

## MEETINGS AND ABSTRACTS

# THE CIVIL AND MILITARY MEDICAL RESPONSE TO NATURAL DISASTERS

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### Abstract

**This article explores the topic of military involvement in disaster response. This was debated during a conference held at the Royal Society of Medicine, through presentations on experiences and procedures within both the military and civilian roles. The conference was run jointly by the Haywood Club Tri-Service Medical Society and the Catastrophes & Conflict Forum of the Royal Society of Medicine on 20th April 2007.**

**Issues of collaboration and accountability are seen as key themes of disaster response, within which the military can have a role, but which needs to be carefully administered in order to avoid an inappropriate response with an associated political fallout.**

**This article does not represent the official stance of government or any of the agencies therein.**

### Introduction

Many in non-governmental organisations (NGOs) feel that a humanitarian military response is a misnomer, or paradox; that the military acting in a humanitarian capacity is impossible due to the fact that an arm of a nation's political power may never be truly impartial. However, there has recently been an increase in the number of large scale disasters in which the military have had a high profile and shown both their unique ability to provide critical support (such as heavy lift capability) and ability to provide a secure operational space for all actors.

The collaboration between contributors involved in disaster relief has improved in recent years, as was seen in the multi-agency response to the earthquake in Pakistan in 2005. However, there is still room for improvement both in collaboration and accountability through assessment, in order to respond more appropriately in future. Although the military do have a role to play in disaster relief they are expensive and an overtly political machine. This can inhibit both their timely deployment and utility once deployed. Other global challenges include: recognising the importance of any response being led by local needs, the increasing security risk with an associated upsurge in prevalence of private security companies (PSC) with often unclear and conflicting agendas, the role of the 24 hour media, and how to provide a response that considers specific effects on children.

This article highlights some contemporary concerns and key messages raised by experts in the field during a one-day conference involving potential collaborators from all sides, but does not attempt to provide a complete assessment of all the issues pertaining to military intervention in natural disasters.

### Assessment and accountability

There is an increasing requirement for accountability and the importance of minimum standards is growing in relation to an

increasing evidence base and research at field level. The gathering and reporting of morbidity and mortality statistics is therefore a key exercise, and it is arguably not acceptable to engage in the field of disaster response as a "hobby".

An increasing need for collaboration between government targeted approaches and those that are more NGO oriented has seen the role of 'Emergency Relief Coordinator' being set up by the Inter-Agency Standing Committee (IASC) at the UN. The "Sphere project", a collaborative framework designed by the ICRC and other NGOs, has also come into practice as a humanitarian charter, providing minimum standards in disaster response. The Sphere Project recognizes the need for an assessment that allows an agency to decide whether to intervene or not, how to plan, what measures to carry out and how to monitor a relief programme [1].

### Coordinating the response

In October 2005, the Pakistan earthquake killed 75,000 out of 500,000 people in the nearest city, left 3.5 million people homeless and was compounded by aftershocks, landslides and an approaching winter. The response to this emergency emphasised the importance of networking and communication in a coordinated response, allowing for the unexpected through a flexible approach.

Pakistan was the first application of the 2005 Humanitarian Reform 'Cluster Approach', which aimed to close gaps in services in the response to an emergency situation. The WHO was given control of the 'Health Cluster' (attended by the Federal Relief Commission, UN agencies, donors, over 50 NGOs, foreign military, NATO and interested individuals), held daily meetings for the first two weeks and twice a week thereafter to plan and co-ordinate health response activities. Key elements for success were felt to be frequent meetings bringing inter-agency understanding, control remaining in the hands of the Pakistani Ministry of Health and support by donor governments of the co-ordinated approach.

### Foreign government

The British government response to disasters is carried out through the UK Department for International Development

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(DfID), and 10% of all DfID's funds go to disaster relief. It is UK policy that taxpayers' money should not be spent by DfID for political gain but to achieve humanitarian ends, and although natural disasters are not in theory controversial, few situations are without political bias or sub-text. In fact it has been said that "Disasters are commonly divided into "natural" and "man made", but such distinctions are generally artificial. All disasters are fundamentally human made..." [2]. In terms of a military response to disaster, the Ministry of Defence (MoD) can only act in humanitarian situation if DfID, or the Prime Minister in extremis, asks them to.

