Situational Triage

Redefining Medical Decision-Making for Large-Scale Combat Operations

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For more than a century, battlefield triage has identified casualties whose likelihood of survival could be improved by timely surgical intervention. Throughout America's twenty-first-century armed conflicts, operational and medical priorities have conveniently aligned, and the resources necessary to optimize casualty survival were routinely made a theater priority. This consensus, however, cannot be guaranteed in future large-scale combat operations (LSCO) characterized by prolonged engagements, multidimensional threats, restricted movement, and competing demands for resources. In such an environment, it will be necessary to employ a new, multifaceted model of situational battlefield triage that incorporates commanders' priorities and logistical constraints with casualty requirements into medical decision-making.

Recalibrating Acceptable Medical Risk

Medical decision-making is heavily rooted in the idea of acceptable risk, a term that is fluid and difficult to define. Clinical practice guidelines in emergency medicine, for example, commonly invoke an acceptable risk margin of roughly 2 percent: before discharging a patient, an emergency room provider should have at least 98 percent certainty that the patient is not suffering from a time-sensitive, life-threatening medical condition. Though most clinical decision-making tools are designed to minimize uncertainty, as the margin of residual risk becomes smaller, greater resource investment is required for further risk mitigation. In resource-constrained environments, efficient use of resources demands a greater margin of acceptable risk.

In recent conflicts, where optimal casualty outcomes rank among the highest of operational priorities, the level of acceptable medical risk approximates that of civilian models. Such concordance, however, cannot be assumed in LSCO. As operational risk increases, medical providers must alter decision-making algorithms to tolerate higher degrees of uncertainty.

In current generation conflicts, medical units are employed to mitigate risk to force, and there are

Previous page: A member of a joint force austere surgical team communicates triage information to the Joint Operations Center from a CH-47 in Iraq in January 2021. (Photo by Lt. Col. Brian C. Beldowicz, U.S. Army Reserve)

(Figure by authors)

Figure 1. Traditional Triage Categories

invariably operational and logistical costs of medical decisions that apportion risk to casualties, to commanders, to evacuation platforms, and to adjacent and remote medical units, shuttling patients forward and rearward based on individual and organizational risk tolerance. Medical providers must be accountable for how their decisions allocate risk across the spectrum of casualty care and operational authority. The model of situational triage proposed here provides both a shared vocabulary and preestablished mechanisms of communication between commanders and medical providers that will be imperative to balancing medical and operational risk.

The Need for Situational Triage

Prevalent triage models categorize patients into four groups, each designated by a universally recognized color that signals a casualty's priority for intervention and resources (see figure 1). These models generally subscribe to an egalitarian philosophy that assumes maximizing patient survival is the principal objective and consider only patient requirements and likelihood of survival in prescribing triage categories.

This article proposes a new model that utilizes familiar triage categories within the context of operational priorities. Such priorities are categorized into three variables: one determined expressly by the operational commander, one inferred by logistical priorities of support, and one assessed by the triaging medical provider. Rather than triaging casualties, this model triages interventions, leveraging the full spectrum of medical expertise across a breadth of providers to focus limited resources where they will most meaningfully influence outcomes.

Situational triage provides commanders flexibility in prioritizing resources in a complex battlespace, nesting medical decision-making and logistics within the commander's intent to better facilitate the desired operational end state. It provides a framework to systematically assess and address the harsh reality that injuries and deaths in LSCO will outpace available resources, reframing risk to force into actionable decisions.

Casualty Outcome Priority

Army Techniques Publication 4-02.55, *Army Health System Support Planning*, lists saving lives and ensuring early return to duty as priorities of medical planning, and over the last twenty years of conflict, the military has been able to project sufficient combat power and resources to simultaneously prioritize casualty survival and sustainment of operational momentum.[1] LSCO, however, will not afford a similar luxury.

Recent Mission Command Training Program Warfighter exercises (WFX) quantify force-on-force casualty volumes at scale and demonstrate the need for clear prioritization of effort. In LSCO scenarios with approximately one hundred thousand friendly forces, fifty to fifty-five thousand casualties are routinely incurred over eight days of maneuver. These numbers break down further, with thirty to thirty-five thousand casualties requiring evacuation out of theater, ten to fifteen thousand casualties able to return to duty, and ten to fifteen thousand casualties dying in action.[2] Put differently, 50 percent of a corps-size element will be injured or killed during peak LSCO maneuver. The logistical demands of the evacuation scheme are obvious, and strain on available medical assets (typically four combat support hospitals and ten forward resuscitative surgical teams per corps) rapidly exceeds mass casualty thresholds.

