Post Vietnam — three decades of Australian military surgery

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Abstract

- ***Background:*** In the three decades since the Vietnam conflict, Australian surgeons have been involved in providing support to geographically extensive Australian Defence Force (ADF) operations. A military surgical capacity has been a key element in the ADF's operational effectiveness and a key facet of the military options available to Australian governments. By understanding the nature of the surgery performed and the degree to which such deployments have been successful in the past, we can plan for effective future deployments.
- ***Aim:*** To review all operational deployments post Vietnam which have included Australian military surgeons.
- ***Methods:*** This review has used the published literature, review of operating theatre books and interviews with participants when no other records were available.
- ***Results:*** The volume of surgery performed during the ADF's post-Vietnam deployments has been low, but covers a wide clinical spectrum. Surgery on civilian patients under a humanitarian mandate and elective surgery to ADF personnel can form a major part of the surgical caseload during low-intensity deployments. Data about surgery on deployments have not been recorded in a complete and consistent manner.
- ***Conclusions:*** Improved data capture would enhance the ADF's ability to audit surgical performance and plan for future deployments. The ADF's core surgical requirement — managing potentially large numbers of combat casualties — has not been tested in recent deployments. Flexible surgical capabilities are required for the ADF's range of peacekeeping and counter-insurgency missions.

ADF Health 2004; 5: 16-21

IN THE 30 YEARS since the Vietnam War, the Australian Defence Force has had many overseas deployments, principally as part of military peacekeeping, peace enforcement and counterinsurgency activities. ADF health support is an important component of any overseas deployment, but only a minority of the missions have required Australian level 3 (surgical) support. The ADF has deployed surgeons in support of the following missions:

- Gulf War (1990–1991) (Operation DESERT SHIELD and Operation DESERT STORM)
- Rwanda — Second United Nations Assistance Mission in Rwanda (UNAMIR II, 1994–1995)
- Bougainville — Peace Monitoring Group (PMG, 1997–2003)
- East Timor — International Force in East Timor (INTERFET, 1999–2000) and United Nations Transitional Authority in East Timor (UNTAET, 1999–2002)
- Solomon Islands (Operation ANODE 2003–2004).

ADF surgeons have also been deployed in a non-conflict related humanitarian capacity in response to the 1998 tsunami disaster in Papua New Guinea (Operation SHADDOCK). An ADF surgeon was involved in a triage capacity during Operation BALI ASSIST (2002).

This article summarises the surgical workload of each mission and compares some of the common aspects.

Gulf War, 1990–1991

In 1990, an ADF surgical team was deployed with the 1000 bed hospital ship *USS Comfort* to provide surgical support to US, British and Australian coalition forces in the Persian Gulf. The ship was staffed by 54 specialist surgical teams. Australia provided two rotations of two surgeons (one orthopaedic and one general surgeon). The second rotation was deployed the day before the Gulf War started (Operation DESERT STORM) and spent the next 100 days off the coast of Kuwait.

Surgical workload

Coalition casualties during the Gulf War were low. During its deployment the second Australian rotation performed one appendicectomy and about 16 arthroscopies.

Rwanda, 1994–1995

Civil war broke out in Rwanda in 1994, with more than 500 000 people massacred by extremist militias. The Second United Nations Assistance Mission in Rwanda (UNAMIR II) was deployed in August 1994 with an Australian Medical Support Force (MSF), the largest medical deployment by the ADF since the Vietnam War and the first since then to involve a surgical capability.[1]

An earlier version of this report was presented at the Annual Scientific Meeting, Royal Australasian College of Surgeons, Brisbane 2003 (Military Surgery Section).

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1: Surgical workload on recent ADF missions, and for UK Field Hospital, KFOR, Kosovo

	Total surgical procedures	Civilians	Children	Elective surgery	Operations per month
Rwanda, MSF, UNAMIR II [1]	750	84%	36%	unknown	65
UN Hospital, INTERFET and UNTAET, Sep 1999–Jun 2003*	673	15% (44% in Australian military personnel)	†	>20% (higher in Australian military personnel)	13
CHE, Bougainville, Dec 1997–Jun1999‡	467	99%	24%	26%	25
UK Field Hospital, KFOR, Kosovo[5]	246	—	†	32% (45% general, 15% orthopaedic)	15

*Unpublished audit data provided by Flight Lieutenant Janine Gregson, Consultant Anaesthetist. †Figures for children were not available. ‡Unpublished data provided by Colonel Peter Sharwood, Consultant Surgeon.