Military medical assistance holds a special position within the paradox of military International Humanitarian Law. There is an inherent struggle between medical professional culture and military organisational culture. In practice, a military field hospital is often last on the ground so is not a realistic first response, and furthermore many humanitarians view a military humanitarian role a contradiction in terms. A key area of dispute in future is likely to be the contracting out to private healthcare of relief in disaster response, as for-profit motivation is seen as undesirable in immediate disaster response.

## Media

From a media perspective, the military are often compromised in disasters (e.g. civil war), and journalists would ideally not engage with them but often have to for safety reasons. Military assets should be a last resort, only reflect humanitarian benefits, and their use should have clear benefits over other options.

The media plays a key role in getting information out, ensuring that vital relief and recovery information is shared in a timely and accurate manner with both internal and external audiences. Media are often seen to interfere, but as information needs to be shared it is important that respondents to any disaster establish a good relationship with the media to ensure coverage of the events is faithful and avoids the transmission of unhelpful messages.

## Security

Figures produced by International Institute for Strategic Studies show a reduction in the global figures for people affected by war, but the security of outsiders in disaster situations has been deteriorating. Aid workers were protected but this is now no longer the case, as they form part of the problem as well as the solution, and often find themselves targets of violence.

If a disaster occurs in an easily accessible region it can usually be dealt with by local/national assets, but if inaccessible or remote, law and order may break down, resulting in the need for international help and security. It is in this scenario that PSCs argue that their role is as humanitarian as any other organisation, providing a niche security role. Exactly what their role should be is poorly defined: although they currently protect the humanitarian aid effort, should they deliver the aid itself? In Afghanistan many failures to deliver care are perceived to be due to a lack of security for aid agencies, and it is here principally that PSCs threaten to fill roles currently carried out by NGOs.

The "relief development continuum", a key concept of the 1990s, identified three phases of response [3]. These were 'relief, rehabilitation and development', and built around a model of a disaster which interfered with development. It is no longer in vogue, and criticised for over-simplicity, being replaced with the 'disaster management' concept, but contributors to humanitarian aid still struggle for integration. The commercial sector is often ignored by governments, but generates jobs and prosperity post-disaster.

PSCs have rapidly expanded in number and being private enterprises are likely to explore other potential markets. PSCs argue they are more accountable than national militaries, as they will not have contracts renewed if they do not perform

satisfactorily. However, PSCs and the military are often antagonistic, even though PSCs are staffed by mainly ex-military personnel.

PSCs are likely to remain key players in providing security in both natural and man made disasters, and are aware of their less than desirable reputation as "Dogs of War". There is a concerted effort by the British Association of Private Security Companies (BAPSC) to regulate the profession via an ombudsman, and there is a desire to see a greater exchange of ideas and a more integrated approach with national militaries, to allow a joined up approach to security provision.

## Case Study – Tsunami in Sri Lanka

The Leonard Cheshire Centre (LCC), were invited to Sri Lanka in January 2005 after the Tsunami, to provide advice on the ground, assess health needs, provide emergency medical equipment, develop project proposals and assess training opportunities. Most people hit directly by the Tsunami died, so that the number of injuries to deal with immediately was actually relatively small. It was as the days progressed that health issues came to the fore, with large numbers of displaced people living in close proximity in insanitary conditions.

What was needed immediately after the tsunami was not medical, but engineering expertise in order to deal with the loss of infrastructure. This illustrates that any visiting organisation needs to have clear aims and a defined end point, and must be led by the local needs, not what the visiting team think is most relevant.

From an engineering perspective wave impact and inundation were the main cause of building failure, the degree of damage was dependent on the water height and speed, proximity to shore and lack of obstacles, structure type and construction quality. Forty two hospitals were fully damaged, 45 partly damaged, and the cost of restoration estimated at \$95million.

