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CANADIAN FORCES COLLEGE - COLLÈGE DES FORCES CANADIENNES

AMSC 8 - CSEM 8

Health Services Support in the 21st Century:

The need to replace Field Ambulances with Tailored Modular Capabilities

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ABSTRACT

To meet the emerging demands of supporting land forces in the future non-linear, non-contiguous battlespace, Canadian Forces Health Services needs to restructure existing field ambulance organizations along the lines of modular, building-block capabilities. Aligning existing field units to with current CFHS doctrine will ensure that wounded soldiers receive definitive surgical treatment in a timely manner. As they are currently organized, field ambulances are no longer relevant in modern operations. Reviewing CF, US and UK medical doctrine indicates a high degree of similarity in how Health Service Support (HSS) is carried out. Recent experiences by US and UK medical facilities indicate that their doctrine will continue to evolve, addressing the issues of the emerging battlefield. Their experiences have highlighted the limited utility of field ambulance organizations as they currently exist in the CF. The emerging battlespace will force medical planners to balance mobility and definitive treatment, the location of surgical capabilities and the proper skill set of medical personnel in support of future operations. These issues can have a significant impact on the operational level and may have limiting effects on an operational commander's plan. The HSS facility most able to support future operations will be built upon required capability modules, not upon existing field ambulance structures.

INTRODUCTION

The Canadian Forces (CF) is undergoing a significant transformation process to conduct operations in the non-linear, non-contiguous future battlespace. CF transformation and the future battlespace will shape how combat service support (CSS) is organized and provided. CSS organizations cannot afford to maintain an attachment to past CSS doctrine and structures, as they will not be helpful in future operations. To meet the emerging support challenges of 21st century military operations, Canadian Forces Health Services (CFHS) has drafted Health Service Support (HSS) doctrine that aligns HSS along modular, building block capabilities, rather than unit structures. Currently, existing HSS field ambulances are structured to support former doctrine based on a linear battlefield. If field ambulances are not restructured along modular capabilities, then there is a danger that wounded soldiers may not receive surgical intervention in a timely manner. Indeed, lessons learned from military medical experiences of US and UK medical facilities in Iraq can provide valuable assistance for modifying CFHS operational support structures along modular capabilities. By replacing existing field ambulances structures with modular capabilities tailored to suit the operation, CFHS will be better able to meet the land component HSS requirements of future battlespaces.

This paper will restrict its discussion to the provision of HSS to land operations. It will provide the background perspective on the debate over the continued utility of field ambulances as they currently exist, as well as provide the current CF strategic concepts that underpin emerging CFHS doctrine. It will review the current health doctrine of Canadian, US and UK militaries for similarities in the doctrinal provision of HSS,

especially in the areas of modular capability. Lessons learned and suggested capability modifications in after action reviews by our allies during recent operations will highlight how practice varies from doctrine; this is offered as food for thought for Canadian HSS planners as they task tailor HSS for Canadian operations. It will discuss concerns the HSS community has in supporting the future battlespace. Finally, it will outline the potential impact HSS can have on the operational level in tradeoffs between mobility and provision of surgical support that may be ameliorated by restructuring field ambulances into modular facilities.

BACKGROUND

The Debate

Discussion regarding the future employment and utility of Canadian field ambulances has been ongoing for several years. In 1997, Major G Richardson¹ initiated early commentary on the continued role of field ambulances in provision of medical support to the army. Richardson recommended removal of brigade field ambulances, as their capabilities can be provided by other organizations. To provide medical support to brigades, Major Richardson recommended that Unit Medical Stations (UMS) be fully manned and equipped to alleviate the need for augmentation from field ambulances. Additionally, in Operations Other Than War (OOTW), Richardson argued that field ambulances have no legitimate role and that the robust ground evacuation capabilities field ambulances can bring to mid-intensity operations could be a task provided by the medical Reserve units. Further, disbanding of the field ambulances could provide valuable personnel offsets to augment Role 1 and 3 units, while allowing medical

¹ Richardson, Major G. "Medical Support to the Army", Briefing note (unpublished) to COS HS, 6 March 1997.

personnel to be posted to units that provide them greater opportunity to regularly practice their medical skills.

More recently, the continued existence of field ambulances in their current structure was once again challenged² when the ability of existing CF Health Services organizations to support emerging military operational trends, future military health clients, future casualty trends and the potential of new technology on medicine in battle was considered. Salisbury and English argued that these factors have so significantly changed the HSS operating environment that “This will bring into question the existence and role of the Field Ambulance, as it currently exists.”³ They go on to further amplify that building block modules may represent the best way ahead as, “Mass casualties are unlikely, and thus the deployment of the entire field hospital as it currently exists is unlikely, and modules of the field hospital similar to the current Advanced Surgical Centres (ASCs) will become the norm.”⁴

IMPACT OF DOCTRINE

The Concepts supporting CFHS Doctrine

Canadian Forces (CF) Strategic Operating Concept (SOC) provides an “overarching conceptual framework for designing the CF of the future,”⁵ as a key tenet for shaping CF transformation. Its focus is on planning for events five to 15 years from now. CF SOC has drawn a picture of the current and future security environments that acknowledge the impact of globalization, failing states, multidimensional battlespace,

² David Salisbury, and A. English. “Prognosis 2020: A military Medical strategy for the Canadian Forces”, *Canadian Military Journal*, Summer 2003: 45-53.

³ *Ibid.* p. 53.

⁴ *Ibid.* p. 53.

⁵ Department of National Defence. *Canadian Forces Strategic Operating Concept. Draft 4.4*, (Ottawa: Department of National Defence, DCDS, 21 May 2004.

stressors in Littoral regions and unconventional threats upon the organization and capability of the CF. SOC identifies the need for the CF to have the capacity to operate in mid intensity combat operations, arguing that a force able to operate in combat can transition to lower intensity operations with more ease than forces transitioning the other way. The SOC also warns that threats to Canada will require a CF able to provide a “similar multidisciplinary approach”⁶ to meet those threats.