The role of the MSF was to provide level 3 support to the United Nations Mission. It was also authorised to use any spare capacity for humanitarian assistance on a case-by-case basis. The capability deployed was a Field Hospital located in the capital, Kigali, with two operating tables and intensive care facilities. Each surgical rotation (one orthopaedic surgeon and one general surgeon) was for 6 weeks. Twenty surgeons served with the MSF over the year-long deployment.

Surgical workload

Over 12 months, 750 operations were performed on 547 patients:

- 85% of patients were civilians
- 74% were operated on for trauma-related injuries, of which 36% were war-related
- 39% were children, who were statistically more likely to have war related injuries than adults.[1]

Forty per cent of the surgical caseload was soft tissue operations, principally debridements, dressing changes and split skin grafts. Forty-five amputations were performed. There were 38 laparotomies; 29 of these were for trauma and 21 were war-related (eg, gunshot or landmine injuries). Fifteen appendicectomies were performed.

Standard two bed resuscitation facility (Bougainville). During this deployment all surgery was undertaken in a canvas operating theatre which was partially protected from the elements under the roof of a copra warehouse.

Medical facility Rwanda. During this deployment pre-existing buildings were used as hospital facilities.

Bougainville, 1997–2003

In 1996, Australia agreed to contribute to a regionally based Peace Monitoring Group on the island of Bougainville to monitor the ceasefire and provide information on the ongoing peace process.

Australia provided a surgical capability to the PMG as part of the level 3 Combined Health Element (CHE) from December 1997 to July 2003. The surgical capability comprised a one table operating theatre supported by a two-bed high-dependency unit. The role of the CHE was to provide health support to members of the PMG. It was also authorised to use any spare capacity for emergency humanitarian or life-saving aid.[2]

From December 1997 to June 1999, there were 38 rotations of surgeons for periods of between 2 and 4 weeks. Unlike most other deployments, each rotation deployed a single surgeon and anaesthetist. These surgeons also participated in regular outpatient clinics held in Arawa township.

Surgical workload

During the 18 months beginning December 1997, 467 operations were performed (unpublished data provided by Colonel Peter Sharwood):

- 99% of the patients were civilians

2: Most common surgical procedures on recent ADF missions, and for UK Field Hospital, KFOR, Kosovo

	Total surgical procedures	Most common	Second most common	Third most common
Rwanda, MSF, UNAMIR II [1]	750	Soft tissue 40%	Orthopaedic 26%	General 15%
UN Hospital, INTERFET and UNTAET, Sep 1999–Jun 2003*	673	Wound debridement 21%	Excision of skin lesions 18%	Orthopaedic 16%
CHE, Bougainville, Dec 1997–Jun1999†	467	Peripheral limb (unspecified abscess, fracture or debridement) 21%	Caesarean section 14%	Excision of skin lesions 7%
UK Field Hospital, KFOR, Kosovo[5]	246	Wound debridement 20%	Orthopaedic 15%	Delayed primary closure 13%

*Unpublished audit data provided by Flight Lieutenant Janine Gregson.
†Unpublished data provided by Colonel Peter Sharwood.
This table demonstrates some of the deficiencies of data collection discussed in this article: incomensurate categories and incomplete records.

- 27% of the cases were due to trauma
- 26% were listed as elective (Box 1)
- children (age < 18 years) accounted for 24% of the patients.

Most of the workload was obstetric, with caesarean section being the most common procedure (67 cases). There were 25 laparotomies and 23 appendicectomies. Interestingly, 7 appendicectomies required laparotomy, possibly reflecting the nature of the pathology and late presentation in a third world setting. Limb surgery involved abscess drainage, debridement and fractures.

Most of the elective surgery involved skin lesions (33 patients) or hernia repair (17 patients). Other elective procedures performed included vasectomy, breast reduction, tubal ligation, Sistrunk operation and transvesical prostatectomy.

Performing a caesarean section on a Bougainvillean woman (Surgeon, Colonel Jeffrey Rosenfeld). This was the most common surgical procedure performed in Bougainville.

Vanimo, 1998

In July 1998, a devastating tsunami occurred off the north coast of Papua New Guinea. The ADF was tasked to spearhead the humanitarian assistance effort, known as Operation SHADDOCK. Within 48 hours, members of the 1st Parachute Surgical Team (PST) were in place.[3] The PST deployed two operating tables, one general/vascular surgeon and one orthopaedic registrar. The PST was later reinforced by two orthopaedic surgical teams, one from Monash hospital and the other from the RAAFSR.

