

The Senior Visiting Surgeons program: A model for sustained military-civilian collaboration in times of war and peace

M. Margaret Knudson, MD and Todd E. Rasmussen, MD

The end of hostilities brings such a sense of relief that we are inclined to want to put the experience behind us. But we must remain prepared for any natural emergency and one way to do that is to study the past and incorporate its lesson in future action.—Michael E. DeBakey¹

HISTORICAL PERSPECTIVES

The use of civilian expertise to assist the military medical corps during times of conflict is not a new concept. Perhaps, one of the most noted examples was the service of Edward D. Churchill, MD, who volunteered to serve as the chief surgical consultant in the North African and Mediterranean theaters during World War II. A colonel in the US Army, Dr. Churchill followed his deployed surgical unit from Harvard Medical School into the war zone, making major contributions to the care of the wounded, most notably in advocating for the use of whole blood for resuscitation.² In addition to Churchill and DeBakey, other surgical giants who contributed to combat care during World War II included Loyal Davis, Fred Rankin, Isidor Ravdin, Robert Zollinger, Ben Eiseman, and J. Englebert Dunphy (former chief of surgery at the University of California, San Francisco). For a more in-depth review of the contributions of Dr. Churchill and others, interested readers are referred to the excellent article authored by Cannon et al.³

The war that has engaged US troops for the past 10 years in Iraq and Afghanistan is unique in American history. This prolonged war has been fought with an all-volunteer military service, including the members of the medical corps. A portion of the surgeons in theater are recent residency graduates and thus relatively inexperienced in trauma surgery. Other deployed surgeons may be reservists in the Army, Navy,

or Air Force Medical Corps who have been deployed multiple times from their private or academic practices. Modern technology has brought the war into our living rooms and onto our computer screens, giving civilians a unique look at battlefield injuries. These considerations as well as many others culminated in the development of the Senior Visiting Surgeons (SVS) program composed primarily of civilian trauma surgeons.

INITIATION OF THE SENIOR VISITING SURGEONS PROGRAM

In 2003, shortly after the initiation of overseas contingency operations, three members of the American College of Surgeons National Ultrasound Faculty (Dr. David Wherry from the Uniformed Services University of the Health Sciences, Dr. Jon Perlstein, US Air Force from Grant Medical Center, Travis Airbase, and Dr. M. Margaret Knudson from the University of California, San Francisco) traveled to Landstuhl Regional Medical Center (LRMC) in Germany to conduct the first Ultrasound for Surgeons course exported outside the United States. The purpose of the course was to educate surgeons deploying into theater on the use of ultrasonography in austere environments. At that time, the LRMC was a military treatment facility that provided primary care for service personnel and their families from around Europe. The surgical tempo and procedures performed there were almost entirely elective. However, within a short period following the initiation of hostilities, the operational tempo of trauma patients rapidly increased. The visiting faculty for the ultrasonography course listened in as young surgeons described the devastating injuries from gunshot wounds and improvised explosive devices that they were treating in far-forward surgical units and combat support hospitals. Not only did these surgeons have to develop effective treatment strategies for wounds never seen in the United States, but also LRMC had to quickly augment its staff with personnel capable of caring for several critically injured patients who would require the entire spectrum of advanced trauma care. We postulated that there might be a role for “seasoned” civilian trauma surgeons to assist in this process somewhere along the continuum of care.