To address support, sustainment and mobility issues, the SOG provides specific direction on expected Department of Defence and CF capabilities.⁷ The directive specifically addressing health capabilities is as follows: “A force health protection capability that covers the full range of health threats and force enablers from prevention and health promotion through immediate life and limb saving capability, to evacuation and rehabilitation to return personnel to duty.”

By 2012, it is anticipated that the CF will have acquired operational reach, the capacity to operate away from a national support base for extended periods of time.⁸ Doctrinally, this will be achieved through acquisition of more strategic lift capability, enhanced deployment enablers, diplomatic arrangements for overflight/clearances, multinational reception and staging cooperation, logistic agreements and material pre-positioning. Synchronization of logistics support activities from strategic through operational and tactical levels will be achieved through a shared CF Common Operating Picture (CF COP) and provided by the National Military Support Capability (NMSC).⁹ NMSC project is currently ongoing and is expected upon rollout to optimize CF support

⁶ *Ibid.* para 14.

⁷ *Ibid.* para 87.

⁸ Department of National Defence. *CF Joint Operating Concept 2012 (Draft)* (Ottawa: DND, 24 July 2003), 12

⁹ *Ibid.*

to deployed operations in joint and coalition operations. This paper acknowledges that, in the context of CF transformation, the future of the NMSC project is presently unknown, but that the NMSC project does provide an existing, valuable model for deployed operational support.

CFHS has been involved with NMSC project from the project's inception, as the limited HSS resources available to place in theatre are expected to provide HSS to joint operations. From CFHS' perspective, NMSC optimizes the seamless sustainment capability expected by deployed commanders. The NMSC Concept of Operations (COO) has broken the functions and tasks down to the appropriate environmental commands for their action. CFHS' provision of HSS support to an operational deployment, under command of the Joint Support Group Headquarters (JSGHQ), will be to provide from Role 1 to Role 3 HSS capability through a Joint Health Support Unit (JHSU) to support the joint troops.¹⁰ This facility is intended to be collocated in the same camp as the JSGHQ although the operational situation may dictate a different solution on deployment. The camp layout is based on a hub-and-spoke concept, with the relatively immobile support organizations inside the joint support camp. This particular layout addresses current CF support in the non-linear, non-contiguous theatre, which allows patrols to go out in the area and return to a relatively secure, defended area. It may not be applicable if operations shift from hub-and-spoke operations to mobility operations.

The Joint Health Support Unit (JHSU) is intended to deploy with its own integral support, less vehicle technicians and food services personnel. In agreement with the CFHS Working Group, the Joint Workshop and Joint Food Services Working Groups

¹⁰Department of National Defence, *NMSC COO Anx C Apx I-JSG Division of Responsibility Matrix*, http://www.dcds.mil.ca/project/pmonnmsc/default_e.asp Internet; accessed 25 February 2005.

agreed to provide these services to the JHSU in exchange for personnel offsets to meet the additional demands from JHSU.¹¹

In structure, role and organization, the JHSU resembles an Advanced Surgical Center (ASC), a sub-unit of 1 Canadian Field Hospital. Both organizations are built upon the following modules: a command and control module, an integral Role 1 and 2¹² modular capability for HSS support to area troops, a reception and resuscitation module, surgical and sterilization module, pharmacy services module, diagnostics and therapeutics module, patient ward modules and a support platoon. Neither organization has integral ambulance assets; however both organizations can have evacuation modules placed under control or under command from higher formations for medical evacuation. While the holding capacity of either structure will be tailored to suit the mission and theatre holding policies, ASCs are organized to have one 5-bed critical care ward and one 10-bed intermediate care ward.¹³ Essential operational criteria that ASCs must meet include the following:

- a. be capable of accepting patients within three hours and conducting surgery within five hours of arrival in location
- b. be self-sufficient at first line
- c. be equipped to provide initial surgery, patient care and holding in climatic conditions where CF formations can be deployed
- d. be capable of deploying in similar terrain to those formations being supported

¹¹ NMSC Working Group discussions between the author and Working Group Chairpersons in Cornwall, ON, 25 February 2005.

¹² Readers will find additional detailed explanations of each role's capability in *Health Services Support to Canadian Forces Operations GJ-005-410-/FO-000(Final Draft)* (Ottawa: CFHS, 2005).

¹³ Department of National Defence. *Role 3 Health Services Support DSP G2536*. 3000-3-G2536-300 (CFMG) (Ottawa: Canadian Forces Medical Services, 1996), D-13-2/5 and D-13-3/5.

e. have the following protection characteristics:

- (1) capable of deploying patient treatment areas in or outside buildings
- (2) possess low noise, infra-red and electronic emission signatures.¹⁴

JHSU is expected to meet the same operational criteria as an ASC.

ASCs have been consistently deployed on CF operations since the initial rotation of an ASC and its equipment of 1 Canadian Field Hospital into the Former Republic of Yugoslavia in 1991. The present Canadian HSS facility for Operation ATHENA in Kabul is identified as a NATO Role 2+,¹⁵ as it can provide initial live-saving surgical support in theatre. It contains an evacuation module from field ambulances and a surgical module from 1 Canadian Field Hospital. The planned HSS facility slated for Operation ATHENA in Kandahar (February 2006) will be a Role 3 facility, similar to an ASC in capability, with an additional robust evacuation module, as it is intended to provide Role 3 HSS support to the multinational brigade as well as Canadian soldiers.

Review of Canadian, US and UK Doctrine

A review of Canadian, US and UK doctrine reveals that all three share common operating philosophies and have organized their support in a similar fashion to meet operational demands. There is some variance in terminology, however. While Canadian and UK doctrine use the term ‘role’ to describe medical support, US doctrine uses the term ‘echelon’ to describe their medical support.