The 2004 tsunami was a rare event with significant consequences, and to compound matters coastal populations are rising therefore increasing the human risk. Good building design and construction can only reduce losses to a certain extent. Critical facilities like hospitals need to be designed to be functional after natural hazard and spread out to avoid a "domino" effect.

## NGOs

Factors governing an NGO response include the host nation government's response to the natural disaster including whether it has the capacity to respond effectively to the situation, the NGO commitment to the Humanitarian Charter and Minimum Standards in Disaster Response, the NGO's capacity to act, the organisational response time and the envisaged impact interventions are expected to have.

The NGO response must ensure that interventions implemented during the emergency/recovery phase are sustainable, and that longer term development strategies have been defined from the beginning. Needs should be properly assessed and resources used appropriately within a coordinated framework.

## Search and Rescue

Standards of Search and Rescue (SAR) team capability are defined and assessed by the United Nations as light, medium or heavy. The UK SAR group is a 'heavy rescue team' capable of shoring, heavy cutting equipment, vibraphones, snake eye cameras, thermography, tunnelling expertise and a medical support team.

The medical team must be capable of supporting two simultaneous extrications with an advanced life support capability, and provide primary care support to the team. Thirteen live rescues were carried out by the UK team during the

response to the Kashmir earthquake. Medical responsibilities included pre-deployment planning and preparation, as well as looking after the health of the team, the search dogs and DfID staff. During deployment their responsibilities are the medical care of 'live rescues', confirmation of death and release of trapped bodies in exceptional circumstances, recovery of injured locals to local care facility and recovery of team members to definitive care. During the response to the Kashmir earthquake there were no serious injuries to deal with, but significant use was made of primary care skills.

### What about the children?

In each year of the 1990s, 242 million children were affected by natural disasters or armed conflict. Children are disproportionately affected, and although armed conflict is responsible for more deaths, seven times more people are affected by natural disasters. The rights of the child are enshrined in the UN Convention on the Rights of the Child (UNCRC), which was ratified by the UK in December 1991 [4].

Although public imagery suggests children take priority in relief, rehabilitation and recovery research is limited; and there is scant reference to children in publications. The medical considerations for children are age dependant and children are the most threatened by any slow recovery of health and other services. Specific paediatric issues include malnutrition, infection, dehydration, trauma, disease prevention and psychosocial effects. Emergency responders often have no paediatric training and limited equipment. Furthermore, the military may be the only medical service who can offer the 'golden hour' service between disaster and reconstruction aid, so need to be adequately equipped to deal with children.

### Should the military get involved?

Action has to be seen within a political context, as there will likely be suspicions at the military/NGO interface. However, a lead agency is vital to make a coordinated response work, and this must therefore be the host nation or failing that a UN agency. It is also important to consider that the global war on terror and 'nation building' is the context in which all this happens.

The ability of the military to cope with the disaster of war has some application to coping with natural disasters but not necessarily with regard to the medical component. Furthermore, military capacity can be a strength if applied correctly, but can also promote dependence. Commonality of approach through doctrine and a uniformed philosophical approach to problems is a potential strength and if the politicians allow, the military can respond very quickly. The military are expensive (but this is in part due to way they are 'costed' by the government), and the military does not want long term entanglements, therefore the duration of any intervention should be short.

A military response to a disaster is a political endorsement with political outcomes, within which are clear humanitarian imperatives, but the 'corporate warrior effect' complicates the picture, wherein whole parts of the military operation is going to private companies e.g. Baghdad airport security being done by PSCs. This reduces the risk to politicians if a corporation takes on the responsibility of security or regeneration, and may not be a bad thing.

### Summary

The response to natural disasters necessitates a multi-agency effort utilising actors whose agendas and ideals vary widely and often appear to clash. The key message from the conference was that there must be a collaborative approach supported by all the different agencies to make disaster relief effective and efficient. There will always be many differing agendas within the immediate period following a natural disaster, but it is imperative that help must be driven by the needs of the local population.

