

ANALYSIS

Preparing Canadian military surgeons for Afghanistan

In February 2006, over 160 military personnel from the Canadian Forces Health Services were deployed to Kandahar, Afghanistan. One primary task was to establish a hospital to provide surgical treatment for severely injured patients.

This hospital replaced the existing American facility but provides increased capabilities. The medical staff consists of a general surgeon, an orthopedic surgeon, 2 anesthesiologists, an internist, a radiologist, an oral surgeon and several family physicians. The hospital itself has a ward with 9 beds and an intensive care unit with 3 beds. It also has a blood bank, ultrasonography, digital radiography, laboratory services and a CT scanner. In short, setting up this hospital involved the largest deployment of Canadian Forces Health Services personnel and equipment since the Korean War.

In this article, we describe how Canadian Forces (CF) surgeons maintained their clinical competence in the years before the Kandahar mission. We then report the number and type of injured patients seen at the hospital in Kandahar and analyze some basic quality-of-care indicators. We conclude by discussing strategies for maintaining and improving quality of care.

Maintaining surgical competence

Severely injured patients have improved outcomes if treated at high-volume trauma centres.¹ Birkmeyer and colleagues² were able to show that this association is mediated in part by surgeon volumes: patients of high-volume surgeons had lower death rates for certain types of major surgery than did patients whose surgeons performed these operations less frequently. Other critical factors include perioperative pro-

cesses such as consultant availability, intensive care, and respiratory and nursing care.³

During peacetime, however, military trauma volumes are usually limited to minor injuries in healthy young soldiers. In the United States, the military established trauma training centres at civilian institutions. One-month rotations through these centres provided US military surgeons with greater trauma volumes than they would have seen in 1 year at their home stations.⁴

Canadian military surgeons faced similar volume issues in the 1990s. However, the Canadian solution to this problem arose as a result of the closure of all tertiary care CF hospitals. Because CF surgeons can no longer work in military hospitals, many complete trauma and critical care fellowships. Following their training, they remain at busy civilian hospitals to maintain their clinical competence. In addition, CF surgeons are sent for 1-month rotations at US trauma training centres.

Trauma patients in Kandahar

During the first 6 months in Kandahar (from Feb. 7 to July 20, 2006), 248 severely injured patients required treatment by the trauma team at the Kandahar hospital. Their mean age was 28 years, and their mean injury severity score was 18. Most patients were Afghan nationals. These patients had hospital stays that were longer than



Colonel Ian Anderson, operating during a mass-casualty situation in Kandahar, Afghanistan.

those of coalition soldiers (Table 1), primarily because injured coalition soldiers were usually evacuated from Kandahar within 24 hours.

Most of the patients experienced either blast or penetrating injuries (45% and 29% respectively). Blunt injuries constituted 25% of the injuries, and burns 1%. Of the 248 patients, 16 (6%) died at the Kandahar hospital. Gunshot wounds and injuries from improvised explosive devices were responsible for 12 (75%) of the deaths. The leading causes of death were severe brain injury ($n = 7$) and exsanguination ($n = 6$). The remaining causes of death were spinal cord injury, burns and multiple organ failure.

During the same 6-month period, 322 patients underwent surgery at the Kandahar hospital, 155 of whom were among those with severe injuries. The

Table 1: Demographic characteristics, length of stay and duration of mechanical ventilation of trauma patients treated at the Kandahar Airfield Hospital

Characteristic	No. (%) of patients $n = 248$	Mean length of stay, d*	Mean duration of mechanical ventilation, d
Canadian military	50 (20)	2.0	0.4
Other coalition military	64 (26)	1.5	0.5
Other military (prisoner)	14 (6)	1.0	0.6
Afghan army/police	85 (34)	3.3	0.3
Afghan civilian	35 (14)	6.8	4.9

orthopedic surgeon handled the majority of cases, most of which involved repair of complex extremity fractures. The general surgeon performed a wide variety of cases, including trauma laparotomies, burn excision and skin grafting, vascular repairs, neck explorations and thoracotomies (Table 2).

Quality of surgical care in Kandahar

Has Canadian military trauma care been improved by embedding CF surgeons in civilian hospitals? Traditional quality-of-care indicators from civilian trauma systems do not necessarily apply. Frequent mass-casualty situations, difficult field conditions and long pre-hospital transportation times make the military field hospital a distinct environment. Death rates, however, remain a crude measure of quality of care. Acosta and colleagues⁵ reported their experience at a US forward surgical hospital in Afghanistan. The mean injury severity score in their series was 9, and the in-hospital mortality rate 8%. At the Canadian facility, the mean injury severity score was 18, and the in-hospital mortality rate 6%. It would seem that Canadian military surgeons have been providing a similar level of care as their American counterparts. The excellent outcomes in Kandahar are equally due to the expertise and out-

Table 2: Type of surgery performed on trauma cases at Kandahar Airfield Hospital

Type of surgery	No. (%) of patients n = 155
Neurosurgery	1 (1)
Neck (other than tracheostomy)	6 (4)
Thoracotomy	6 (4)
Laparotomy	27 (17)
Repair of extremity fracture	103 (66)
Vascular	3 (2)
Burn excision or split-thickness skin grafting, or both	9 (6)

standing perioperative care of CF anesthesiologists, internists, radiologists and nurses. Like the surgeons, these health care professionals were maintaining their clinical competence in civilian centres before deployment.

Perhaps more telling than hospital death rates are personal anecdotes. Major Christine Simard, a military general surgeon from Quebec City, described one of her experiences in a recent email: While operating on a patient with a shrapnel injury to the left lung and left ventricle, she quickly released the cardiac tamponade, repaired the left ventricle and then completed 2 non-anatomic pulmonary resections for bleeding (personal communication, Sept. 24, 2006). Major Simard recently completed a trauma fellowship in Vancouver and credits this training for preparing her for this type of case.

Areas for improvement

During the first 6 months in Kandahar, 6 patients died in hospital because of hemorrhage, in all cases from penetrating injuries to the torso. Five of the patients were Afghan nationals who were not wearing body armour. Four of the 6 patients lost their vital signs en route to the Kandahar hospital. No major deficiencies in the trauma system have been noted that have contributed to excess deaths from hemorrhage. Med-evac helicopters are always available, except during extreme weather. Unfortunately, transportation times to the hospital can still be prolonged because of rugged terrain and vast distances.

Seven patients died in hospital from severe brain injury. All had devastating intracranial injuries and were not considered likely to survive. Even so, CF surgeons should be encouraged to undergo extra training in emergency neurosurgical techniques (burr holes, intracranial pressure monitoring and decompressive craniotomies) before deployment.

Future direction

All CF surgeons “are doing high acuity practices in large centers, which has been the best thing to evolve from

the closure of the Canadian Forces hospitals” (Colonel Ian Anderson, chief of surgery for the Canadian Forces: personal communication, Sept. 22, 2006). With the extension of the Canadian mission in Afghanistan, maintaining a cadre of well-trained surgeons should remain a priority for the Canadian Forces Health Services. Currently, there are 8 general surgeons and 6 orthopedic surgeons in the Canadian military; however, planned retirements may reduce these numbers substantially. Active recruitment and retention initiatives should be continued. Strategies such as encouraging fellowship training and embedding surgeons in busy civilian centres make a military career more attractive to surgeons and have proven to be of great value for overseas deployments. Initiatives to encourage training in emergency neurosurgical techniques before deployment should also be considered.

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