As Operation Iraqi Freedom and Operation Enduring Freedom continued, members of the American College of Surgeons’ Committee on Trauma (ACSCOT) and the American Association for the Surgery of Trauma (AAST) saw several of their active-duty and reserve military surgical

KEY WORDS: Military-civilian collaboration; training; translational research; military trauma system. (*J Trauma Acute Care Surg.* 2012;73: S535-S539. Copyright © 2012 by Lippincott Williams & Wilkins)

Submitted: August 30, 2012, Revised: Month Accepted: September 19, 2012.
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DOI: 10.1097/TA.0b013e31827548e9

J Trauma Acute Care Surg
Volume 73, Number 6, Supplement 5

S535

Report Documentation Page

Form Approved
OMB No. 0704-0188

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1. REPORT DATE 01 DEC 2012		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE The Senior Visiting Surgeons program: A model for sustained military-civilian collaboration in times of war and peace.				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Knudson M. M., Rasmussen T. E.,				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) United States Army Institute of Surgical Research, JBSA Fort Sam Houston, TX				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 5	19a. NAME OF RESPONSIBLE PERSON
a REPORT unclassified	b ABSTRACT unclassified	c THIS PAGE unclassified			

colleagues deployed (often more than once). Members of both of these professional societies sought to develop a plan to support these surgeons either by backfilling their practices or by volunteering to deploy in some capacity. In early 2006, Colonel Jay Johannigman (US Air Force, Reserve) and Colonel John Holcomb (US Army, now retired) approached the leadership of the ACSCOT and the AAST and asked that they consider a program that would bring experienced civilian trauma surgeons into service at LRMC. The goal of this proposed program was to provide opportunities for information exchange between the experienced civilian trauma surgeons and their military counterparts when exposed to the challenge of an active military conflict. This proposal was positively received by Dr. C. William Schwab, then president of the AAST and a retired navy surgeon, and Dr. Wayne Meredith, then chair of the ACSCOT. Both organizations committed to the program and provided a degree of financial support as well. The initiation of such an endeavor would not have been possible without the critical additional support of military leaders such as Lt. General P. K. Carlton (retired surgeon general for the Air Force and former Air Force Governor of the American College of Surgeons), Dr. Charles Rice (president of the Uniformed Services University of the Health Sciences and Dr. Ben Eiseman Rear Admiral [retired]), as well as the military leadership of the United States Central Command. As a culmination of these factors, the SVS program was initiated.

The Mission of the SVS Program

Following the approval by the Board of the AAST, the SVS program was advertised on the AAST Web site, and the application process was described. Interested surgeons were encouraged to submit a letter of intent along with their curriculum vitae. A selection committee of military surgeons, assisted by their colleagues at LRMC, screened the potential pool of applicants. Criteria for selection included demonstrated leadership skills in education, clinical services, trauma system development or research in trauma or critical care surgery, and a collaborative attitude that would be amenable to practicing in the setting of a military medical system. Selected applicants applied for surgical and critical care privileges with the medical staff office at LRMC, a critical process supported by the chief(s) of surgery at that institution. The surgeons were expected to provide rotations of 2 weeks to 4 weeks at a time at LRMC, and their airfare and lodging were provided through military funds.

Although there was a great deal of enthusiasm for this program on the civilian side, both the leadership of the professional societies as well as our military counterparts thought that it was essential to clearly define the purposes of such a program and use these measures to assess the program's success. As such, the following goals of the SVS program were developed:

- Identify areas where civilian surgeons could be of assistance to their military counterparts,
- Establish scientific exchange between leaders in civilian trauma care in the United States and experienced military clinicians,

- Assist in codifying the important lessons being learned in the military Joint Trauma System (JTS) and develop a repository for these lessons to be used in future conflicts as well as to assure that these same lessons were transmitted to the civilian trauma community when applicable,
- Provide mentorship for young military surgeons as they returned to their military posts or practices after deployment,
- Provide formal educational opportunities for deployed physicians stationed at LRMC,
- Identify areas of research that could be translated from the military to the civilian trauma setting, and
- Assist in the development of the military's JTS.