Canadian HSS Doctrine

CFHS doctrine is based on roles of support. Roles of HSS support are based on clinical capabilities required within the operational environment and on the requirement

¹⁴ *Ibid.*, D-13-3/5 – D-13-4/5.

¹⁵ Readers will find definitions of NATO HSS Roles in *Health Services Support to Canadian Forces Operations* GJ-005-410-/FP-000(Final Draft) (Ottawa: CFHS, 2005).

to provide Force Health Protection (FHP). Clinical capabilities refer to the progressive examination, treatment, evacuation and hospitalization of sick and injured personnel.¹⁶ At point of wounding, casualties will receive first aid and emergency medical treatment at the Role 1 facility—a Unit Medical Station (UMS)—and will be triaged and stabilized prior to evacuation to the next role of care, if needed. At Role 2 facilities—Brigade Medical Station (BMS)—rapid evacuation of stabilized casualties is provided while they are enroute to sustaining care. Emergency lifesaving resuscitation may be performed. Role 2 facilities have very limited holding capability. Those casualties who require a longer recovery time to return to duty in excess of the unit holding policy will be evacuated rearward. Role 3 facilities—Advanced Surgical Centers (ASC) and field hospitals—emphasize resuscitation, initial wound surgery, pre and post operative care, diagnostic services (laboratory and x-ray), blood storage, intermediate and critical care wards, limited internal medicine and psychiatric services. Role 4 facilities are normally out of theatre definitive care hospitals that can provide a full range of surgery, rehabilitation, storage of national HSS stocks and major repair/replacement of HSS equipment. HSS facilities in theatre can be augmented, to a limited degree, with some of the capabilities from the role above it.

US Army Medical Echelons of Support

US Health Services Support (HSS) doctrine in joint operations is based on conserving the fighting strength of land, sea, air and special operations forces through minimizing the effects of wounds and disease on unit effectiveness, readiness and morale. HSS is based on five echelons of care, each echelon providing increasingly sophisticated

¹⁶ Department of National Defence. *Health Services Support to Canadian Forces Operations-GJ-005-410-FP-000 (Final Draft)*, (Ottawa: CFHS, 2005), Chapter 1, Section 108, para 1.c.

interventions.¹⁷ Maintaining HSS proximity to supported troops allows those facilities to treat casualties as close to combat operations as the tactical situation permits and to evacuate casualties only as rearward as the severity of their wounds dictate.

At Echelon I, casualties receive care at the unit level, including self and buddy aid, examination and emergency lifesaving measures. In addition, this echelon may also have an aid station with a physician or physician assistant (PA). At Echelon II, a casualty will receive care from a team of physicians or PAs and care at this echelon includes basic resuscitation and stabilization. It may also include surgical capability, basic laboratory, limited x-ray, pharmacy and temporary holding capability. At Echelon III, resuscitation, initial surgery and post operative treatment is provided. A casualty may receive the first stage of comprehensive surgical treatment intended to restore him/her to functional health. For example, hospital ships provide Echelon III medical care.¹⁸ Echelon IV care provides definitive therapy for casualties and may provide a recovery phase for those who are expected to return to duty within the theatre evacuation policy. Echelon V care is convalescent and rehabilitative care normally provided by military, civilian or Department of Veterans Affairs hospitals in United States. Care is intended to restore patients to functional health with the objective of returning to duty or a useful life upon release.

US Army Medical Department (AMEDD) has taken advantage of technological gains in field medical capabilities to meet current operational requirements. To address the need of far forward medical care, Forward Surgical Team (FST) modules have been successfully trialed in multiple operations. FSTs are relatively small and flexible units

¹⁷ United States, Joint Chiefs. *Doctrine for Health Services Support in Joint Operations* 26 (Washington: DoD), April 1995.

¹⁸ *Ibid.*

that can complete approximately ten surgeries per day and the post operative care associated with those surgeries until patients can be evacuated rearward for more definitive care.¹⁹ FSTs can deploy in the area of a manoeuvre brigade or armoured cavalry regiment and typically have a staff of 20 members organized into four functional areas: triage-trauma, surgery, post surgical recovery and administration/operations. With two operating tables, each FST can provide initial surgery and up to six hours of postoperative care for up to eight patients at a time. Surgical interventions include major chest and abdominal wounds, hemorrhage, severe shock, airway and respiratory distress, amputations, major organ fractures, crush injuries and acute deteriorating consciousness from closed head wounds.²⁰ While surgery is ongoing and while patients are recovering post operatively prior to medical evacuation rearward, FSTs are not mobile.

UK Roles of Medical Support

Doctrine of the UK Army Medical Services (AMS) has been adapted, since the first Gulf War in 1991, from supporting a cold war scenario to supporting military operations that are more expeditionary in nature.²¹ Additionally, wherever possible, service personnel will be offered a standard of health care equal to that they would expect to achieve in the UK during peacetime. As a consequence, UK defence chiefs have been willing to expend significantly more resources on managing critically ill or injured casualties who would have, in past, been managed as expectant cases in cold war scenarios.²²

¹⁹ Lieutenant General J.B. Peake. "Fielding a Medical Force to keep Soldiers Healthy" *Army*, June 2003.

²⁰ *Ibid.*

²¹ M.J. Roberts, M.A. Fox, C. Hamilton-Davies and S. Dowson. "The Experience of the Intensive Care Unit in a British Army Field Hospital during the 2003 Gulf Conflict." *J R Army Med Corps* (2003): 284-290.

