

AUDIT OF THE EFFECTIVENESS OF COMMAND AND CONTROL ARRANGEMENTS FOR MEDICAL EVACUATION OF SERIOUSLY ILL OR INJURED CASUALTIES IN SOUTHERN AFGHANISTAN 2007

RF Cordell¹, MS Cooney², D Beijer³

¹Headquarters 1st (UK) Armoured Division, British Forces Post Office 15; ²Navy Information Operations Command, Maryland, USA; ³National Defence Headquarters (CA), 101 Colonel By Drive, Ottawa, ON Canada K1A 0K2

Abstract

Aims: The effectiveness of the command and control of medical evacuation by helicopter (MEDEVAC) of casualties sustained in southern Afghanistan each month from 1 May to 31 July 2007 was audited. In this period 762 casualties of all categories were evacuated to International Security Assistance Force (ISAF) field hospital facilities under the direction of Operations and medical staff of NATO Regional Command (South) (RC-S).

The criterion for the audit was the time taken from notification in the RC-S Combined Joint Operations Centre (CJOC) until the helicopter landed ("Wheels Down") at the destination field hospital's helicopter landing site. The standard to be met was 90 minutes for all "9-liner" Category A (URGENT) and Category B (URGENT – surgical) cases (in hospital within 2 hours of wounding) allowing for time from injury to first notification in the CJOC, and time from landing to transfer to the Emergency Department (30 minutes together) at the designated destination hospital. Those that did not meet this target were assessed in order to review their outcome and to identify means for improving performance.

Results: Analysis of evacuation times for all missions each month from May to July revealed that three quarters of A and B category missions met the 90 minute target. No adverse outcome resulted from those which did not meet this target, reasons for which included distance (more than 30 minutes flying time each way), delay in securing a hostile landing site, delay in obtaining sufficient information, incorrect categorization of the casualty's priority, and on one occasion, an overmatch of assets available at that time. No casualties died who were recoverable.

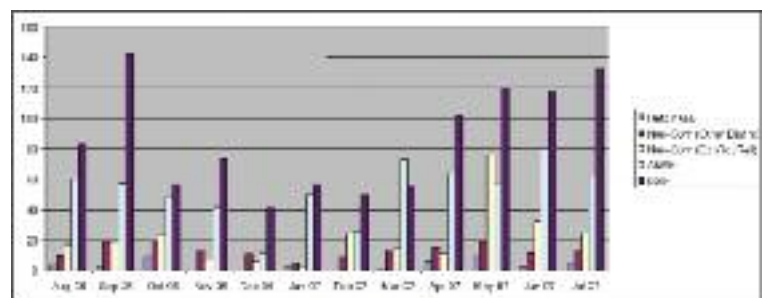
Comparison with data from the two previous RC-S rotations (prior to 1 May 07) showed an improvement in mean response time, but little change in median response on the rotation of RC-S staff on 1 May 07. The major change that had occurred on this rotation was to move the medical operations staff into the CJOC. The convergence of median and mean at this time indicates a reduction in "outliers", providing evidence that collocation of medical and operations staff improves incident response and should be the "default setting" in deployed tactical formation headquarters.

Conclusion: Regular audit of MEDEVAC response should be routine for Medical Operations staff, in order to ensure the optimal casualty care pathway from point of wounding to field hospital.

Introduction

The casualty load in southern Afghanistan in mid-2007 was substantial; injuries among ISAF and coalition (US) troops were being sustained through direct combat and Improvised Explosive Devices (IEDs) of various types. In one year from 1st August 2006, 2122 casualties were evacuated from the field (ISAF and coalition troops, Afghan security forces, injured and some civilians) by helicopters staffed and equipped for casualty evacuation (MEDEVAC) (Figure 1). It should be emphasized that treatment of the local population in armed conflicts will almost always be necessary to a greater or lesser degree [1], particularly so in Afghanistan, where the healthcare infrastructure, in the south especially, is rudimentary as a result of almost 30 years of destabilising influences [2]. Progress is being made through the efforts of the Government of the Islamic Republic of Afghanistan, ISAF and other international partners, both in primary healthcare [3] and hospital provision [4], but will take time.