Left to historic standards of practice, medical decision-making will continue to prioritize survival, but operational considerations may demand different prioritization. Commanders must therefore shape medical decision-making by stating a standardized casualty outcome priority as part of operations orders, clearly and concisely articulating their intent for medical support within the larger operation.

To guide commanders' decisions, we propose four categories of operationally relevant casualty outcomes, specifically tied to operational and tactical demands:

- immediate return to duty,
- delayed return to duty,

- highly functional survival, and
- survival with potentially profound dysfunction.

Immediate return to duty is defined as management of an injury or illness that allows a combat-effective soldier to return to his unit without onward evacuation. This outcome may be prioritized when sustained manpower for an immediate engagement is of paramount importance.

The second potential outcome, delayed return to duty, describes the soldier who may be combat-ineffective for a period but will be able to regain his effectiveness without evacuation from theater. Such an outcome may be prioritized when the immediate threat is low, but conflict intensity remains high.

The third potential outcome is highly functional survival. In such instances, an ill or injured soldier will require evacuation from theater but maintains the potential to function independently and contribute to the ongoing effort, either on active duty or in some civic capacity. Such an outcome may be a priority when the nation's full resources have been mobilized for the war effort but the immediate need for the soldier's return to duty is limited.

Finally, there is the outcome of survival with potentially profound dysfunction. Often such casualties will consume a high volume of resources both in-theater and beyond, while a high risk of mortality persists, and the chance of an independently functional survival is low. This outcome may be prioritized in low intensity, politically sensitive conflicts where popular support for the war effort is at risk of deterioration, as has been the case for our most recent protracted conflicts in Iraq, Afghanistan, and elsewhere.

By clearly stating which casualty outcome priority applies by phase or subphase of an operation and defining conditions where it may be adjusted, commanders will provide specific guidance to all subordinate medical assets. Medical units can then guide decisions to either prioritize patient outcomes through aggressive treatment and evacuation or to steward resources to sustain forward combat power. This designation will adjust triage and treatment decisions at all roles of care and consequently attenuate demands on medical and logistics networks.

Medical Priority of Support

Priority of support is a command-driven designation, nested within each phase of an operation. It prioritizes various units, locations, and classifications of supply according to the evolving conditions of the battlespace. Logistical support of medical elements can be reduced to two major considerations: Class VIII resupply and medical evacuation of casualties (MEDEVAC) to the next echelon of care. Using these two core concepts, medical priority of support within an operation can be categorized as follows:

- Resupply and evacuation both available
- Resupply available; evacuation unavailable
- Resupply unavailable; evacuation available
- Resupply and evacuation both unavailable

In instances where timely resupply is available, low-density resources are less likely to impact medical mission capacity because it is expected that the

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limited resource can be replenished. These resources are then of lesser concern in triage decisions. In instances where timely evacuation is available, the total volume of a casualty's resource requirement is less of a consideration because a high consumer of resources can be evacuated to a more thoroughly equipped echelon of care.

Future LCSO will challenge the density of resources and freedom of movement that have come to characterize present operating environments; planners will need to ensure medical priority of support aligns with an operation's casualty outcome priority. To illustrate, when immediate or delayed return to duty are prioritized outcomes, Class VIII resupply of far-forward units should be a command priority. When casualty survival is of greater importance than sustaining manpower at the forward line of troops, MEDEVAC should be prioritized accordingly.

Similarly, assessing and defining medical priority of support will guide positioning of far-forward medical assets. A mission-capable medical element is a theater asset; a culminated medical unit is a command liability. While placing surgical assets in closer proximity to casualty-producing events has been credited with decreasing combat fatality rates to their lowest levels in recorded history, commanders will have to gauge the value of those assets in situations where they are at risk of reaching culmination before the desired operational end state is achieved.[3]