²² *Ibid.*

Army medical doctrine is built upon a chain of medical care organized into Roles and extending from point of wounding to definitive rehabilitative medical care in the UK, with a focus on maintaining the fighting strength of the Army.²³ At point of wounding, a casualty receives ‘buddy’ aid or self-aid and then progresses to a Regimental Aid Post (Role 1) for resuscitation. At the aid post, the casualty is assessed by a medical doctor and Battlefield Advanced Trauma Life Support (BATLS) is initiated. From the aid post, the casualty is evacuated to a medical dressing station (Role 2) that may be augmented with a surgical capability (Role 2+). Surgery at this facility is only initiated to ensure the casualty will survive further evacuation rearward to the field hospital (Role 3). At the field hospital, definitive surgical care is provided and the casualty is prepared for repatriation to a rehabilitation facility (Role 4) in the UK. Throughout the chain of evacuation, the casualty is constantly monitored to address any life threatening symptoms and priority of evacuation is given to the most seriously wounded casualties. UK medical doctrine acknowledges the tension between needed mobility and clinical capability. The more clinically capable a hospital, the less mobile it becomes; conversely, the lighter and smaller a facility, the better it can keep up with maneuver elements.²⁴ The cost, however, of increased mobility is borne in compromising clinical outcomes and care environments.²⁵

IMPROVING CASUALTY SURVIVABILITY

In medical parlance, increased likelihood of wounded soldiers surviving their injuries is based upon the construct of the ‘Golden Hour.’ The term identifies the

²³ United Kingdom. Ministry of Defence. *Army Doctrine Publication Volume 3 Logistics* (London: MoD, June 1996): para 0213.

²⁴ United Kingdom. Ministry of Defence. *Army Medical Service Core Doctrine Volume 4—Part 2 Hospital Care” (Draft 2)* (London: MoD, March 2004): para 0116.

²⁵ *Ibid.*

importance of providing definitive protocols in rapid medical assessment and resuscitative care, including surgery, as critical to patient survival and, as such, is considered to be a benchmark standard in present trauma management.²⁶ It is described in Advanced Trauma Life Support (ATLS) protocols as the period in which rapid medical assessment and resuscitation is required²⁷, in order to improve the likelihood of casualty survival. There is learned discussion ongoing regarding the efficacy of applying this terminology to combat casualties, as it was initially coined to describe the resuscitation timings required for victims of blunt-trauma injury and does not truly reflect the significantly more urgent care requirements of combat casualties with penetrating trauma.²⁸ For the purpose of this paper, highlighting the discussion on the use of this terminology is intended to draw the reader's attention to the urgent requirement of combat casualties receiving surgical care as soon as possible after wounding and as close to the 'Golden Hour' timing as possible.

Combat casualties can be described using a bi-modal distribution of mortality. Using a bimodal distribution model, approximately 90% of combat deaths occur within five minutes of wounding, including those combat casualties who die of severe wounds within seconds of injury²⁹, and of those who survive past that time, an additional 15% of deaths occur within 30 minutes of wounding.³⁰ Between thirty minutes and six hours post-wounding, five to twenty percent of casualties will die, with half of those deaths

²⁶ Colonel D.R. Porr. "To be There, To be Ready, and to Save lives: Far-Forward Medical Care in Combat" (Carlisle Barracks: U.S. Army War College, 1993).

²⁷ American College of Surgeons. *Advanced trauma life support program for physicians: ATLS (5th Ed)*. (Chicago: American College of Surgeons, 1997).

²⁸ G. Cecchine, *et al*, *Army Medical Support to the Army After Next* (Santa Monica: RAND, 2001), 18.

²⁹ Colonel D.R. Porr. "To be There, To be Ready, and to Save lives: Far-Forward Medical Care in Combat" (Carlisle Barracks: U.S. Army War College, 1993).

³⁰ Colonel S.P. Gouge, "Combat Health Support of the Transformation Force in 2015" (Carlisle Barracks: U.S. Army War College, 2001).

occurring in the first two hours. Gouge³¹ advises that unless early treatment for shock and removal of any penetrating infectious material is initiated, sepsis and multi-organ failure leading to 60% mortality rates will occur. Unless casualties receive ATLS within the first hour, many will not survive long enough to reach surgical facilities. Prompt evacuation of those casualties with serious wounds is vital; otherwise, those soldiers are likely to die between 30 minutes and six hours. The importance of casualties receiving speedy access to definitive treatment is acknowledged in CF doctrine, such that:

The shock-producing affect of blood loss from injury is worsened by other fluid depletion, such as from significant burns, vomiting, diarrhea, perspiration, or limited fluid intake. For those with very severe shock, the Advanced Trauma Life Support (ATLS) principle of the “golden hour” applies.³²

CF doctrine goes on to clarify that “life/limb-saving clinical intervention must be provided as soon as possible, ideally within the first hour, but completed not later than six hours following onset of life/limb-threatening injury.”³³ In this instance, an argument can be made for placing surgical capability as far forward as is practicable: if surgery can be performed within the ‘Golden Hour,’ soldiers’ lives can be saved, if it is not, then death will be the most likely result.

The role of efficient and timely medical evacuation from point of wounding to a medical facility able to deal with the nature of the injury is essential in improving patient survival. Medical evacuation (medevac) can be conducted using ground or air ambulance assets and should not transport the casualty rearward of the most forward treatment facility with the capability to treat that level of injury. The nature of the battlespace will determine the degree to which the total medical footprint can be reduced in theatre.

³¹ *Ibid.*

³² Department of National Defence. *HSS to Operations(Final Draft)*, (Ottawa: DND, 2005), Chapter 2, Section 202, para 4.

³³ *Ibid.* Chapter 2, Section 205, para 3.

Further, the capability to stabilize casualties and rapidly evacuate them out of theatre needs to be balanced with the requirement to have a degree of hospitalization capability in theatre.³⁴ As technological advances have increased the enemy's ability to strike anywhere into friendly territory, the likely extension of evacuation distances to offset this threat cannot be discounted. Extended evacuation distances reduce patient survivability and also render evacuation assets more vulnerable to enemy fire.³⁵

The helicopter has proven itself to be a reliable platform for medical evaluation in past conflicts and its ability to speedily transport wounded to surgical facilities has ensured wounded are more likely to reach surgical facilities within the 'Golden Hour.' Its ability to transport wounded to a medical facility more quickly than can be provided by ground evacuation assets increased the flexibility of the medical plan in past operations. The increased reliance on aeromedical evacuation (air medevac) caused two distinct changes to combat medical support.³⁶ As this reliance brought air medevac evacuation to the forward areas, medicine became increasingly dependent upon it to move casualties. Additionally, entire generations of medical personnel became increasingly comfortable with reducing the mobility of medical units and with retaining comprehensive medical support in the rear. An evacuation plan that utilizes helicopter and air medevac resources assumes that friendly forces will have air superiority, enabling air medevac to take place when and where it is needed.³⁷ With US medical evacuation in past conflicts, this has been reality; however, current and future operating environments

³⁴Colonel S.F. Gouge, "Combat Health Support of the Transformation Force in 2015" (Carlisle Barracks: U.S. Army War College, 2001), 21.