Experiences From the SVS Program

For readers who are unfamiliar with the current construct of the JTS, a more complete description can be found in several recent publications.^{4,5} Briefly, an injured troop is initially cared for at a battalion aid station (Level 1) in the combat zone and then quickly evacuated to a Level 2 facility with a forward surgical team. If needed, the first operation might be performed in this facility, but a second tactical evacuation is usually accomplished promptly to the Level 3 facility where full surgical teams, including subspecialty surgery and complex intensive care unit (ICU) capacity, are readily available. Within 24 hours to 36 hours, injured troops are loaded onto fixed-wing aircraft with Air Force critical care air transport teams capable of providing complete critical care in the air for the 8-hour to 12-hour transport to LRMC. The ICU at LRMC is staffed with multidisciplinary teams from three branches of the military (Army, Navy, and Air Force) who work collaboratively with the single goal of providing immediate surgical therapy, stabilization, and critical care services while preparing injured warriors for a second transport back to military hospitals in the United States (the Walter Reed National Military Medical Center in Bethesda or the San Antonio Military Medical Center in San Antonio). During the past 10 years, LRMC has served as the central "clearing site" for all American and some North Atlantic Treaty Organization troops, as well as civilian contractors, injured in Iraq and Afghanistan.

It was particularly fitting that Dr. C. William Schwab was the first SVS to arrive in Germany in August 2006. Dr. Schwab had little time for jet lag as the operations tempo at that time at LRMC demanded that he hit the ground running and immediately assume an active role on the trauma/critical care team. As was the case for Dr. Schwab, a typical day at LRMC started early when the wounded arrived at nearby Ramstein Air Base and were transported directly to the ICU. It was not uncommon to receive five or more critically injured patients at any one time. When that happened, the physicians on the team would quickly pair up with a nurse and assign themselves to a patient. The patient was examined thoroughly, all injuries and previous operations were updated, all lines from "downrange" were changed, and swabs were obtained for culturing of organisms transported from the field (*Acinetobacter baumannii* was a frequent offender).⁶ The need for additional surgeries or imaging procedures were identified and scheduled immediately.

Following the admission of the patients from the aeromedical evacuation flight, ICU rounds were commenced. A

multidisciplinary team of physicians (surgeons, medical intensivists, pulmonologists, and infectious disease specialists), ICU nurses, the trauma program manager and her staff, a pharmacist, a dietician, and respiratory therapists was present on rounds. Not only were the immediate needs of the patients identified, but also preparations were made for those who were deemed stable enough to make a second critical care air transport back to the United States. This required strict attention to electrolyte replacement, assuring deep venous thrombosis prophylaxis, provision of nutrition, correction of anemia, and optimization of oxygenation to avoid complications during the next 8-hour to 12-hour flight.

After rounds, visiting surgeons participated in surgical procedures on the wounded. Although the most common operations involved wound or burn debridements, abdominal washouts and vascular procedures were also routinely scheduled. It was not uncommon for a SVS to assist the busy orthopedic surgeons with operative procedures as well. Keeping families in the United States updated on their loved one's condition was also an important responsibility of the ICU physicians.

In addition to providing clinical care, each SVS gave a Grand Rounds lecture on a subject of his/her choice. These were vetted in advance and served as a method of providing continuing medical education credit for deployed physicians, nurses, and physician assistants. An additional lecture was given at the Trauma Multidisciplinary Conference. Visiting surgeons also participated in the weekly military video teleconference. This unique conference linked up all the providers for each individual patient (from in theater through treatment facilities in the United States) and allowed for frank discussions of treatment plans, missed opportunities, and identification of areas for performance improvement initiatives.

In the selection process for the SVS, the particular expertise of that individual surgeon was taken into consideration. To that end, there were a variety of contributions made by these surgeons (Table 1). Some surgeons reviewed records and worked on descriptive research projects in collaboration with the surgeons on staff at LPMC. Others provided their experience in preparing LPMC for formal verification as a trauma center (discussed later). Still others assisted in the development and review of practice management guidelines for the JTS.⁷ For a more in-depth assessment of the activities

of the SVS, readers are referred to the after-action reports published on the AAST Web site (www.aast.org).