There remain areas of disaster relief that can be significantly improved, such as the capability of the agencies to care for children, and perhaps a military paediatric capability is desirable. There is a need not just for appropriate equipment but a service tuned-in to paediatric care advocacy.

A collaborative approach may include the military, but the role of the military needs to be carefully considered and developed so as to be practicable. It is also important to recognise that on many occasions the military may not be the most appropriate or cost effective agency to fulfil a certain role and that other options must be explored. To this end, privatisation of NGO or military work may increasingly be a factor in future.

Although the combination of a civilian and military medical response to natural disasters remains a contentious subject, collaboration has improved in recent years alleviating tension to allow a more informed joint approach to the provision of healthcare by all actors following a natural disaster.

### Acknowledgements

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Group Captain Aroop Mozumder and Squadron Leader Ed Nicol have both been awarded the Chadwick Military Prize and Medal from the University College London, for their work in promoting civil and military collaboration and improving the public health of those affected by conflict.

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## Military Surgery 2008

The Military Surgery 2008 conference was held at HMS Collingwood on the 17-18th April this year and was again organized by Lt Col Bowley and Surg Lt Cdr Stannard. This year's conference built on the success of last years Tri-Service Surgical Meeting and marked the transition from what was a predominantly General Surgical meeting to a truly tri-service multidisciplinary event. Most surgical specialties were well represented during the meeting, and the excellent attendance enjoyed a varied selection of presentations from speakers from as far afield as the Uniformed Services University of the Health Sciences (USUHS) in Maryland in the USA. Professor Mark Bowyer from USUHS delivered a stimulating lecture on the state of the art simulation scenarios being developed there. The Military Surgical Society once again kindly provided the prizes for the winners of the best oral and poster presentations, Capt KV Brown and Major M Leigh Davies respectively. The best five oral presentation abstracts are published below and the winning poster's Case Report is published in full elsewhere in this edition; the remaining abstracts will be published online at [www.ramcjournal.com](http://www.ramcjournal.com) in due course.

### Ballistic Extremity Vascular Injuries

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**Aims:** The aim of this study was to determine the incidence and complications of high-energy vascular injuries in the military environment. **Methods:** We analysed prospectively the records of all injured UK military personnel from point of wounding. From this, we identified all patients who had sustained limb injuries and reviewed the case histories. **Results:** We identified 85 limb injuries (71 patients) with military wounds that penetrated beyond the deep fascia. All involved high-energy mechanisms such as gun shot wounds or explosions, 79 had associated fractures. 23 limbs (27.05%) had associated significant vascular injuries, 17 of these also had fractures. Of the 23 limbs, 15 would have required immediate revascularisation to preserve the limb. 8 were amputated either because the critically ill casualty could not tolerate the required surgery or the limb was unsalvageable. 7 vascular repairs were undertaken: 1 direct repair, 1 initial shunt and reverse LSV graft and 5 primary reverse LSV grafts. 8 patients did not require immediate revascularisation, 4 had ligation and 4 had delayed repair (2 x posterior tibial, 1 x axillary artery; 1 x common femoral vein – the only isolated venous injury) There were 5 significant complications (21.7%). These were 2 deep infections, 2 thrombosed grafts (LSV graft) and 1 late amputation. These all occurred in patients with associated fractures. 7 patients had associated injuries of which only 2 were significant (1 x lung contusion and 1 x compartment syndrome). **Conclusion:** Our analysis confirms the finding of other studies that there is a significant incidence of vascular injury in military trauma. In agreement with previously documented military trauma studies, there is a high complication rate, which is likely to be related to the high-energy nature and significant contamination of military wounds. Prognosis is worse if there is an associated fracture and we believe that a fracture is an indication of much higher energy transfer. Standard vascular techniques are usually all that are required although provisional shunting can be used in the military if significant delays are anticipated. Even in the primary amputations, the cause of the patient's poor condition was due to the limb injury itself rather than other injuries.