³⁵ *Ibid.*

³⁶ LCdr C.J. Hooton, "Medical Support for the FMF: Far in the Rear, Too much Gear" *Marine Corps Gazette* April 1990: 52.

³⁷ *Ibid.*

contain the emerging threat to aircraft from shoulder-fired missiles. These weapons have advanced lethality and accuracy and their proliferation has increased their availability to enemy forces. Ongoing discussion suggests the modern and future battle space may be too lethal to support continued reliance upon air evacuation of wounded and the continued survivability of helicopters in that environment is not assured. Further, the present heavy reliance upon air evacuation of casualties by helicopter may need to be revisited to address the support required in future operations.^{38 39}

RECENT US AND UK OPERATIONAL MEDICAL EXPERIENCES

US Medical Lessons Learned from Operation IRAQI FREEDOM

After action reports (AAR) suggested that the overall size of Combat Support Hospitals (CSH) were too large and recommended that CSH facilities should be divided into two independent surgical facilities, based upon the experiences of dividing 21st CSH and given the casualty workloads of the split facility in two locations.⁴⁰ 21st CSH North had 44 beds and 21st CSH South had 84 beds. Generally, the peak capacity at CSH North was, on average, 30 patients. With the capacity to evacuate post-surgical patients, expectations were that mass casualty situations could be met by the split units.

AAR also highlighted deployment issues regarding required coordination to ensure engineer support for ground preparation prior to the arrival of the CSH.⁴¹ Further, the reports identified an ongoing need to have integral lift capability within CSHs, while acknowledging the efficacy of Corps assets such as the Rough Terrain Cargo Handlers to

³⁸ Captain Arthur M. Smith, "Care Delayed is Care Denied! Casualty Handling in Littoral Operations." *Naval War College Review* 41, no. 2 (Spring 1988).

³⁹ James Harris, "My Two Wars," *The New York Times*, April 20, 2003, 4.9.

⁴⁰ Colonel D.J. Cohen, "Lessons Learned After Action Report on Deployment to Iraq: Role of the Combat Support Hospital" *Outlook*, Winter 2004 [journal on-line]; available from <http://das.cs.amedd.army.mil/outlook1.htm> Internet; accessed 10 September 2005.

⁴¹ *Ibid.*

move CSH's containers once a site had been selected. Having no integral lift made CSHs reliant upon external lift assets held at US Army Corps level, usually these assets are not made easily available during the early phases of an operation.⁴² The AAR also identified pieces of equipment within the CSH that worked well, as well as diagnostic equipment (CT scanner and microbiology capability) that needed to be added to the standard operating equipment of a CSH.⁴³ Additionally, AMEDD is currently designing lighter, more efficient shelters to accommodate field hospitals and are investigating the application of telemedicine with lightweight portable diagnostic equipment for deployments.⁴⁴

This lesson is relevant to the discussion of modular capability as the US experiences suggest that smaller modules can meet the surgical demands of current operations. Their lack of internal lift and its impact on the mobility of the unit is a reminder to Canadian HSS planners to consider maintaining a service support module as part of the new HSS model, depending on the anticipated mobility of the CF operation.

UK Medical Lessons Learned from Operation TELIC

During Operation TELIC, UK land forces were supported by two field hospitals, one located in Kuwait and the second hospital, 202 Field Hospital, at the abandoned Iraqi Air Force base at Shaibah, Iraq.⁴⁵ 202 Field Hospital had no integral lift and relied upon the Joint Forces Logistics Brigade to move it into location. The field hospital was moved in 67 container carriers and the containers were dropped into the general location. With its integral container handling capability, the hospital opened 25 beds and two operating

⁴² *Ibid.*

⁴³ *Ibid.*

⁴⁴ Lieutenant General J.B. Peake, "Fielding a Medical Force to keep Soldiers Healthy," *Army*, June 2003.

⁴⁵ Discussion with Captain Neil Bagley, UK Medical Services, describing his observations as 1 (UK) Division's Operations Medical Planner in support of Op TELIC in 2003.

rooms (ORs), as a priority, to meet anticipated initial casualties and then set up the remainder of the operating rooms, to a total of seven ORs. The hospital did not set up its complete 200-bed capability, as patients tended to be speedily airlifted out of theatre to Kuwait or onward to the UK. The field hospital remained more forward of the Role 2 medical assets of 7th Armd Bde, rendering this capability redundant. Despite the presence of combat surgical teams attached to the Role 2 facilities, the majority of wounded were medevaced straight back to the Role 3 facility by either armoured ambulance or helicopters.⁴⁶ Generally, casualties were received at the field hospital within 20 minutes of wounding when evacuated by helicopter and within one hour by road ambulance.

