophistication in treatment capability, but a decreasing capability with regard to tactical mobility and survivability. Joint and Service doctrinal definitions for each level of care vary marginally due to Service-specific support requirements, but they essentially complement one another. Each level is characterized by the features listed in figure 1.[2]

The CHS system is represented by this architecture and the sum total of all the military's structures, personnel, assets, and equipment organized for the purpose of maintaining a fit force, preventing casualties, and treating the wounded.[3] Ideally, this system should be able to exploit technologies and advanced practices—both medical and otherwise—and apply them in battlespace at the appropriate point and time to most effectively reduce mortality and morbidity. Unfortunately, we have yet to achieve the attributes of a genuine joint system that takes full advantage of all Service capabilities. Despite incremental improvements, the medical forces in the Services continue to function more as a composite, contingency organization rather than a single, seamless, interoperable CHS system.

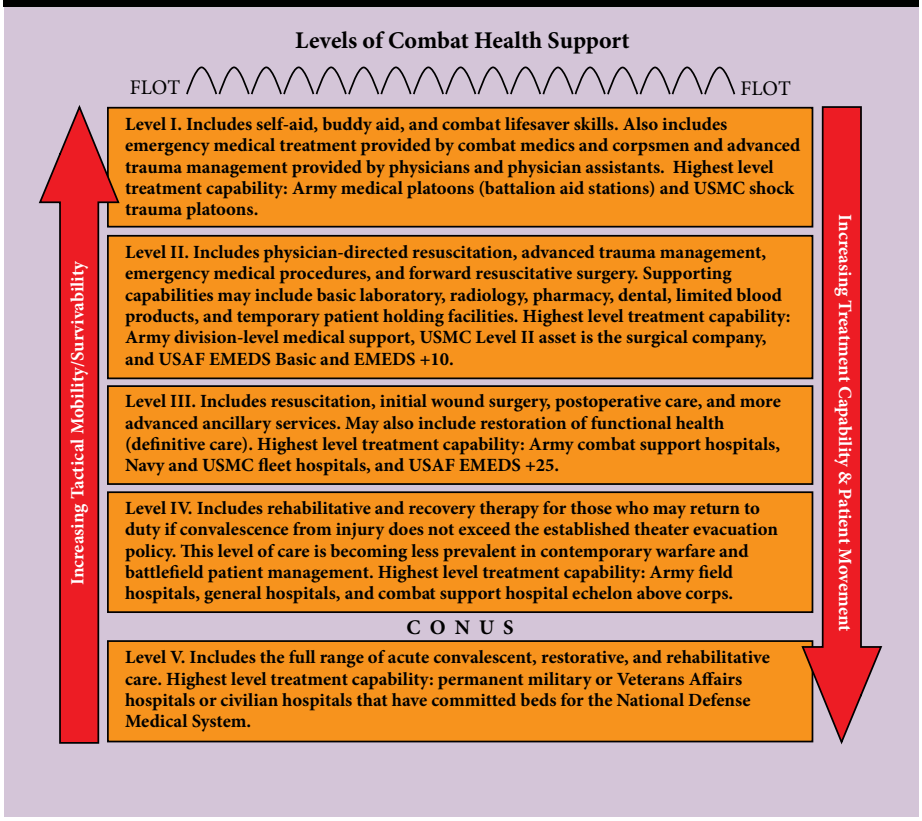
The Current System

Creating this transformed joint CHS system must begin with a common vision and a standard objective. First and foremost, it should emphasize structuring our operations and doctrine around the golden hour as the center of gravity, because the 60 minutes following trauma remain the principal standard that dictates the system's ultimate success or failure. Historically, wound data and casualty rates indicate that more than 90 percent of all casualties die within the first hour of severe wounding without advanced trauma life support. Actually, 67 percent die within the first 30 minutes, creating even more urgency for rapid access of the wounded by level I and II medical personnel.[4] An estimated half of the total die due to exsanguination (bleeding to death). Success remains firmly affixed to bringing the full measure of medicine to bear within that first 60 minutes.