Corresponding Author: Brigadier Robin Cordell BSc MBBS
MRCGP MFOM DCH DRCOG
Email: robin.cordell180@mod.uk



Total casualties admitted by MEDEVAC: 2122, of which 290 in Sep 06 and 290 in May, 249 in Jun, 227 in Jul 07.

Figure 1. Casualties admitted by MEDEVAC helicopters within ISAF Regional Command (South) from 1 Aug 06 to 31 Jul 07. Detainees were predominantly Taliban insurgents; non-combatant civilians were those "caught in the cross-fire" or others with emergency problems unrelated to the conflict. Afghan National Security Forces included both Afghan soldiers and Police; "ISAF" in this context includes US troops fighting alongside ISAF troops within the US led Operation Enduring Freedom (OEF).

The aim of this study was to determine the effectiveness of the medical evacuation system using helicopter assets (MEDEVAC) in order to ensure optimal outcome for those injured.

Headquarters Regional Command (South) (RC-S) commanded the response to incidents involving ISAF and US Operation Enduring Freedom (OEF) troops within southern Afghanistan, including casualty evacuation by helicopters (provided by the UK and US Armed Forces). The medical director of the NATO headquarters provided leadership of the medical element, ensuring that Operations (J3) staff were advised on the urgency of each case and assigning the deployed hospital facility that the casualties would be taken to. Given the distances over which ISAF and OEF troops were operating, the hostile environment (in all senses of the word) and the finite aviation and medical resources available, it was critical that the medical evacuation system was as efficient and effective as possible in order to minimise the impact of injury and to save life. At this time there were approximately 20 000 ISAF and OEF troops in RC-S, with deployed hospital facilities provided by NATO at Kandahar Airfield (Canadian-led), Camp Bastion in Helmand province (UK provided), Tarin Kowt in Uruzgan province (Dutch provided) and two light facilities provided by US forces at Tarin Kowt and at Qalat in Zabol province. The latter had no holding capability, casualties usually being moved to the NATO Role 3 field hospital at Kandahar Airfield after initial surgery or to the US facility at Bagram Airfield.

The treatment and evacuation of those sick or injured in the military environment is no different in principle from civilian practice. It is a process to which both medical and non-medical elements contribute, for example the Police and Fire and Rescue Service in civilian settings, as well as Ambulance and hospital staff. To be effective all contributions to this patient care pathway, from point of wounding through to rehabilitation, must be integrated.

An essential first step in the military environment is arresting catastrophic haemorrhage, and the training and equipment for those combat soldiers assigned as team medics has already paid dividends. However, to save the lives of those with uncontrollable haemorrhage, advanced resuscitation techniques and surgery will be required. Although all casualties will be reached by skilled medical aid as soon as possible, NATO medical planning yardsticks [5] require that urgent cases are treated by Advanced Trauma Life Support staff within one hour of injury and receive Damage Control Surgery within two hours of injury. The authors' contribution was to ensure these timelines were met.

All missions to evacuate the seriously injured by helicopter were undertaken by aircraft specifically assigned and equipped for this role, the crew including at least one paramedic; this is termed MEDEVAC by NATO (Figure 2).



Figure 2. US casualties collected rapidly from the scene of an incident by means of a CH47 Immediate Response Team (IRT) helicopter platform with UK Medical Emergency Response Team (MERT) embarked.

The casualty evacuation system required that troops on the ground needing evacuation of the sick and injured call their own battlegroup operations room by radio, who would in turn send a MEDEVAC request to their Task Force operations room; this message would then be transmitted by a computerised system (*mIRC*) to the Headquarters RC-S Combined Joint Operations Centre (CJOC). Although this might appear to involve a number of steps in the process, in practice the CJOC Operations staff would be aware of casualties as soon as they occurred, some time before the actual MEDEVAC request was received, as CJOC staff continually monitored the battle. A number of casualties might be evacuated on one MEDEVAC mission, depending on the capacity of the helicopter (this being greater for the CH47 used by UK Forces than the smaller US BLACK HAWK).