Evacuation of a civilian casualty by helicopter.

Surgical workload

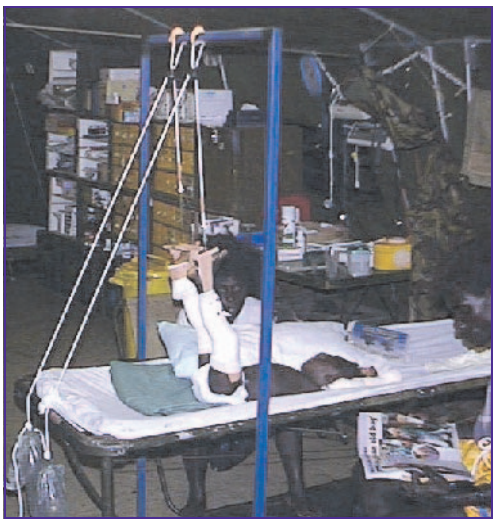
The surgical workload was extremely high in the first several days, with up to 150 patients arriving at a time. Two hundred and nine procedures were performed in 10 days. Most of the initial workload was debridement and amputation (14 amputations were performed). After day 5 most procedures were delayed primary closure and grafting. A quarter of the patients were children.

East Timor, 1999 to the present

East Timor is the most recent (and current) of the ADF's surgical deployments. Australia has maintained a surgical capability in East Timor since September 1999. As the

mission in East Timor changed from INTERFET (primarily a counterinsurgency operation) to UNTAET (primarily a peace operation) the requirements for surgical support have altered. The Health support facility in East Timor has changed form several times from an initial Forward Surgical Troop–Heavy located at Komoro airfield, to the United Nations Military Hospital (UNMILHOSP) then to the current Forward Surgical Troop–Light (more accurately an augmented health support team) which is based at Moleana.

During the 3 years that the UNMILHOSP was operational it was tasked to provide level 3 health support to United Nations forces.[4] The capability of the UNMILHOSP located at the Dili Proyek museum was one operating table and an intensive care facility.



Providing paediatric traction in a standard field hospital bed.

From September 1999 to June 2003, there were 36 specialist rotations. The length of rotations was variable. During the first 83 days the surgical teams comprised an orthopaedic and a general surgeon supported by an anaesthetist and intensivist. The current surgical facility at Moleana is manned by a single surgeon and anaesthetist.

Surgical workload

During the 34 months from September 1999 to June 2003, 673 procedures were performed (Bradley,[4] and unpublished data provided by Flight Lieutenant Janine Gregson). Between 15% and 39% of the patients were civilians. The number of children is not clear from the data that were kept. There was a peak in the 0–5-year age group, similar to that for UNAMIR II in Rwanda, suggesting that children accounted for up to a quarter of all cases.

Gregson conducted an audit of anaesthetics given during the period between July 2000 and June 2002 (Flight Lieutenant Janine Gregson, unpublished data). Of the 320 procedures performed during this period, 61% were general surgery, 26% orthopaedic and 4% obstetric and gynaecological.

Removal of skin lesions was the most common general surgical procedure, constituting 18% of cases overall but 37.8% of operations performed on Australian military personnel. The general surgical workload included 17 laparotomies and 10 appendicectomies. Orthopaedic surgery included both open and arthroscopic cases.

A distinguishing feature of the East Timor deployment is that it is the only post-Vietnam deployment in which Australian surgeons have treated Australian combat casualties.

Comparison

Care needs to be taken in comparing these data as each mission was different. Each occurred in a different geopolitical setting, with very individual threat scenarios, different mandates and differences in the level of facility deployed. In addition, the data have been sourced quite differently for each of the deployments, coming from a variety of personal databases, published articles and operation records. However, with this in mind, it is valuable to consider some of the similarities and differences.

Box 1 summarises the percentage of civilian patients and children. Figures from the United Kingdom Field Hospital in Kosovo[5] are included for comparison. Civilian patients predominated in Bougainville, but not East Timor. This is almost certainly a reflection of the differing mandate in East Timor and the availability of other health support for the civilian population. On each mission, children probably comprised at least a quarter of the patient load.

Elective surgery only took place on the two longer deployments (Bougainville and East Timor), where it constituted 20%–25% of the workload.

Box 2 summarises the most frequent procedures performed. In Rwanda, East Timor and Vanimo, wound debridement was the most common procedure. Excision of skin lesions represented 7%–18% of all operations performed in Bougainville and East Timor, the longer deployments. The 14% caesarean section rate in Bougainville is probably an aberration reflecting the unique nature of that deployment.