We continue to collect and process the medical lessons learned from Operations *Iraqi Freedom* and *Enduring Freedom*, but two themes are clearly emerging. First, in spite of the outmoded design and structure of the CHS system, we are gradually migrating toward increased emphasis on deliberate joint operational planning and execution. Second, our Service operational planners are organizing medical resources with increasing regard to the actual point of injury and adopting a philosophy of far-forward placement of assets—in essence, to beat the golden hour. Both of these evolu-

there remains a disconnect between the increased sophistication of our treatment capabilities and the combat health support system that employs them

Figure 1



tions, however, can be largely credited to the creativity of commanders at the tactical and operational levels, who must often plan around the inefficiencies of the present CHS system design.

Secretary of Defense Donald Rumsfeld, in a speech on transformation at the National Defense University in January 2002, cited the success of the German military, which was technically only "10 or 15 percent transformed," with its use of *Blitzkrieg* in World War II: "What was revolutionary and unprecedented about the *Blitzkrieg* was not

doctrine continues to work in contradiction to innovations

the new capabilities the Germans employed, but rather the unprecedented and revolutionary way that they mixed new and existing capabilities."[5]

The essential components for a revolutionary change in the combat health system are similarly achievable today. In instances during *Iraqi Freedom* where units were thinking far-forward and joint, the successes were monumental and were responsible for a died-of-wounds rate of about 1 percent. The Air Force changed its doctrine to configure any available airframe in theater to transport casualties and went so far as to conduct aeromedical evacuations directly from level II facilities in the brigade area of operations. Far-forward surgery enjoyed unprecedented success. Forward Resuscitative Surgical Squads supporting the Marine Corps lost none of the casualties they received. For the first time ever, the Army attached a forward surgical team with every brigade committed. In certain circumstances, surgical assets were collocated with battalion aid stations. Some Army medical evacuation aircraft were positioned closer to maneuver units to facilitate immediate launch and movement of casualties from collection points to definitive care facilities. Information systems were fielded as far forward as the level I and level II units to provide surveillance against emerging medical threats throughout the theater. Improved equipment and therapeutics, including the use of fibrin-impregnated bandages, were credited with saving lives that once would have been lost.

Unfortunately, doctrine continues to work in contradiction to these innovations. It is possible to arrive at a point in every system where the value of modernizing each component is maximized. Genuine transformation means changing the shape, design, and even functional processes to respond to global shifts in technology, environment, and geopolitics. The charge against the military has always been that we continue to fight the last war. Transformation requires the vision to see the next war and the boldness to pursue the changes necessary to ensure success.

As Lieutenant General George Taylor, the Air Force Surgeon General, has stated, we have to become "light, lean, and responsive." Over recent years, this has become a euphemism for force reduction. Yet a strong case can be made within the context of current strategic requirements that medical personnel (along with military police, engineers, and civil affairs) should expand. Whether the requirement is for humanitarian assistance, stability operations, or intense combat, a robust medical capability has become indispensable for every contingency.

Respiratory therapist checking Iraqi soldier at Air Force theater hospital at Balad Air Base, Iraq

Air Force News (Lance Cheung)

Nonetheless, the present system has not changed remarkably since World War II. Largely designed by Colonel Edward Churchill, USA, around his concept of wound management, the medical support system "allowed forward hospitals to be more mobile, and concentrated more resource-intensive casualty care far to the rear in secure base areas where evacuation hospitals [would not be] required to move with changing tactical situations."[6] The primary objective of this concept was to maximize the number of Servicemembers we could return to duty in theater and was embedded in an operational precept that valued mass over speed as a principal of war. Today, we need medical units that are capable of rapid force projection and, once in theater, can enjoin an operational tempo that adversaries cannot sustain. We need flexible and adaptable units that can morph and function as commanders choose to dictate conditions and tempo on the battlefield. By creating this high-velocity environment, we can control the enemy's decision cycle and force him to wage a war he ultimately cannot win. To accomplish this, every battlefield operating system must be able to meet these preconditions of speed and adaptability. Without substantial change, the current combat health support system will not meet that challenge.