Casualty Resource Requirement

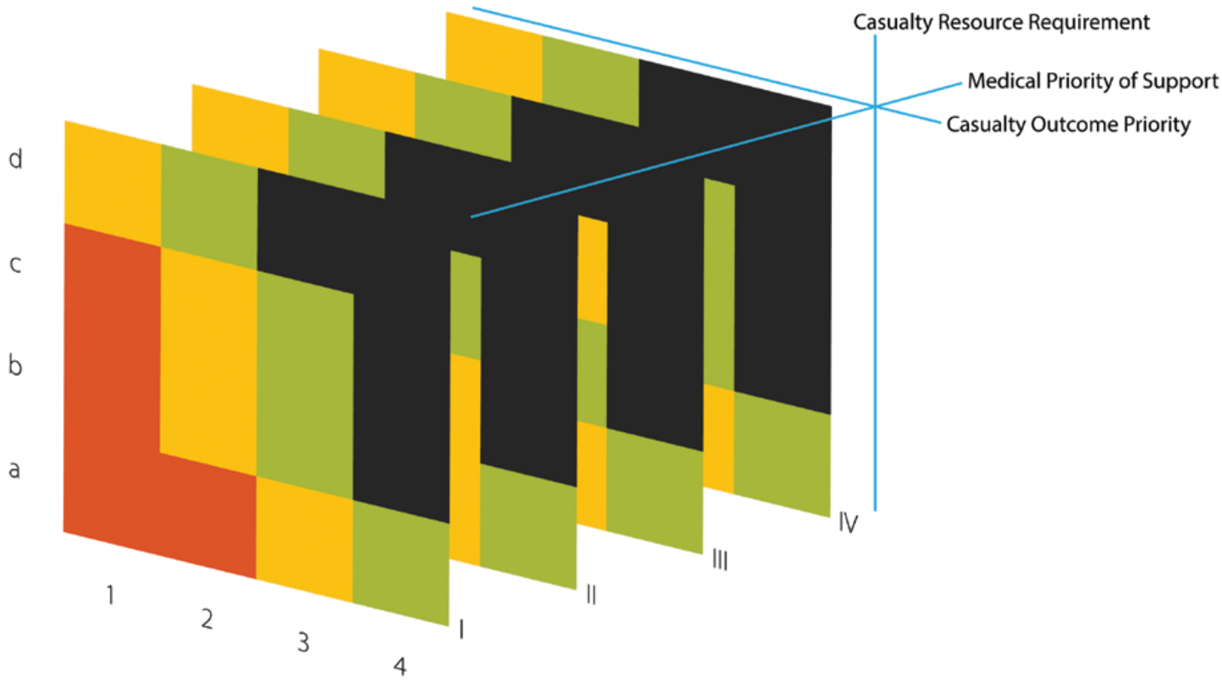
Patterns of injury and patient physiology at the time of triage inform an estimation of medical resources a casualty will acutely require. In a logistically unconstrained environment, egalitarian triage models seek to achieve the best possible outcome for the most possible patients with little concern for excess use of materials and resources. Considerable resources are committed to minimizing morbidity with only marginal influence on functional outcome or survival. In a constrained environment, however, the situational triage model requires utilitarian allocation of resources to best achieve the commander's prioritized outcomes for the most possible casualties.

A specific medical intervention should only be considered if it is likely to influence a casualty's outcome relative to the operationally relevant casualty outcome priorities described earlier. For example, if a casualty is predetermined by his condition to suffer a delayed return to duty regardless of intervention at a resource-constrained echelon of care, the medical intervention should only be undertaken if the resource expenditure will not undermine the capability of the medical element to support ongoing operations. If, however, an intervention has the potential to alter the outcome's categorization, for example from mortality to survival with potentially profound dysfunction or from highly functional survival to delayed return to duty, the intervention should be considered at the triaging echelon of care.

Casualty resource requirement is classified based on the scarcity and the total volume of resources necessary to achieve the higher priority of two or more possible outcomes. Resource density and total consumption are relative to a medical element's supply and projected operational demand. Depending on the situation, a scarce, or low-density, resource could include blood products, surgical intervention (based on both surgeon and instrument availability), mechanical ventilation, pharmaceuticals, or simply specialized medical attention, whether provided by a medic, nurse, advanced practice provider, nonsurgical physician, or surgeon. A high consumer is a casualty that will require extensive resources of varying availability. Casualty resource requirement is categorized as

- requiring few if any scarce resources and little total volume,
- requiring some scarce resources but small volume of resources,
- requiring few if any scarce resources but large volume of total resources, or
- requiring both scarce and a large total volume of resources.

A historical example of a low-density, high-scarcity resource consumer was the soldier who required penicillin for treatment of venereal disease contracted during World War II. Penicillin was available only in limited quantities, but by providing this precious resource to afflicted soldiers, they could be quickly returned to duty with minimal consumption of additional resources.[4] A high-density, low-scarcity resource consumer would be a blast victim who sustained a significant burn of greater than 20 percent of his body's surface area. Such a patient located at a



Colors indicate triage categories identified in figure 1. (Figure by authors)

Figure 2. Situational Triage Matrix

Role II medical facility may consume a mechanical ventilator, sedation, analgesia, and intravenous fluid in the first few days after the injury. If the medical unit is not inundated with additional casualties, all these resources are generally available in sufficient quantities. Similarly, disease nonbattle injury patients may consume hospital space, attention, and pharmaceuticals for multiple days, but not require any specific resource that is in low supply.