202 Field Hospital admitted 1366 patients during the war fighting phase of Operation TELIC (17 March—30 April 2003). The majority of admissions were ballistic trauma, gunshot wounds or shrapnel and then burns. After the conclusion of the war fighting phase (1 May—20 July 2003), the majority of medical admissions shifted from ballistic trauma and burns to heat injuries and blunt trauma injuries from road accidents.⁴⁷

Security of medical facilities is always of concern to operational planners. In the case of a Role 3 Field Hospital, the footprint, size, complex integral systems within the facility, and patient requirements are such that the facility is not readily mobile and is not intended to defend itself. 202 (UK) Field Hospital in Shaibah was protected by layered defences: by its physical location on the vast Shaibah Airfield, by the presence of a

⁴⁶ *Ibid.*

⁴⁷ M.J. Roberts, M.A. Fox, C. Hamilton-Davies, and S. Dowson, "The Experience of the Intensive Care Unit in a British Army Field Hospital during the 2003 Gulf Conflict," *J R Army Med Corps* 2003, 149.

dedicated Quick Reaction Force (QRF) and other joint troops on the airfield and a point missile system.⁴⁸

Operation TELIC provided operational medical planners an opportunity to learn valuable lessons and to review the planning assumptions used in estimating medical support to operations. Basing the medical estimate on the medical experiences of Operation AGRICOLA (Kosovo 1999), medical planners underestimated the intensity of the expected workload for Operation TELIC, in that the proportion of intubated and ventilated patients was significantly higher than expected (44.5%).⁴⁹ Specifically, planners did not anticipate that many patients would require a significant period of post-operative ventilation while they were undergoing resuscitation. The major difference in patient admissions between 202 Field Hospital and hospitals with past peace support operations was in the greater numbers of ballistic trauma patients filling the Intensive Care Units.

Additionally, there were medical support requirements that needed to be addressed. It was impossible to maintain a reasonable ambient air temperature in the tented facility during the heat of the day and, as a consequence, the body temperature of burn patients became critically high.⁵⁰ During sandstorms, the facility became extremely dusty and staff was forced to stop ventilator testing to reduce sand accumulations in the equipment. Noise was a constant problem as well: air conditioners and generators affected the quality of clinical examinations. Medical support to Operation TELIC highlighted the requirement for planners to address an important logistical issue: facilities

⁴⁸ Discussion with Captain Neil Bagley, UK Medical Services, describing his observations as 1 (UK) Division's Operations Medical Planner in support of Op TELIC in 2003.

⁴⁹ M.J. Roberts, M.A. Fox, C. Hamilton-Davies, and S. Dowson, "The Experience of the Intensive Care Unit in a British Army Field Hospital during the 2003 Gulf Conflict," *J R Army Med Corps* 2003, 149.

⁵⁰ *Ibid.*

may not be able to rapidly evacuate their casualties and that some post surgical complications may need to be managed in theatre, despite the doctrinal focus of rapid evacuation out of theatre.⁵¹

Lessons learned from the UK experience demonstrated the importance of placing Role 3 surgical support forward with appropriate security arrangements, as this facility was heavy to lift. As in the US case, UK field hospitals lack integral lift and must rely on joint logistics units to move them. The presence of the Role 3 facility rendered the Role 2 facility redundant, as wounded could be speedily medevaced to the Role 3. In this instance, the facility was very large and the number of casualties it handled during the operation indicated that the size of this facility was appropriate in the circumstances. From the UK experience, Canadian HSS planners can draw three important lessons. During the medical planning process, they must seriously consider including integral lift modules in the development of medical facility. They need to keep in mind that limiting the sophistication of the medical facility to 'bare bones' will exacerbate heat, dust and sterility concerns to the detriment of the wounded, and they need to consider the need for additional security requirements on the facilities, depending on their mobility.

SUPPORTING THE FUTURE BATTLESPACE

If past CF military doctrine described a two-dimensional battlefield with opposing forces facing off against each other, what will future combat and combat service support look like? Current expectations have shifted to acknowledge the increasing likelihood that our forces will be facing asymmetric combat threats in a non-linear, non-contiguous battlespace. Additionally, the rising prevalence and complexity of urban operations will

⁵¹ *Ibid.*

shape the way combat service support, including HS support is delivered.⁵² Further, military forces of the 21st century must be prepared to operate in an urban environment and must be prepared to meet that challenge from a positive perspective, not a defeatist attitude.⁵³ The asymmetric threats facing deployed forces will remain a concern in future operations.

Asymmetric warfare can be described as those means used by adversaries to focus their attack on an opposing military's organizational weaknesses while avoiding conventional strengths.⁵⁴ In the modern context, asymmetric threats target unexpected vulnerabilities, resulting in heightened surprise and a lengthened response cycle. These actions cause unacceptable friendly force losses and prevent a decisive victory for friendly forces, while asymmetric forces can disguise their intent, strategy and capabilities. Additionally, they may choose to avoid having attacks attributed to them, with a result of achieving their objective and avoiding retaliatory response.⁵⁵ The nature of asymmetric warfare is inherently unpredictable and asymmetries between opposing forces of will, technology, organization and time can exist at strategic, operational and tactical levels.⁵⁶

Certainly the Russian experiences in the urban battle for Grozny (January-February 1995) can provide a useful perspective on the difficulty of providing HSS in a non-linear, non-contiguous battlespace. Their experience indicates that future battles may be conducted differently than in past. Russian Army medical support was well

⁵² Russell W. Glenn, Steven L. Hartman, Scott Gerwehr, "Urban Combat Service Support Operations: The Shoulders of Atlas" (Santa Monica: RAND, 2003).

⁵³ V.J. Goulding, Jr., "Back to the Future with Asymmetric Warfare", *Parameters*, Winter 2000-01.

⁵⁴ S.E. Johnson, et al, *New Challenges New Tools for Defense Decision making* (Santa Monica: RAND, 2003), 40-45.