Beyond LPMC

A few civilian surgeons have been offered a unique opportunity to experience other aspects of the military JTS. Some have visited Walter Reed Army Medical Center and the Brooke Army Medical facility/Army Institute for Surgical Research in San Antonio. Both institutions are host to the Center for the Intrepid, an experience that one should not miss if afforded the opportunity to visit and that one will never forget afterward. Others have flown as passengers on the critical care air transport flights to appreciate the unique aspects of providing critical care in the air.⁵ A few, such as Drs. Mike Rotondo, John Fildes, Ron Maier, Don Trunkey, and Lynette Scherer, visited Afghanistan and produced a document categorizing their observations of the military trauma system in place there. One civilian trauma surgeon was allowed into Balad (Iraq) and spent a week with the deployed surgeons there to experience first-hand the challenges faced by our military colleagues working in theater.⁵

MEASURES OF SUCCESS

Six years after its initiation, has the SVS program lived up to the expectations of the founders? In 2007, a compiled summary of the reports from the first four surgeons was accepted for publication in the *New England Journal of Medicine*, a journal that rejects 99% of articles received.⁴ Getting the attention of that prestigious journal and its worldwide readership certainly has to be considered a success. Shortly thereafter, the Society for Vascular Surgery and both the orthopedic and the neurosurgical professional societies developed visiting surgeon programs at LPMC that emulated the SVS program. Dr. Thomas Russell, then the executive director of the American College of Surgeons, was so impressed with the SVS program that he took time off of his busy schedule to visit LPMC in person.⁸ In 2007, through the perseverance of the trauma medical and program directors as well as the trauma program manager at LPMC and with assistance from several SVS members, LPMC was officially verified by the ACSCOT as a Level II trauma center, the first ever outside the United States.⁹ LPMC has since undergone a second site review and is now recognized as a Level I trauma center because of its emphasis on research.

Another example of how the SVS program proved useful relates to the use of recombinant factor VIIa (rFVIIa). This drug which was designed and approved for treatment of patients with hemophilia who had developed antibodies to factor VIII or IX also proved useful in treating coagulopathic bleeding in some patients receiving massive transfusions. The initial data with combat injuries published by Perkins et al.¹⁰ suggested that there was a 20% reduction in red blood cell transfusions in those patients who received rFVIIa. However, since the drug was being given for a purpose not formally approved by the US Food and Drug Administration, its use on wounded warriors drew attention from the leadership of the US Department of Defense as well as the US Congress. A group of surgeons from the SVS program were asked to conduct an independent

TABLE 1. Activities of the SVS

Critical care in the LPMC ICU
Operative care
Grand Rounds lectures
Trauma Rounds lectures
Informal teaching of students, residents, and staff
Participation in the video teleconference
Initiation and participation in research efforts
Mentorship of military surgeons (career goals, research activity, etc.)
Assistance in developing clinical practice management guidelines for the JTS
Participation in performance improvement initiatives
Provision of expertise in trauma center and trauma system development

review of the use of rFVIIa by the military medical corps. After reviewing data from 615 patients injured in combat, the SVS group assured members of Congress that rFVIIa had been used appropriately in the theater of operations and likely had proved lifesaving in selected cases.

Partially as a result of the SVS program, the Military Committee of the AAST has enjoyed resurgence, with a growth of activities and members. Military abstracts are reviewed with interest for oral and poster presentations during the AAST annual meeting, and at the 2011 meeting, the first military master surgeon lecture was delivered. Most importantly, all who have rotated at LRMC have come away with a deeper appreciation for the physical and emotional wounds of war and the dedication of the military medical community throughout the entire JTS. As stated by Dr. Thomas Russell, “the surgeons who take the time away from active duty or civilian practice to care for our nation’s troops deserve our utmost respect and gratitude.”⁸