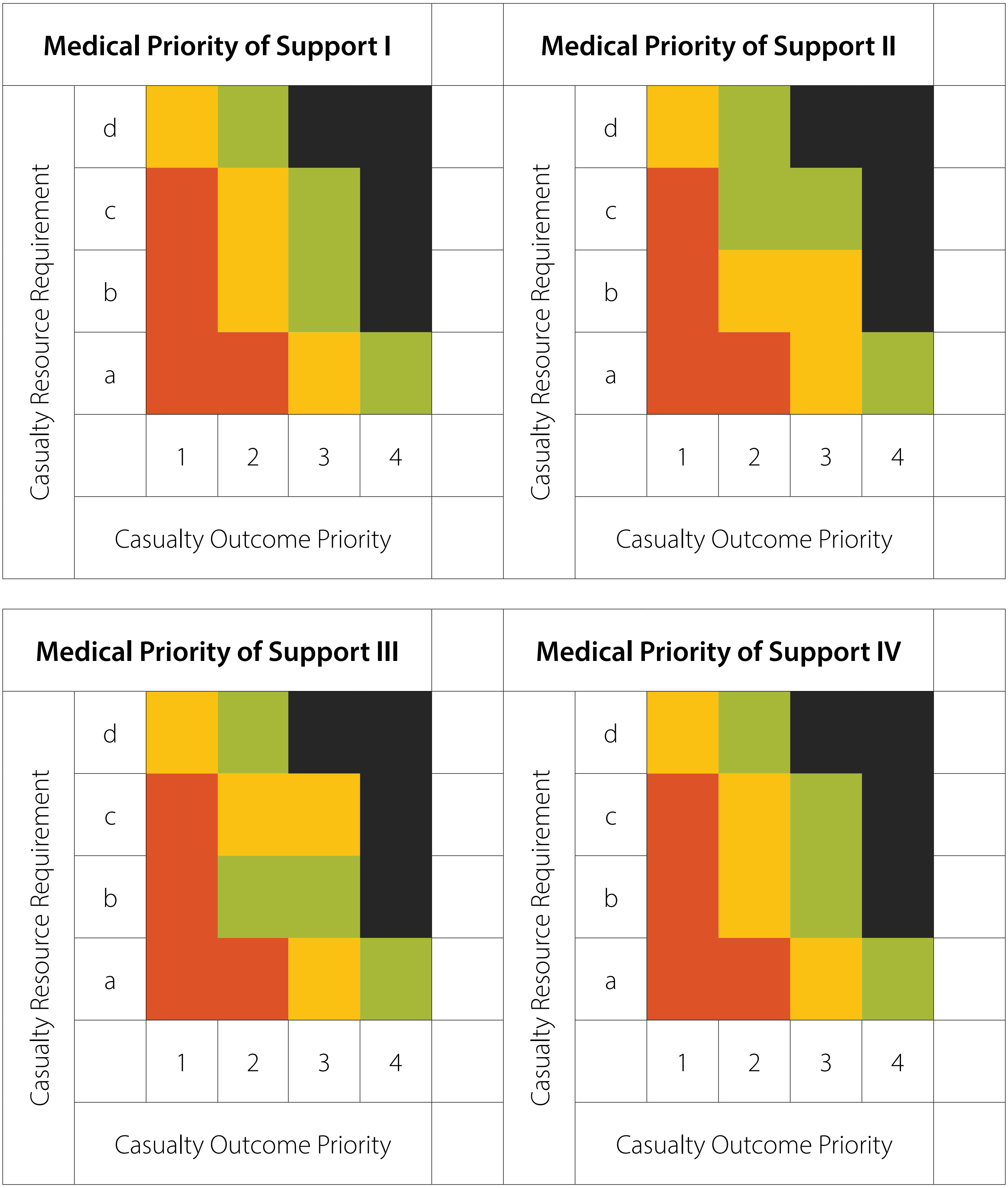
It is important to note that the overall casualty resource requirement is somewhat dependent on the skill and flexibility of the individual medical provider and the medical system. Not unlike the constraints placed on medical providers and facilities during the COVID-19 pandemic, medical providers in LSCO will be forced to make difficult decisions not only regarding who receives resources but also when to utilize secondary and tertiary treatment modalities in the interest of resource conservation. For example, sedation for patients connected to a mechanical ventilator is most commonly achieved with intravenous infusions, but in conditions where resupply and evacuation are unlikely and resources are scarce, sedation can be achieved with medications administered orally, nasally, or even rectally, though most providers lack familiarity experience with such practices.