Soldiers providing first aid to victim after attack in Tal Afar, Iraq

Fleet Combat Camera Group, Pacific (Alan D. Monyelle)

In 2003, RAND completed a study that followed several Army transformation exercises to assess "the medical risks associated with emerging Army operational concepts and the capacity of the Army Medical Department to mitigate these risks."[7] In essence, RAND's charter was to determine if the envisioned CHS system was adequate for future Army combat operations. Their conclusion was, "Probably not." In the exercises they followed, the CHS system was overwhelmed with scenarios that introduced only modest casualties. Critical capabilities such as surgical capacity, evacuation assets, and logistics were quickly exhausted. Further, the health service architecture evaluated represented a "best-case scenario," and under more realistic circumstances the outcomes would have been even worse. In fact, the exercises required an operational pause to enable the CHS system to catch up with the other battlefield operating systems. The most disturbing finding was:

The fact that the HSS [health service support] *assets available to the future force UA* [unit of action] *battalion in this scenario (that is, all brigade assets, a CHS at division, and all the aerial medical evacuation assets allocated to the division) were probably more than what would reasonably be expected suggests that the HSS systems portrayed in these three workshops, even in optimized and undegraded states, were inadequate.*[8]

there is perhaps no function on the battlefield with more potential for exploiting joint capabilities than the combat health support system

The most recent transformation efforts of the Army Medical Department include plans for a more robust command and control structure for brigade-level medical CHS, but, by and large, the fundamental elements do not appear to have changed from 20 years ago. If we truly desire brigade-centric organizations, the medical support structure must be enhanced. The technologies envisioned by the Army Medical Department will undoubtedly improve operational capabilities and save lives, but their effectiveness will be limited if they are incorporated into an outmoded organizational design. The organizational structure for combat health support must be engineered to meet the known and expected challenges of planned contingencies, yet flexible enough to respond to less predictable scenarios. The design that is currently welded into the Army's transformation plans has been adequate for the past two decades but does not seem sufficient to meet the demands of the near future.

Transform and Perform

For purposes of describing a general concept of CHS transformation, the model proposed here uses the Army's maneuver brigade as its organizational structure; however, it likely is equally applicable to the Marine expeditionary brigade. The three main recommendations below are especially relevant to the Army's vision in the creation of brigade units of action. Ultimately, these brigades will replace the division as the primary Army warfighting unit, and the CHS system that supports them must be reengineered to support this doctrinal shift. All the battlefield operating systems in these

brigades must have command and control capabilities to operate independently, unit architecture that allows them to deploy flexibly, and subordinate units that can project rapidly and sustain significant combat power. Moreover, this redesign must support the ability to perform in a more joint fashion. There is perhaps no function on the battlefield with more potential for exploiting joint capabilities than the CHS system.

Expand level II medical support. Brigadier General Edward Usher, USMC, the Commanding General of the 1st Force Service Support Group, I Marine Expeditionary Force, in Operation *Iraqi Freedom*, has praised the performance of the forward resuscitative surgical squads that accompanied their level II medical units in direct support of Marines engaged in combat: "I didn't want to take them to war, but now I wouldn't go to war without them."[9] Every combat unit that directly witnesses a fully equipped and prepared medical support force at work can immediately appreciate its overwhelming value.

I propose an organizational design that would include a medical battalion as organic to the maneuver brigades. Medical platoons need to expand to company-sized elements. These medical companies would provide sufficient personnel to:

- outfit the rifle companies with a full complement of combat medics
- increase evacuation assets to support multiple casualty collection points
- adequately staff a battalion aid station to execute split-team operations
- provide medics for widely dispersed operational areas with regular support to scouts, mortars, and antitank units (which are not currently authorized organic medical support)
- transition the company's mission to area support for humanitarian civic assistance actions following combat operations.