In order to optimize MEDEVAC, during the Mission Rehearsal Exercise for Headquarters RC-S, the CJOC Director agreed to move the Medical Operations staff for this deployment from a building a short distance away within the RC-S complex into the CJOC. The purpose was to improve situational awareness and, critically, integration with other staff involved in the management of incidents, especially the J3 Current Operations and Aviation controllers.

Methods

In order to assess the effectiveness of the MEDEVAC system and to assure sustained effectiveness, a monthly audit was instituted utilizing a bespoke database and subsequent analysis from 1st May 2007. Previous data was available from Aug 06.

The criterion for the audit was the time taken from first notification of an incident in the CJOC until the helicopter carrying seriously injured casualties (requiring admission to hospital care within 2 hours from point of illness or injury) landed at the designated hospital facility ("wheels down"). On the NATO standard "9-Line" MEDEVAC request form these casualties are categorized A (URGENT – 2 hours) or B (URGENT – 2 hours and require surgery). Those who were less seriously ill or injured (Category C – 4 hours, or Category D – 24 hours) were not included in the audit.

Given the requirement to admit such cases within 2 hours, taking account of the time taken for troops on the ground to activate the evacuation system and for transfer of the casualty from the hospital helicopter landing site into the Emergency Department, the target time was set as 90 minutes from first notification in the CJOC until "wheels down" at destination.

Those Category A and B MEDEVAC missions which took longer than 90 minutes were then reviewed using the comprehensive information contained both within the HQ RC(S) *mIRC* battle log in the CJOC and the prospective database.

Results

The results for May, June and July show that 75% of MEDEVAC missions were completed in the target time of 90 minutes. The figures for July 2007 are representative and are described in detail. Forty one out of 53 (77%) MEDEVAC missions were accomplished ("wheels down") within 90 minutes, nine were completed in 90-120 minutes and three took longer than 120 hours as follows. Those completed within time were not considered further. Figure 3 describes the reasons that the 12 Category A and B MEDEVACs were not completed within 90 minutes.

In one of the three missions that took in excess of 2 hours from first notification to "wheels down", the casualty had been wrongly assigned as a B casualty. Confusion had arisen as the UK Task Force was using the T1, T2, T3 system for triage, and then translating this into the NATO mandated "9-line" format.

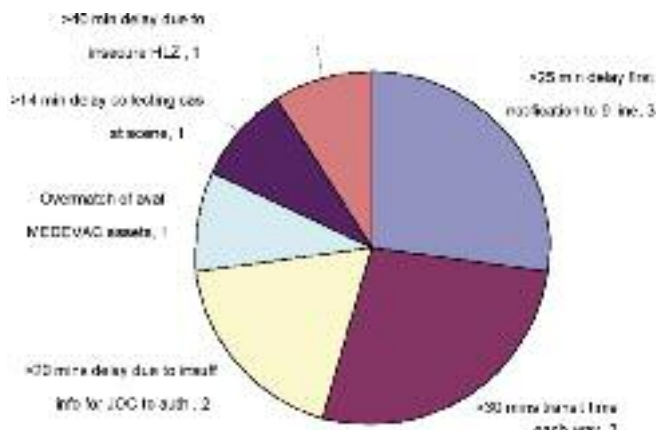


Figure 3. Reasons for failure to meet 90 minute timeline target for Category A and B MEDEVAC missions in July 2007. HLZ = helicopter landing zone.