Discussion

Nature of the surgery

Each mission required a broad range of surgery. In particular, obstetrics and paediatric surgery have comprised a large component of the workload. This has clear training implications for surgeons deployed in support of ADF operations. Many general surgeons have only limited experience in trauma surgery and few have received training in obstetrics or paediatrics. Different skill sets are required to deal with humanitarian surgical workloads than are required for pure "military" operations. The combination of surgical skills required is unlikely to be found in a single surgeon, suggesting that the ADF needs to be able to deploy a range of surgical teams.

The need to train military surgeons across a broad range of surgery is controversial. The Australian military population is generally younger and has a higher background level of health than the civilian population. In providing surgical support limited to military personnel (such as in times of war), skills in paediatric surgery or obstetrics are not required. However, ADF surgeons are frequently required to operate within a humanitarian mission where these skills are essential. The introduction of

the military module of the Definitive Surgical Trauma Care course has been an important development in delivering this training to Australian military surgeons.[6]

Volume of the surgical caseload

The volume of the surgical caseload in each of the deployments, except Vanimo, has been low. On average, surgeons have performed between one and two procedures per day (Box 1). Although a low workload is in many ways desirable (as it means that ADF soldiers are not being injured), it can be frustrating for members of the surgical team. It is important that the expectations of surgeons deployed in support of ADF operations are managed well to minimise these frustrations. On most deployments, a significant amount of the surgeon's time is spent in teaching activities, either within the ADF health facility or among the local communities.

Elective surgery

On longer deployments, elective surgery can form a significant component of the workload, even if (as in Bougainville) the mandate dictated the provision of emergency humanitarian and lifesaving aid only. Elective surgery in the field is a phenomenon noted by other countries during peacekeeping operations and represents a merging of "garrison" and operational field surgery.[7]

Elective surgery on civilian populations

Most ADF deployments have mandated the provision of emergency humanitarian surgical assistance. The provision of non-urgent or elective surgery is controversial.[8] There are many ethical and political issues to be considered in providing non-urgent surgical aid. These include the adequacy of informed consent, the standard of care provided (particularly relevant when a surgeon is operating outside the scope of his/her area of specialist experience) and the management of adverse outcomes. Performing non-urgent surgery on children in a military setting raises particular issues, both surgical and anaesthetic. In addition, there are politico-strategic concerns, such as the effects of "mission creep", which must be balanced against benefits, such as fostering goodwill in the community and providing training opportunities for ADF members.

There is no doubt that surgical service to the local population provides humanitarian assistance and creates a sense of "contribution" which benefits the morale of both the health facility staff and the wider deployed force. However, these issues need to be carefully balanced when dealing with non-urgent surgery.

Elective surgery for deployed ADF personnel

Many factors must be considered before operating on deployed soldiers. These include purely medical considerations such as hygiene, the standards of the medical facility and access to a suitable specialist. There may also be resource constraints. ADF surgical facilities, for example, do not deploy with computerised tomography, fluoroscopy or laparoscopic equipment. Therefore patients requiring the use of such equipment would automatically require repatriation.

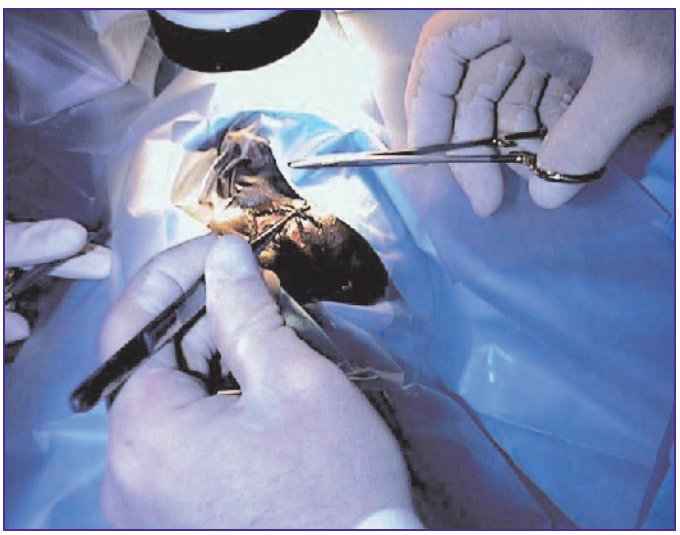
Administrative considerations include the geographic environment, the normal duties of the soldier, any requirements to wear protective equipment (eg, combat body armour) and the appropriateness of convalescence within the area of operations. For example, it may be appropriate to perform a hernia repair on a sailor deployed in HMAS KANIMBLA when he can be restricted postoperatively to light duties in a clean environment, but inappropriate to undertake the same operation on an infantry soldier in East Timor.