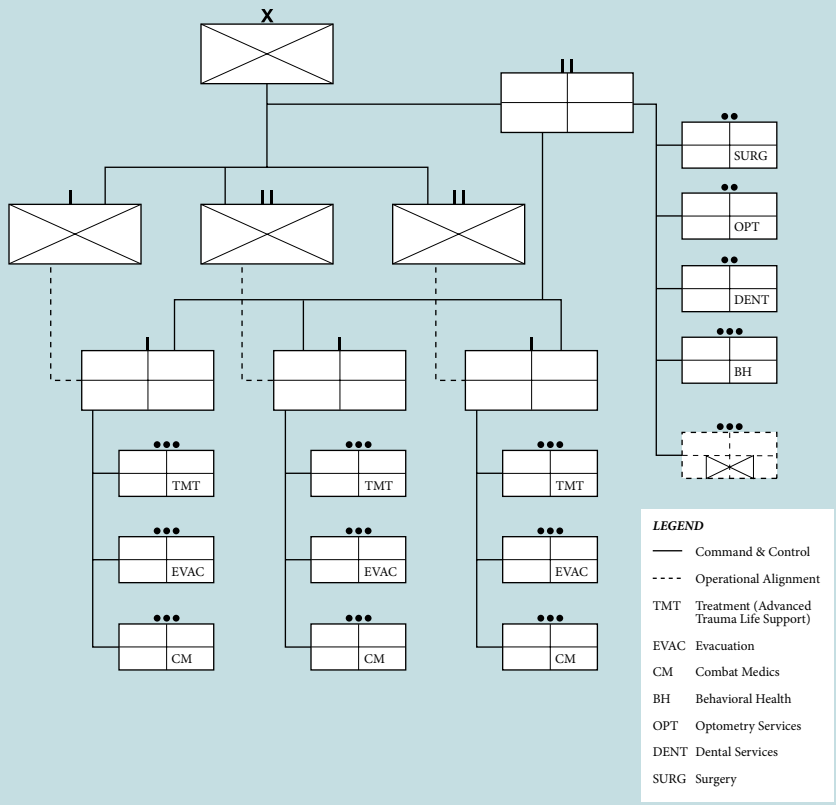
Each of these medical companies would continue to maintain a direct support relationship to the maneuver battalions as the medical platoons do now, but they would ultimately come under the command and control of a medical battalion commander on the maneuver brigade commander's staff. Assets under the immediate control of the medical battalion commander would include a forward surgical capability and other ancillary services, such as preventive medicine, dental support, laboratory, and radiology. A generic organizational design proposal is provided in figure 2.

This direct command relationship would provide the maneuver brigade commander with a comprehensive treatment and surgical capability allowing him to function independently from the forward support battalion. He owns the assets. Additionally, the medical battalion commander would have a vantage that allows him to view and direct all available medical assets consistent with the brigade maneuver plan in order to weigh the main effort of the operation and to reposition them in real time as conditions change on the battlefield. Above all, a medical battalion commander provides a seasoned leader on the brigade staff to integrate the combat support planning into the maneuver plan. He is also directly accountable to the brigade commander for the plans and policies that maintain a healthy and fit force (for example, vaccinations and dental readiness), prevention of casualties (such as medical intelligence reports and digitized surveillance of the area of operations), and providing a more effective life-saving capability for his wounded Soldiers or Marines.

A more subtle but no less important advantage in this transformational design is the mentoring and professional development that a medical battalion commander provides to junior medical operations officers in the maneuver brigades. Today's medical company commander must be able to: predict areas of casualty density, evaluate routes of evacuation and plan casualty collection points for use during the fight, deconflict airspace management for aeromedical evacuation routes with the brigade aviation liaison officer, determine how to tailor limited resources while still supporting the main effort, evaluate and coordinate the necessity for additional corps assets, plan and operate communications networks, precoordinate all fixed and rotary-wing aeromedical evacuation support, synchronize the efforts of every

Figure 2

Proposed Organizational Design for Combat Health Support in the Brigade Units of Action



Sailors evacuate wounded Iraqi soldier during Operation *Steel Curtain*

1st Marine Division Combat Camera (Michael R. McMaugh)

▲ *Download as wallpaper at ndupress.ndu.edu.*

medical platoon and section in the brigade area of operations, and other activities—all before the first shot is fired. It is a daunting responsibility for a young captain who likely has received little mentorship from a seasoned medical service corps officer during his career. Clearly, the operational constraint of the golden hour separates combat health support from every other logistic function.

