Special considerations of military cardiothoracic surgeons

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Military cardiothoracic surgeons have unique perspectives, experience, and job demands. We attempt to operate a routine cardiothoracic surgical practice similar to our peers, but face some specific challenges. In this editorial we review our perspective on current military cardiothoracic surgery practice. We dedicate this discussion to the memory of our colleagues who paid the ultimate price and to the warfighters who are the reason for our existence. We will describe the current state of our combat surgical practice and peacetime/nondeployed practice because these are 2 distinct areas of life as a military cardiothoracic surgeon.

Throughout history, military conflict has led to advancements in surgical care.^{1–4} Many master surgeons have reviewed their military experience in publications and shared applications and implementations from military surgical practice.^{1,5}

Several concepts have emerged as a result of recent combat experience: the resurgence of the tourniquet, care of amputees, and Air Force critical care air evacuation teams (CCATs). Tourniquets are frequently used at the point of injury because they prevent massive hemorrhage and exsanguinations, allowing patients to reach surgical care. Modern tourniquets can be placed with a single hand by an injured patient, which also increases their use. Tourniquets are now a focus of the American College of Surgeons, whose leadership and experts are investigating implementing lessons from combat casualties into civilian trauma.⁶ Wartime extremity injuries have paved the way for an amazing new generation of prostheses and care for amputees. CCAT has revolutionized evacuation systems. CCATs provide mobile intensive care unit environments that can be used to transport patients out of a combat theater to sites with higher levels of care and more resources. Using CCATs, transport after damage control surgery has minimal

Patriotic American eagle.

Central Message

Perspectives on the current status of military cardiothoracic surgery in both combat and peacetime/elective practice.

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influence on a patient's continued care until he or she arrives at facilities with more resources and/or capabilities. This has significantly contributed to a decreased overall risk of dying from a combat injury in current conflicts.^{2,3,7–11}

Recent conflicts have yielded low rates of thoracic injury in allied forces, largely as a result of improvements in personal protective equipment for our combat troops. Surgical intervention for thoracic or vascular injury is required in only about 10% of cases.^{1,2,7–9,12} Although surgical intervention for thoracic injury is uncommon and index cardiothoracic surgical procedures are rarely performed in combat trauma settings, cardiothoracic surgeons contribute valuable skills to combat trauma management beyond the treatment of thoracic injuries.² McNeil and Pratt,² Propper and colleagues,³ Chambers and colleagues,⁷ Holcombe,⁵ Zouris and colleagues,⁵ and Ivey and colleagues¹³ have all separately published articles on the typical experience of thoracic surgeons and surgical elements during our recent conflicts. The general surgery training, proficiency in vascular techniques, routine care of critically ill patients, and familiarity with basic and advanced techniques for hemorrhage control make cardiothoracic surgeons well suited to provide initial surgical management of all traumatic injuries. Cardiothoracic surgeons can function extremely effectively as trauma surgeons in busy or mass casualty situations, or as experienced consultants to trauma surgeons. In addition, expertise in critical care management is a valuable asset in deployed settings.

In addition to the practical skills that deployed surgeons offer combat troops, military surgeons provide a sense of security and peace of mind to service members who travel outside the protective walls of bases and fortifications because they know we are waiting to help them if harm comes their way. There is a positive, palpable effect for the combatants who face the enemy more directly: They understand and appreciate our commitment to them.

Military surgical deployments are typically for periods of between 3 and 9 months, and military and transitional requirements lengthen the interval of inactivity in elective cardiothoracic surgery for an additional 2 to 3 months. The frequency and location of deployments have varied with military strategic surges, but thoracic surgeons are indeed currently deployed. Some surgeons find themselves very close to military action and thus in a busy surgical situation, whereas others find themselves with minimal work and located at a distance from active conflict. These deployments fluctuate to meet requirements of higher commands to support strategic military goals. Extended periods of clinical inactivity within our primary field are associated with a detriment in surgical skills upon the resumption of elective practice, particularly in the current environment of low cardiothoracic surgical volume practice at most military hospitals. There is also the potential for the deployment of cardiothoracic surgeons to influence the continuity of care and staffing levels of stateside military facilities, patients, and surgical education programs.

Although most military cardiothoracic surgeons practice both cardiac and thoracic surgery, the recent development of separate training pathways for thoracic and cardiac surgery dictates that more recent program graduates have a more focused practice. The relatively new development of integrated 6-year (I6) training programs may further influence the breadth and versatility that cardiothoracic surgeons will enjoy in the future. Military cardiothoracic surgeons are a limited resource, and when deployed may work alone without the benefit of general or trauma surgery support. Graduates of I6 programs will certainly be prepared for elective cardiothoracic surgical practice, and the I6 training programs are attracting some of the brightest students, but I6 graduates will have less experience in other areas of surgery. It is uncertain whether graduates from this new, integrated pathway will be able to provide the same contribution to military medical teams as their historical counterparts.