It had not been appreciated by some that A and B have the same priority on the “9-line”, B being used to indicate a casualty that will require urgent surgery, whereas an A casualty would have urgent problems but was considered not requiring surgery. In this case a casualty categorised as T2 was wrongly assigned a B category; the helicopter had delayed take-off by 25 minutes to take on stores which was agreed with medical staff on the ground as acceptable, which indeed it was. Of the other two cases, in one there was considerable delay (52 minutes) between initial notification and receipt of the MEDEVAC request, due to ongoing treatment by the doctor on the ground, and in the final case there were four MEDEVAC requests received at about the same time. A judgement was correctly made by the Medical Operations officer on duty in the CJOC that this mission had the least priority. There was no adverse outcomes.

These results were then analysed statistically. The mean response time was obtained for all MEDEVAC missions in the calendar year 1 August 2006 to 31 July 2007, although prior to this period only information on time of receipt of the MEDEVAC request and “wheels down” at the destination facility was collected. Given that the arithmetic mean can be significantly affected by “outliers”, the median was also calculated for each month, as shown in Figure 4.

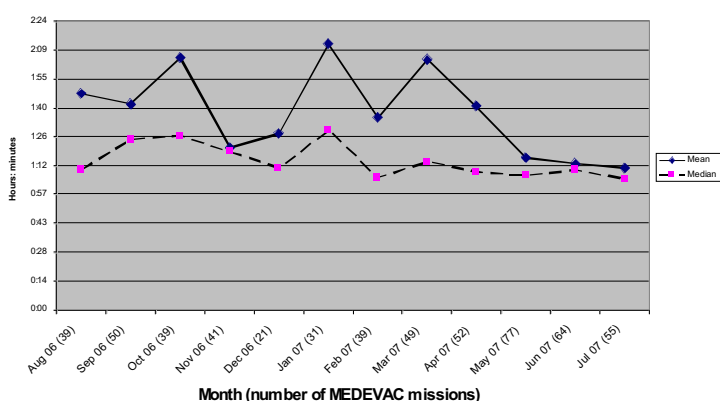


Figure 4. Mean and median response time from receipt of “9-line” MEDEVAC request until “wheels down” at receiving deployed hospital facility in ISAF Regional Command (South) August 2006 – July 2007. Rotation of Headquarters RC-S staff took place on 1 May 07.

Finally, the MEDEVAC missions for those who were evacuated by helicopter but died of wounds were also examined; all were reached within the 90 minute timeline target. Post mortem examination of these casualties confirmed that they all had non-recoverable injuries.

Discussion

Shortly after the first month’s audit was first promulgated within RC-S, criticism was raised in the UK national media over MEDEVAC response times. This was within the context of criticism in the media of equipment shortages for the military, and prompted by an article written by a military orthopaedic surgeon, published in the Journal of the Royal Army Medical Corps [6]. The UK Surgeon General’s response to the media was positive, supported by our early findings and the publication of up to date figures [7]. However important response time is, it is not the only determinant of the effectiveness of medical support. The timely evacuation of the seriously sick and injured must be seen as part of a continuum of care, to which a number of key personnel contribute. Not least is the central importance of managing the incident, including securing the scene; in a conflict situation this can only be done by combat troops and hence command of such incidents must remain with the military executive Chain of Command. Medical staff play an essential but supporting role, just as in the civilian incident response setting [8].

This audit revealed confusion among UK personnel over the format for casualty evacuation requests. The Major Incident Management and Support (MIMMS) triage system is used by UK Forces in Iraq to categorise casualties as T1, T2 or T3, representing the order in which they should be treated [8]. From this a METHANE message is generated (*My location, Exact location, Type of Incident, Hazards at the scene, Access, Number and type of casualties, Evacuation assets required*). One problem arose from a misunderstanding among the troops and Executive staff, such that the category T4 (actually those in mass casualty situations who are for expectant care only) was being used to denote those who were dead. More importantly however, UK staff used the T system for requesting evacuation rather than following the NATO standard “9-liner” [9]. The greatest area of confusion arose from a failure to understand that “evacuate within 2 hours” means “two hours from injury” and also that B Category casualties are just as serious as A – not only must they be in hospital within two hours but also they will need surgery. The “9-liner” is in our view better than the METHANE format as it tells the aviation team exactly what is required ie have the patient in hospital within 2 (or 4 or 24) hours of injury. The T system is a means of sorting casualties such that those who are T1 are treated before those who are T2, and T2, i.e. stretcher cases that are not T1, before those categorized as T3. We managed this issue by amending the RC(S) Standing Operating Instruction on MEDEVAC to include the T categories and MIST [10] handover information as suggested content in the Remarks box on the “9-liner”.