Casualty resource requirement is an estimation that incorporates immediate resource demand and availability with projected requirements both for the casualty and ongoing operations. Whenever resource consumption can impair a medical unit's mission capacity, the situational triage framework should be considered in allocating that resource.

Situational Triage Model

Incorporating operational, medical, and logistical considerations into a single model results in a 4x4x4 matrix in which the casualty outcome priority serves as the x-axis, the casualty resource requirement as the y-axis, and the medical priority of support as the z-axis (see figure 2). Interventions can then be ascribed a traditional, color-based triage category in a manner that is informed by the commander's intent and operational constraints, enabling more effective allocation of resources to achieve the commander's prioritized outcomes for the most possible casualties.

The rank order of the four categories of operationally relevant casualty outcomes is applied to the



Colors indicate triage categories identified in figure 1. (Figure by authors)

Figure 3. Triage Categories Based on Medical Priority of Support

x-axis based on commander's guidance. The y-axis pertains to estimation of the resources required for a given intervention. Again, only interventions likely to influence both casualty outcome category and a unit's mission capability need to be subjected to triage categorization. The distribution of triage categories differs based on the medical priority of support (see figure 3, page 120).

Members of an austere surgical team perform an initial assessment on a mannequin specially designed to simulate a combat casualty during a joint training exercise in October 2020. (Photo by Lt. Col. Brian C. Beldowicz, U.S. Army)

Advantages of a New Understanding

Situational triage is an operations-centric, resource-conscious, outcome-specific decision framework that apportions resources to specific interventions most likely to have a meaningful effect on outcome. Left to its own biases, conventional medical triage is an exclusively medical decision that determines both treatment needs and logistical requirements. The realities of LSCO may, however, make it necessary to prioritize casualty outcomes other than survival.

Employed as a cognitive framework, situational triage ensures cohesiveness between operational and medical priorities, focusing resource investment on casualty outcomes and operational end states. Although the model may appear to create new demands on the operational commander and the planning process, it concentrates planning efforts on meaningful communication and prioritization in a way that will influence the execution of the support mission. Situational triage nests medical decisions within a commander's intent by clarifying necessary adjustments to medical risk tolerance, better aligning support priorities with operational priorities, and illustrating situations where modifications to standard treatment are both acceptable and necessary.

Though, like conventional triage, this model was developed for use in war, its principles are adaptable to any resource constrained environment or mass casualty situation.

Challenges of the Unfamiliar

Because of its requirement for multidisciplinary perspectives and its concentration on interventions rather than generalized "treatment," situational triage is significantly more complex than conventional triage and employing it as an algorithmic process is cumbersome. At the tactical level, isolating the consideration of each specific resource-consuming intervention will increase the volume and frequency of medical decisions compared to the generalized treatment considerations of conventional triage. In addition to the cognitive strain of a greater number of deliberate considerations, the process increases the potential for interprovider disagreement.

This model also expands the influence of commanders and planners into ethically challenging medical decisions. Any decision to prioritize a utilitarian ethical framework based on mission success rather than an egalitarian framework to maximize survival needs to be carefully considered, which is why treatment priorities should be informed by both command and medical perspectives. Such decisions require coordination of the most knowledgeable and experienced medical operations and medical officers available at both the strategic and tactical levels.

Conclusion

Large-scale combat operations will require novel interpretations of prioritized casualty outcomes, medical risk tolerance, and resource utilization that conventional triage models fail to provide. But nesting medical decisions within the commander's intent will be essential to optimizing the performance of medical support elements to meaningfully contribute to the desired operational end state in peer or near-peer conflict characterized by prolonged engagements, multidimensional threats, restricted movement, and competing demands for resources. Situational triage provides a framework for shared operational and medical understanding that ensures medical support is deployed with maximum effectiveness. ■

Notes

1. Army Techniques Publication 4-02.55, *Army Health System Support Planning* (Washington, DC: U.S. Government Publishing Office, March 2020).

2. Matthew Fandre, "Medical Changes Needed for Large-Scale Combat Operations: Observations from Mission Command Training Program Warfighter Exercises," *Military Review* 100, no. 3 (May-June 2020): 37, 42.

3. Russ S. Kotwal et al., "The Effect of a Golden Hour Policy on the Morbidity and Mortality of Combat Casualties," *JAMA Surgery* 151, no. 1. (January 2016): 15–24, https://doi.org/10.1001/jamasurg.2015.3104.

4. Victor W. Sidel and Barry S. Levy, *Physician-Soldier: A Moral Dilemma in Textbook of Military Medical Ethics* (Washington, DC: Borden Institute, 2003), 297.