⁵⁵ *Ibid.*

⁵⁶ From a lecture on "Asymmetric Warfare" provided to AMSC 8, 28 September 2005 by Colonel K.D. Dickson, Joint Forces Staff College, National Defense University.

planned and special medical treatment detachments were trained prior to the attack on Grozny⁵⁷. The Russians used their normal evacuation system of mainly ground medical evacuation, not anticipating that they would be facing a different enemy in the urban operations of Grozny. The wounded were evacuated by armoured ambulances to a medical aid post and then evacuated rearward by medical helicopter to military hospitals. Chechen fighters deliberately targeted medical assets and facilities, disrupting medical support during operations. Forward medical posts and hospitals needed to be dug in or placed in basements to limit the impact of Chechen shelling on medical facilities. After several medical evacuation helicopters and aircraft were shot down, forward air evacuation was not frequently utilized. As a consequence, statistics of wounded to killed ratios became skewed to 4:1 from the expected 2:1 ratio, likely because most of those wounded who died were unable to be treated or evacuated.⁵⁸ Snipers targeted medical personnel and Russian wounded frequently could only be evacuated under cover of darkness. A ruthless enemy who shot down medevac helicopters, and bombed field hospitals in violation of the Geneva Conventions took actions that the Russians either could not or would not contemplate.

This concern is also reflected in Smith's⁵⁹ discussion on the nature of future operations and how medical support may be affected:

For medical evacuation, the helicopter has been an ideal vehicle, but future guided munitions may limit its effectiveness. Instead of medical extractions in minutes, we may have to return to the hand litter, wheeled vehicles, or "walking" casualties. It may take hours or even days for casualties to reach forward

⁵⁷ L.W. Grau, and T.L. Thomas, "‘Soft Log’ and Concrete Canyons" Russian Urban Combat Logistics in Grozny." *Marine Corps Gazette*, Oct 1999: 67-75.

⁵⁸ *Ibid.*

⁵⁹ A.M. Smith, "The Influence of Medicine on Strategy," *Naval War College Review* 41, no.2 (Spring 1988): 22-36.

hospitals for primary surgical care, resulting in higher fatality rates among those with head, chest and abdominal injuries.⁶⁰

HSS CONCERNS WITH SUPPORTING THE FUTURE BATTLESPACE

Medical planners wrestle with the most effective way to provide HSS to forces in non-linear, non-contiguous battlespaces, especially when those operations may be engaging enemy forces willing to target HSS facilities and personnel to disrupt friendly forces and gain the advantage of surprise. There are dynamic tensions amongst mobility and definitive treatment, location of surgical capabilities and proper skill set of medical personnel when considering medical support in future operations. These tactical issues can have a significant impact on the operational level, as the mobility and capability of HSS facilities may limit an operational commander's plan.

How mobile can a medical facility reasonably expect to be? A rapidly changing, non-contiguous battlespace presents a unique challenge to the provision of HSS. Lines of communication and logistic routes can be rendered vulnerable and subsequently evacuation routes can be rendered insecure. If evacuation routes are lost, then existing evacuation assets are in danger of becoming overwhelmed, even in the absence of mass casualty situations. In response to this variable, HSS planners can place medical treatment capability, including surgical support, more forward.⁶¹ The decision to place capability forward is based on the current doctrinal construct of evacuating only relatively stable patients rearward. However, moving treatment forward raises the dynamic tension between increased treatment capability and reduced mobility and raises the specter of evacuating less stable patients rearward in order to address casualty treatment within the 'Golden Hour.' Also, placing surgical capability forward may lead

⁶⁰ *Ibid.*: 30.

⁶¹ G. Cecchine, *et al*, *Army Medical Support to the Army After Next* (Santa Monica: RAND, 2001), 22.

to surgeons in those forward locations attempting surgeries that are better initiated at a more comprehensive rearward facility. While the enthusiasm of those forward surgeons is commendable, the unintended secondary outcome can involve unnecessary patient morbidity or mortality.

Mobility is a paradoxical characteristic that medical facilities wish to achieve in accordance with supported units and the operational commander's plan, yet must balance against the specific requirements of patient treatment. AMEDD is currently looking to field even more mobile shelters for forward surgical treatment and yet, in reality, medical facilities are mobile only until they receive casualties. Then mobility becomes moot. Physicians with combat surgical experience have identified that a reasonable planning figure for surgery is approximately two and one-half hours.⁶² Also, post surgical recovery and stabilization for further rearward evacuation of casualties will limit any mobility of medical units until those patients can be cleared from the facility.

Given the ongoing concern with the safety of evacuation vehicles during future operations, forward surgical care must be considered as a viable option, otherwise HSS support in the future battlespace may not be possible. The challenge in providing far forward surgical care is that without robust evacuation assets, the facility is in danger of being overwhelmed as soon as all operating tables are filled and casualties continue to arrive. The needs of those casualties undergoing surgery are being met but those awaiting surgery might be better off being evacuated rearward by the time the surgical team gets to them.⁶³ In considering this situation, a panel of physicians recommended that AMEDD investigate an opportunity to combine evacuation and treatment platforms

⁶² *Ibid.*, 23.

⁶³ *Ibid.*, 22.

to provide high volume, therapeutic care while enroute to rearward facilities. They felt that this technological advance would allow surgery to be initiated enroute on relatively unstable patients as a way to provide surgical care within the ‘Golden Hour.’ The panel felt this might be a reasonable opportunity to explore, provided evacuation platforms can be developed to provide therapeutic care in a relatively stable environment.⁶⁴ Until these platforms can be developed and trialed, it is important for medical planners not to ‘assume’ away these issues by relying on next generation technology that is currently unavailable.

During a seminar on medical support to the Army After Next, discussion ensued regarding the efficacy of non-definitive battlefield care. A study comparing morbidity and mortality outcomes of casualties provided with battlefield treatment and those who did not receive treatment indicated that non-definitive (ie. non-surgical) treatment was not an indicator of a positive outcome. Rather, the important factor seemed to be speedy access to definitive care, such as that provided by trauma surgery.⁶⁵

MODULAR CAPABILITIES PROVIDE BEST HSS OPTIONS

The discussion throughout the paper has laid the groundwork explanation on the requirement to replace current field ambulance structures with modularized capabilities that includes surgical modules, given the likelihood that the most important factor in patient survivability is speedy access to trauma surgery. This section will discuss the doctrinal, mobility and holding capabilities of allied experiences that support this recommendation.