Establish the joint theater hospital. This emphasis on the golden hour and level I and II units does not suggest a diminished role for level III hospitals. It does, however, point to a fundamentally different and more dynamic role than present doctrine allows. Five levels of care have been historically arranged, both tactically and operationally, to support a large, static, and linear theater of war and to displace casualties according to the severity of their conditions. The primary objective of the present CHS system is to maximize the return-to-duty rate to maintain as many warfighters in the combat zone as possible. Doctrine has since changed for combined arms operations, and technologies along with it, but the CHS system remains largely ensconced in the more dated paradigm.

The shortcomings in level III hospitals have become increasingly apparent as combat operations and tactics advance. After-action reviews from Afghanistan and Iraq, from both medical leadership and the line, continue to lament the lack of modularity and scalability of hospitals. The current design of Army combat support hospitals and Navy fleet hospitals is a Cold War relic: massive unit assemblages that are incapable of rapid force projection, immobile once they arrive in theater, incapable of echeloned movement to maintain continuity of support for maneuver units, and designed so rigidly that it is virtually impossible to tailor them to changing conditions on a high-tempo battlefield. A conceptual design for a joint theater hospital was outlined by the Joint Staff in 1997, the product of an enormous tri-Service effort under the rubric of *Joint Vision 2010/2020*. While the operational concepts of that effort have had some influence on subsequent operations, the force structure of level III medical facilities has not experienced commensurate change.

The Force Health Protection component of *Joint Vision 2010* advocated a single joint theater hospital design that could be adopted by all Services. This new level III facility would be capable of providing essential care in theater, as opposed to the more comprehensive care that could be gotten from existing combat support hospitals and fleet hospitals. The concept offers countless advantages over the current design. By focusing on essential care of casualties, a joint theater hospital could dramatically reduce weight and cubic volume of its equipment and supplies to facilitate more rapid deployment in support of contingency operations.

Furthermore, a joint theater hospital must assume a modular design that enables the unit to deploy in echelons. This provides two advantages. First, a small level III

capability could be quickly inserted with rapid deployment combat forces to provide surgery, patient hold, and a more definitive care capability consistent with requirements for the combat force buildup. Second, once a hospital is fully deployed in theater, it can move in sections (or echelons) to support the advance or other offensive operations of combat forces. This creates a tactical advantage that is impossible under existing designs. It also offers greater flexibility to commanders for quickly tailoring medical units for a broad range of contingencies—whether humanitarian assistance actions, stability operations, or more intense combat operations.

The joint theater hospital, by necessity, would be more dependent on responsive aeromedical evacuation assets that provide more sophisticated clinical capability for en route care. Recent experiences in Operation *Iraqi Freedom*, however, indicate that the Air Force may be prepared for this challenge. New changes in aeromedical evacuation doctrine, equipment, and organization are well synchronized with the demands of this transformed combat health system.

once units across all Services are equally equipped, trained, and functioning as joint hospitals, any Service could support the casualty flows from brigade medical units