The importance of this audit is twofold. Firstly, it demonstrated that no casualty had died in Regional Command (South) as a result of any deficiency in the MEDEVAC system. Secondly, and significantly, the audit provided evidence supporting the decision to move the Medical Operations cell into the Headquarters CJOC. This was manned by three experienced Medical Corps officers (one Dutch and two Canadian majors) on a 24 hour basis. Although the median response time over the year (Figure 4) has not changed greatly, the convergence of mean and median in the three months since this change took place indicates that there are fewer “outliers” – i.e. fewer missions where MEDEVAC was delayed. Whereas it would seem intuitively right that medical staff should be within the Operations Room when casualties require urgent evacuation, this audit demonstrates that such co-location promotes integration of incident response as well as improving situational awareness for the medical elements supporting the force.

It should be emphasized that effective incident response is not just about the time taken to bring a casualty back to a hospital. Those controlling such incidents should be advised to “make haste slowly”, ensuring that the right casualty is moved, by the right means, with the right capability, to the right facility at the right time. Co-location promotes this approach.

Conclusion

Audits such as this should be standard practice for all Medical Operations cells, so the effectiveness of the command and control of MEDEVAC may be monitored and adjusted to optimise performance. The key change made for this RC-S rotation was to move the Medical Operations desk into the CJOC, alongside J3 Operations and Aviation staff. The findings presented in this paper indicate that this arrangement, long advocated by medical staff, should reduce the risk of death and disability from recoverable injuries sustained in the field. The convergence of median and mean demonstrating a reduction in “outliers”, has largely resulted from improved communication and collaboration between Operations, Aviation and medical staff in the CJOC. We contend that collocation of medical and operations staff improves incident response and should be the “default setting” in deployed tactical formation headquarters.

This audit has provided evidence that in hostile environments such as Afghanistan, the integrated approach, led by J3 Operations staff with advice from experienced medical support officers and Aviation staff, provides effective command and control of MEDEVAC. This will in turn ensure an optimal casualty care pathway from point of wounding to hospital.

References

1. Hodgetts T, Mozumder A, Mahoney B, McLennan J. Defence Medical Services Support to Civilians on Operations: Report of an Evidence Based Review. Academic Department of Military Emergency Medicine at the Royal Centre for Defence Medicine. 2005.
2. LaTourette G. Combat Medicine in Afghanistan, *Military Medicine* 1990; **155** (5): 231-2.
3. A Basic Package of Health Services for Afghanistan. Ministry of Public Health, Islamic Republic of Afghanistan, 2005.
4. The Essential Package of Health Services for Afghanistan. Ministry of Public Health, Islamic Republic of Afghanistan, 2005
5. http://www.nato.int/docu/logi-en/logistics_hndbk_2007-en.pdf page 153 accessed 29 Nov 07.
6. Parker PJ. Damage control surgery and casualty evacuation: techniques for surgeons, lessons for military medical planners. *J R Army Med Corps* 2006; **152**: 202-211.
7. <http://www.mod.uk/DefenceInternet/DefenceNews/DefencePolicyAndBusiness/SurgeonGeneralRespondsToConcernsOverAfghanistanMedicalTreatment.htm> accessed 29 Nov 07.
8. Major Incident Medical Management and Support the practical approach at the scene. Advanced Life Support Group. ISBN: 0727913913 BMJ Publishing Group
9. AJP 4.10(A0). Allied Joint Support Medical Doctrine. North Atlantic Treaty Organisation, 2006.
10. Greaves I, Porter, K.. Emergency Care: A Textbook for Paramedics, Saunders, London, 1997.