In general, nondeployed/peacetime elective cardiothoracic programs are and have been successful, but some significant challenges have arisen during the past decade. Military cardiothoracic surgeons in peacetime provide care for service members, their families, and retirees. As a result of policy changes in the military health care system during the past decade, more patients are receiving care in their local civilian network rather than at regionalized

military medical centers. Although these policy changes may provide greater patient convenience, the policies have been associated with a dramatic decline in cardiothoracic surgical case volumes at all military medical centers. Many facilities now struggle to maintain adequate cardiac and thoracic surgical volumes to ensure surgical proficiency. This decline in case volume has also led to the closure of both of the military's thoracic surgery training programs.

Mentorship of military cardiothoracic surgeons from within the military remains another challenge because military career length varies. By the time a surgeon gains adequate experience to serve as an effective mentor, he or she typically can retire from military practice or may choose to pursue a focus on military leadership roles rather than clinical practice. As a result, many military cardiothoracic surgeons are dependent on civilian mentors who may or may not understand all of the challenges of a military current practice environment. We are developing a multiservice morbidity and mortality conference that would allow increased collaboration among institutions with the goal of developing solutions to common problems on a more global scale. Locally, military facilities are trying to make more affiliations with local Veterans Affairs (VA) medical centers and academic centers as a strategy to achieve increased mentorship and cumulative expertise.

Declining cardiac surgical volumes have engendered creative means to support surgical proficiency. The Air Force has established proficiency metrics for each specialty. For cardiac surgeons, the Air Force mandates at least 50 annual cardiac cases per surgeon. Clinical activity in nonmilitary facilities to achieve this requirement has been authorized. However, this metric is arbitrary, difficult to establish, and currently does not exist in the Army or Navy. At San Antonio Military Medical Center (SAMMC), the combined Army and Air Force cardiothoracic surgery service has established a relationship with the South Texas Veterans Health Care System. Surgeons from SAMMC now provide all of the cardiothoracic surgery services for the South Texas Veterans Health Care System. This collaborative agreement has led to a 3-fold annual increase in surgical volume for military cardiothoracic surgeons assigned to SAMMC. This is a much more robust surgical experience and the cost savings for the VA are profound. The VA perfusion service is also augmented by the military's perfusion service. VA patients appreciate our presence, and they enjoy seeing surgeons in uniform in clinic and during their care. This model for surgical skills retention offers the potential for translation to other military medical centers co-located with VA facilities.

The Air Force has created collaborative arrangements in northern California and San Antonio, TX, that are designed to augment clinical volume for active duty surgeons and

provide training opportunities for staff and surgeons alike. These relationships involve military facilities, VA facilities, and public academic institutions. At David Grant Medical Center at Travis Air Force Base in California, there are training affiliation agreements with the University of California, Davis, Medical Center and the VA that include many specialties and training programs. These relationships are mutually beneficial for surgeons, patients, and support staff at David Grant Medical Center via shared resources, training, and practice opportunities. The University of California, Davis, Medical Center and the Air Force have recently partnered to create an opportunity for military trainees to pursue integrated cardiothoracic surgery residency in the university's combined I6 residency program.

Collaborative relationships between military and civilian institutions are likely a necessity for military cardiothoracic surgeons in the future because they provide critical opportunities for practice in higher-volume facilities. However, because these agreements are a product of local surgeon/institutional efforts, fluctuations in personnel make their maintenance a significant challenge. These relationships were the focus of an Early-Riser Session at the 2015 Society of Thoracic Surgeons (STS) Annual Meeting in San Diego, CA, in an effort to raise awareness for surgeons who are commonly faced with low-volume environments. We hope these relationships will continue to gain momentum for all military facilities and provide enhanced clinical experience for all military cardiothoracic surgeons.

We strive to provide excellent surgical care to our patients. Our commitment to quality and our successful efforts to bolster surgical volumes have led to success in this regard. SAMMC is unique among military cardiac surgery programs in that institutional data are reported to the STS database. Other military facilities have been deterred from similar participation due to legal and administrative constraints. Participation in the STS database at SAMMC has reaffirmed the high quality of cardiothoracic surgical care that the military provides at SAMMC. SAMMC also recently received an exemplary rating from the American College of Surgeons National Surgical Quality Improvement Program for overall cardiac surgery morbidity. Most other military facilities across all 3 services use standard risk predictors (eg, STS, European System for Cardiac Operative Risk Evaluation, and VA) to derive expected

morbidity and mortality rates, and rigorously compare these rates to observed outcomes as a means to ensure quality and provide a metric for process improvement. The morbidity and mortality review process is also a crucial part of process improvement and optimizing clinical outcomes. This is a focus at each facility, and efforts are underway to create multiservice/facility combined military cardiothoracic surgery conferences to share experience and foster excellent outcomes.

Military cardiothoracic surgeons are well suited for broad range applications in combat surgery. We face many challenges in our peacetime/nondeployed practice, and are working to establish creative solutions to maintain proficiency and excellent outcomes. The future success of our critical field within military medicine will require continued diligence, effort, and commitment.

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