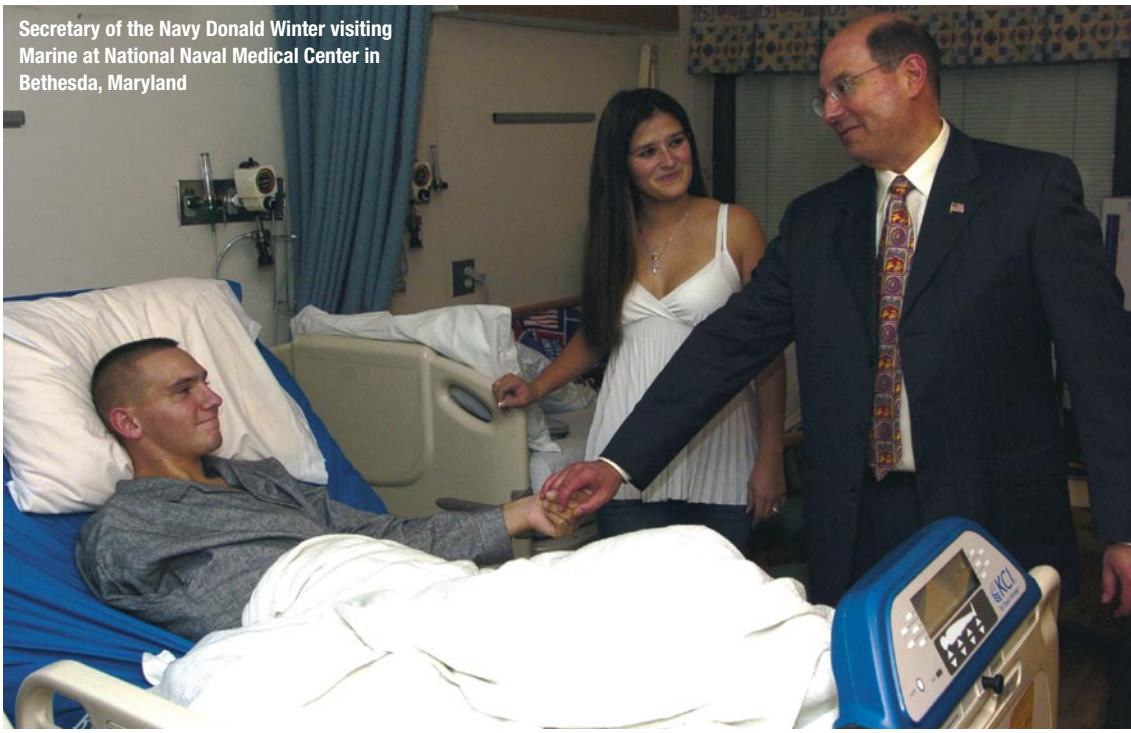
A single joint design also enhances interoperability between the Services. Combatant commanders and staff, as well as strategic movement planners, would now recognize a lone menu of options for hospital support, irrespective of Service color, to support the different phases of a given operation. Medical logistic support, biomedical maintenance repair, and general support maintenance are more easily facilitated when the whole CHS system is operating under a common set of requirements. The greatest benefit is the potential to leverage the entire inventory of medical personnel across the MHS to staff these hospitals. Service-specific requirements are less pronounced beyond the division rear boundary. The unit of productivity is essentially the same—treating the wounds and saving the lives of individual Soldiers, Sailors, Airmen, and Marines. Once units across all Services are equally equipped, trained, and functioning as joint hospitals, any Service could support the casualty flows from brigade medical units.

Streamline five levels of care to three. By expanding the resources of level II units, creating a more dynamic level III capability, emphasizing en route patient care to sustain stabilized patients, and using definitive fixed facilities outside of the combat zone, we can now pare the five-level system to three levels. Level I would represent brigade (division) level medical support, with no distinction between the battalion aid station and medical

Soldier and medic preparing for security convoy, Operation *Iraqi Freedom*

1st Combat Camera Squadron (Sarayuth Pinthong)

company capability since the full complement of advanced trauma and surgical care is organic to the medical battalion and can be employed wherever the battlefield dictates. Level II would represent the stabilizing care capability provided by the joint theater hospital. Level III would provide definitive care and is represented by any fixed facility positioned beyond the combat zone.