RESEARCH OPPORTUNITIES

It has been said that the arena that stands to benefit the most from war is medicine, and this war is no exception.¹¹ Indeed, war can be considered a laboratory for trauma research.¹² Those injured on the battlefields in Iraq and Afghanistan have the highest survival rate in the history of war, a success attributed to the remarkable medical care provided from the medic in the field through the entire military trauma system. Remarkably, the system, as large as it is, has adapted rapidly to changes that impact care in a fashion not readily reproducible in civilian trauma systems. In addition, some military practices may be directly transferable to the civilian setting without further study. One obvious example is the critical care air transport system, which could easily be used during disasters.¹³ Translational research from the military to the civilian world is at the heart of the National Trauma Institute, a nonprofit organization that has been supported by the US Department of Defense as well as other agencies, and funds trauma research in several academic centers (www.nationaltraumainstitute.org). Areas that are potentially amenable to military-civilian translational research are listed in Table 2.

TABLE 2. Potential Topics for Military-Civilian Translation Research Initiatives

<i>En route</i> care and aeromedical evacuation
Prehospital hemostatic measures (topical dressings, tourniquets)
Resuscitative fluids (blood products, tranexamic acid, rotational thromboelastometry, etc.)
Management of complex wounds and burns
Prevention and treatment of venous thromboembolism after injury
Damage-control operations (vascular, orthopedic, neurosurgical, and abdominal)
Diagnosis and management of traumatic brain injury
Diagnosis and treatment of posttraumatic stress disorder
Management of multicasualty and mass casualty events
Rehabilitation after injury

FUTURE DIRECTIONS

It is imperative that the SVS program be continued even after the current war efforts come to a close. As mentioned previously, the considerable lessons learned during this war that are responsible for the remarkable number of lives saved must not be forgotten. The AAST as an organization and the SVS as individuals must assure that these lessons are codified and available to the next generation of military surgeons. We must also continue to assure that those enrolled in military training programs are kept “combat ready” by offering them training in civilian trauma centers. Indeed, as can be gathered from a recent poll of deployed surgeons, more training in certain areas of trauma surgery (particularly vascular, thoracic, and neurosurgical procedures) would have better prepared them for delivering trauma care in theater.¹⁴ An exchange of surgical faculty between military institutions and civilian trauma centers might also be entertained. Importantly, as mentioned previously, translational research from the battlefield to the civilian trauma centers must be kept in the forefront.

On behalf of all of the SVS, we would like to take this opportunity to express our gratitude to the members of the US Military Medical Corps for the unforgettable and often life-changing experiences that you have afforded us. Please know that your personal sacrifices are appreciated and that the lessons that you taught us will not be forgotten.

Saving lives when everyone else is trying to take lives will always be glorious to both God and man.

—Edward D. Churchill (circa 1942)

AUTHORSHIP

Both authors jointly prepared and edited the manuscript.

ACKNOWLEDGMENTS

The SVS gratefully acknowledge the assistance of Kathleen D. Martin, MSN, RN, and her staff for making the SVS program possible.

List of Participating SVS Since 2006:

John Armstrong, Florida
 Juan Asensio, Florida
 Michael Baker, California
 Stephen Barnes, Missouri
 Bruce Bennett, Minnesota
 LD Britt, Virginia
 Reginald Burton, Nebraska
 Mark Cipolle, Delaware
 Steven Cohn, Texas
 Jim Davis, California
 Kenneth Davis, Ohio
 Brent Eastman, California
 David Feliciano, Georgia
 John Fortune, Vermont
 Erik Frykberg, Florida
 Ronald Gross, Massachusetts
 Jeffery Hammond, New Jersey
 Sharon Henry, Maryland
 John Holcomb, Texas
 Jerry Jurkovich, Denver
 Frank Kennedy, California
 M. Margaret Knudson, California

Larry Lottenberg, Florida
Robert Mackersie, California
Ronald Maier, Washington
Kenneth Mattox, Texas
Kimball Maull, Pennsylvania
Mary McCarthy, Ohio
Wayne Meredith, North Carolina
Gene Moore, Colorado
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Peter Rhee, Arizona
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DISCLOSURE

The authors declare no conflicts of interest.

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