⁶⁴ *Ibid.*, 23-24.

⁶⁵ *Ibid.*, 21.

Review of allied doctrine indicates that all three countries have highly similar doctrine based on appropriate treatment at progressively more sophisticated medical or HSS facilities as the casualty is evacuated rearward. All countries' doctrine indicates that casualties should go no further rearward than the treatment facility necessary to address their wounds. HSS and medical doctrine are focused on maintaining the fighting fitness of forces and, once wounded, the organization focuses on providing appropriate care to casualties with the intent of returning them to battle or repatriating them out of theatre for definitive rehabilitative care.

Interestingly, US AAR suggests that CSH may be too big for current and future operations, as they are relatively less mobile and have excess patient capacity. The recommendation of the AAR, to divide CSH capability in half, speaks to the possibility of modularization of CSH assets in future operations. While the modularized CSH would have a larger holding capacity than an ASC, it shares similar capabilities.

US AAR and UK feedback also voiced concerns that CSH and UK field hospitals do not have integral lift and consequently are reliant upon higher organizations to provide lift. The difficulty with this arrangement is that medical facilities may require lift at the same time as other supported organizations and compete with them for scarce lift resources. By modularizing HSS, medical facilities can add an integral lift and support module to move delicate medical equipment and temperature-sensitive drugs, reagents and equipment. A modular medical facility with similar capabilities to an ASC can be efficiently lifted with six-50 foot trailers.

The UK medical experience during Op TELIC identified several key issues that indicate that field ambulances would be less than effective in current operations. Despite

the presence of Role 2 facilities supporting 7th Armoured Brigade, casualties were evacuated directly from Role 1 facilities to the Role 3 hospitals, bypassing the Role 2 facilities in favour of a facility that could provide more definitive care. UK Role 3 facilities struck a balance between mobility and bringing equipment that could have improved patient diagnosis and comfort. For example, the noise, dust, high internal temperatures experienced inside the Role 3 tent lines could have been alleviated with increased air conditioning capability and containerized facilities; however, including these capabilities would have increased lift requirements and decreased mobility. Countering that argument, the UK field hospitals did not move, as they were sited forward of 7th Armoured Brigade Role 2 facilities and were located in a well defended area. In a similar doctrinal decision, the NMSC JSG facilities, including the JHSU, are intended to remain in a defended location in support of hub-and-spoke operations. This solution may be a reasonable response to asymmetric threats, given current CF equipment holdings. Operational planners must resist the desire to wish away the limitations inherent in current equipment realities with futuristic, untried technology that may or may not mitigate the issue at hand and may bring its own unanticipated problems to the operation.

The ability to hold casualties post operatively is possible in modular facilities with capabilities based on ASCs and/or Role 3 facilities because they have the integral medical support equipment to monitor patients in recovery wards. Current field ambulances cannot hold post operative patients, as they do not have that capability. Placing surgical, diagnostics, and holding capabilities in an existing field ambulance changes its structure into one similar to an ASC and renders it less mobile. The Russian

experience in Grosny, in response to the Chechen sniping of medical personnel, bombing of their medical facilities and destruction of medical evacuation assets, was to dig in medical facilities. They did not attempt to make their medical facilities more mobile in that environment because the facilities could either move or provide treatment but could not do both in the presence of an enemy that actively engaged non-combatants.

Additionally, both Smith⁶⁶ and Roberts et al.⁶⁷ warn that facilities need to have a robust holding capability and that some post surgical complications may need to be managed in theatre. Despite the doctrinal requirement of evacuation rearward and out of theatre as required, the present reliance upon airframes for medical evacuation may reveal a weakness to be exploited by the enemy, as was experienced in Grozny by the Russians.

CONCLUSION

CF Transformation is ongoing to meet the non-linear, non-contiguous future battlespace. CSS organizations must review their current organization and doctrine to ensure they remain relevant in future operations. CFHS field ambulances are organizations that have limited relevance in current and future operations and should be realigned along modularized capabilities, as modular HSS organizations can provide surgical services, post operative monitoring and ancillary equipment necessary to support casualties until they can be evacuated or returned to duty. Recent experiences of allied military medical organizations suggested that, while mobility was considered an important doctrinal planning factor, it was often sacrificed to ensure patient treatment, especially if the facilities were sited in defensible positions. Canadian support doctrine

⁶⁶ A.M. Smith, "The Influence of Medicine on Strategy," *Naval War College Review* 41, no. 2 (Spring 1988).

⁶⁷ M.J. Roberts, M.A. Fox, C. Hamilton-Davies, and S. Dowson, "The Experience of the Intensive Care Unit in a British Army Field Hospital during the 2003 Gulf Conflict," *J R Army Med Corps* 2003, 149.

has acknowledged the relative immobility of much of the CSS assets expected to support a joint deployment by envisioning a joint camp that is defensible and in support of hub-and-spoke operations. HSS support in this future joint camp is referred to as the JHSU, a modular facility with a structure and capabilities similar to an ASC. Also, US AAR suggested that CSHs could be smaller facilities, making them closer in size and capability to an ASC. Further, UK medical units evacuated patients from Role 1 to Role 3 facilities, without stopping at Role 2 facilities in the chain of evacuation, because they had the ability to evacuate patients directly and quickly to the required treatment facility. This activity indicates that Role 2 facilities have limited utility in current and future operations, provided robust evacuation modules exist at Role 1 and Role 3 facilities to meet the evacuation demands. By replacing field ambulance structures with modules that include surgery modules, CFHS will be better positioned to meet the land component HSS requirements in asymmetric future operations.

This paper has uncovered areas of further research that may assist this debate. Further research is required to investigate the ongoing impact of the non-linear, non-continuous battlespace on the provision of HSS in future operations. Additionally, there is a requirement to conduct evidence-based studies on the efficacy of medical skill sets required forward of definitive (trauma) surgery, so that limited HSS personnel and resources are appropriately employed to maximize patient survivability.

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