Secretary of the Navy Donald Winter visiting Marine at National Naval Medical Center in Bethesda, Maryland

1st Combat Camera Squadron (Sarayuth Pinthong)

Tenets for Critical Thinking

Transformation of any system must begin with a vision. General Peter Pace, Chairman of the Joint Chiefs of Staff, has stated, "I will tell you categorically that if we change none of our toys and simply change the way we think about how to apply them, we will have transformation on a very, very fast pace."[10] It would be easier to continue on our current path and accept incremental change to the current design, particularly given our successes in Operation *Iraqi Freedom*. True CHS transformation will invite controversy. An article in *Army Magazine* stated, "Army leaders must create an environment where critical thinking is the norm and reasoned debate replaces unspoken dissent."[11]

Can those who represent the MHS find a means to channel its collective energy, experience, and intellect to create a dynamic medical system that will more effectively serve the next generation of warfighters? Ideally, this discussion will provide a point of departure for further discourse, but perhaps most will agree on at least the following tenets:

- The design of the combat health support system must be capable of enjoining an operational tempo commensurate with that of the combat forces we support.
- We must commit ourselves to becoming a fully interoperable joint medical force—a seamless system that leverages Service core competencies for the entire theater and maximizes economies of scale for competencies that are not Service-specific.
- Medical assets must be planned and positioned as far forward as the tactical situation allows.
- Essential care must be provided in theater; effective en route care that sustains casualties can be furnished by all medical evacuation teams (ground and air), both intra-theater and inter-theater; and definitive care can be given by fixed facilities positioned outside the combat zone.
- We must beat the clock. We have only recently explored the advantages of forcing the full impact of American medicine into that first 60 minutes following trauma on the battlefield. It isn't simply a golden hour; every minute is golden.

Every attempt to press the limits of these tenets will result in a more responsive and joint CHS system that meets the challenges of the golden hour standard. The true benefit will be the lives saved. **JFQ**

NOTES

[1] Richard H. Carmona, "The Role of Military Medicine in Civilian Emergency Response," available at <www.surgeongeneral.gov/news/speeches/mercy07262003.htm>.

[2] See Department of the Army, Field Manual 8–10–6, *Medical Evacuation in a Theater of Operations: Tactics, Techniques, and Procedures* (Washington, DC: Government Printing Office, 2000), 1–8 through 1–10. See also Joint Publication 4–02, *Doctrine for Health Service Support in Joint Operations,* July 2001, II–2 through II–3, available at <www.dtic.mil/doctrine/jel/new_pubs/jp4_02.pdf>.

[3] The Joint Staff, "Force Health Protection: A Healthy and Fit Force, Prevention and Protection, Medical and Rehabilitative Care," *Force Health Protection Capstone Document,* available at <www.dtic.mil/jcs/j4/organization/hssd/fhpcapstone.pdf>.

[4] Russ Zajtchuk and Gordon R. Sullivan, "Battlefield Trauma Care: Focus on Advanced Technology," *Military Medicine* 160 (January 1995), 2.

[5] Donald H. Rumsfeld, "Remarks as Delivered by the Secretary of Defense, National Defense University, Fort Lesley J. McNair, Washington, DC, January 31, 2002," available at <www.defenselink.mil/speeches/2002/s20020131-secdef.html>.

[6] Thomas E. Bowen, *Emergency War Surgery: Second United States Revision of the Emergency War Surgery NATO Handbook* (Washington, DC: Government Printing Office, 1988), 1–2.

[7] David E. Johnson and Gary Cecchine, *Conserving the Future Force Fighting Strength: Findings from the Army Medical Department Transformation Workshops, 2002* (Santa Monica, CA: RAND, 2004), xiii.

[8] Ibid., 29.

[9] Joel Lees, presentation as delivered on the I Marine Expeditionary Force (MEF) Warfighters Medical Lessons Learned, Operation *Iraqi Freedom* Medical Lessons Learned Symposium, Arlington, VA, September 24–25, 2004.

[10] Rumsfeld.

[11] David A. Fastabend and Robert H. Simpson, "The Imperative for a Culture of Innovation in the U.S. Army: Adapt or Die," *Army Magazine* 54, no. 2 (February 2004), available at <www.ausa.org/webpub/DeptArmyMagazine.nsf/byid/CCRN-6CCSBU>.