The provision of non-urgent health support to peacekeepers may enable them to return to duty without requiring repatriation to Australia for surgery and convalescence. Elective surgery in the field may help conserve the strength of the ADF force and may have some cost benefit in reducing evacuation for conditions which can be treated within the area of operations.

Data capture and audit

One of the major problems encountered when compiling data for this review was the absence of a consistent means of data capture. Data have come from widely disparate sources. All of the data are retrospective. There are no morbidity or mortality figures, and many records are incomplete. No information could be obtained on whether procedures were planned or unplanned. In only a few cases was it possible to determine if the surgery performed was related to trauma.

In this era of surgical audit and accountability, these shortcomings represent a significant deficiency in operative record keeping and deserve to be looked at more closely. Accuracy of audit has implications not only for standards of care, but also for training needs analysis, equipment procurement and resourcing. As professional military surgeons, it is imperative that we capture these data. This could be easily achieved using a laptop system similar to those used in many



Eye surgery being performed in Bougainville (Surgeon, Lieutenant Colonel Susan Neuhaus). The microscope is not an operating microscope but was borrowed from the health section for the purpose.

public hospitals. Programs can be constructed to provide specific and unique audit capability and to contain routinely collected audit information. An example would be the ability to specify if wounds were combat-related or accidental, and the mechanism of injury (eg, landmine, grenade, bullet). Such a system could also capture Medicare item numbers, which would indicate the relative "cost-value" of the surgery performed. Accurate and targeted audit would provide the ADF with the ability to assess and monitor performance and identify any structural problems in the provision of surgical care, thereby improving the standards of surgery for Australian service personnel.

Future challenges

ADF surgeons were not deployed in support of the 2003 (second) Gulf war, but that conflict is a reminder of the need to maintain the core surgical skill base for combat trauma injuries, plus a niche capability to deal with the effects of chemical/biological weapons. In any future major conflict, it is likely that ADF surgical teams will be integrated with those of other "coalition" partners. This raises important issues regarding the interoperability of our surgical teams with non-ADF capabilities, which are beyond the scope of this article. The current ADF deployment to the Solomon Islands (the first such government deployment in which the ADF is not the lead agency) raises similar issues.

Finally, the "war on terror" may present unique surgical challenges. A terrorist incident holds the threat of mass casualties, perhaps with large numbers of burns patients. In the event of a major attack on Australian soil, many of the ADF surgical capabilities that have been used offshore would be deployed internally. This too has implications for the planning, skills training and equipment enhancements required to meet such a challenge.

Conclusions

Australian military surgeons have been deployed several times over the last 10 years, yet only once in support of war. During these deployments they have provided an essential surgical support capability to Australian service personnel. Fortunately, in only one of the deployments was surgery required for Australian combat casualties.

The ADF's surgical efforts have provided significant humanitarian assistance to local populations. This is evidenced by the number of civilian patients operated on during each of the deployments. However, it should be remembered that this is not the *raison d'etre* of the Defence Health Service, which exists to protect the fighting strength of the ADF. As with every other military capability, there is a need to structure and optimise a core military surgery capability to support war-fighting, but a co-existing need to adapt it to peacetime and/or other frequently encountered operational conditions. The provision of surgical care to future operations will need to embrace such flexibility.

Operating theatre East Timor (operating surgeon, Major Justin Bessell). The operating theatre is in an ISO-container, rather than a tent.

The volume of surgery performed during the post-Vietnam deployments has been low, but covered a wide clinical spectrum. Elective surgery in the field has emerged as a new phenomenon in low-intensity operations. Improvement in data collection and the introduction of surgical audit will improve our ability to assess more accurately the surgery performed and facilitate planning for future operations.

Australia's ability to provide a surgical capability to operational deployments remains an important strategic health asset, not just for the ADF but for the wider Australian community. With the increasing tempo of military and peacekeeping operations in our region, it is likely that there will be many future ADF deployments requiring surgical support.

Acknowledgments

I thank Colonel Peter Sharwood for access to his personal database which has provided much of the data for the Bougainville deployment and Flight Lieutenant Janine Gregson for access to her data from East Timor.

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(Received 26 Aug 2003, accepted 5 Nov 2003) ❑