### Central Vascular Injuries In Deployed Military Personnel: A Contemporary Experience

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**Aim:** Battlefield extremity vascular trauma is amenable to pre-hospital control (tourniquets, haemostatic dressings) but injuries to the central vessels of the torso can only be controlled by formal surgical intervention. Our aim was to quantify the cause and outcome of such injuries. **Method:** Casualties with central vascular injury sustained between 2003 and 2007 were identified from the UK military's trauma registry (maintained at the Academic Department of Military Emergency Medicine). Individuals were categorised as possessing a realistic opportunity for surgical intervention (OSI) or not (NOSI) based upon exhibited vital signs prior to or upon arrival to a surgical facility. **Results:** 34 patients were identified. 7 were excluded from analysis due to the presence of co-existent catastrophic CNS or myocardial injury.

**Conclusion:** Despite rapid advances in the training of combat surgeons and the institution of advanced pre-hospital resuscitation retrieval teams, central vascular trauma is a highly lethal event beyond the scope of surgical resuscitation on the battlefield. Patients who have sustained isolated cervical vascular injuries represent a self-selected group who benefit from timely vascular intervention from military surgeons.

	NOSI n=21	OSI n= 6
Mechanism (blast/total)	12/21	4/6
Injury Severity Score (median, range)	75 (29-75)	75 (26-75)
Vessels injured		
Aorta*	13	1
Arch branches	3	-
Visceral branches	2	-
Cervical	10	5
Survivors	0	3**

\*No patient with an aortic injury survived

\*\*All Survivors had isolated cervical vascular injury

### A Review Of Field Hospital Surgical Discharge Letters In Summer 2007, Iraq: Burden By Surgical Specialty And NHS Standards

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The Defence Medical Services should provide an 'NHS level of care' to deployed personnel. The UK Field Hospital in Iraq is a 50-bed trauma orientated surgical facility, with one general surgeon and one orthopaedic surgeon. Debate continues regarding the need for additional surgeons. From 1st May to 4th September 2007, there was sustained insurgent activity in southern Iraq: 19 British soldiers died from enemy action. This paper takes a snapshot of the time by reviewing 2 consecutive

surgical doctors' discharge letters, written for each patient. Data was gathered on mechanism of wounding, injuries, management and disposal. Of the 313 patients admitted under the surgical team, 25% presented with routine problems, (cellulitis, perianal sepsis etc.) 232 (75%) were trauma cases, of which 109 (47%) were due to 'battlefield injury' (IDF 46%; IED 37% and Small Arms 17%). A total of 203 operative procedures were performed. Work concentrated around incidents as they occurred; much of it at night and for periods well in excess of 12 hours. Preliminary judgments for the table below are based on author's SHO rotation, (A+E, Gen. Surg., Orthopaedics, ITU and Plastics).

#### Specialties pts would be referred to in 1st 24hrs if in NHS

Orthopaedics	181 (58%)
General Surgery	77 (25%) (incl. minor head injuries)
Burns and Plastics	55 (18%) (incl. hand trauma)
Urology	19 (6%)
Ophthalmology	12 (4%)
Max-Fax/ENT	9 (3%)
Neurosurgery	3 (1%) (moderate HI / CT changes)
<b>Total Referrals</b>	<b>356 for 313 patients</b>
<i>Time to Aeromed</i>	<i>Mean 2.8 days (0.5-19)</i>

While Orthopaedics dominated, it is interesting that a Plastic Surgeon would have been asked to see over a sixth of all patients. The 12 most severely injured patients were swiftly evacuated (mean 1.04 days; range 0.5-2), but most waited for planned flights (1 or 2 per week). The impact of delay is a matter of debate, but an extra surgeon would certainly reduce fatigue during incidents. Deployed Plastic Surgeons would augment burns, vascular, debridement and hand surgery expertise. In this period, addition of a Plastic Surgeon would have increased on-site coverage, from 72%, to 88% of all specialist surgical referrals. Although this paper relies on the discharge letter, not case notes, it supports the notion that there is a useful role for a deployed Plastic Surgeon.

## Fowl Surgery At Sea. Proving A Microvascular Capability In PCRf

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**Introduction:** Limb salvage and reconstruction following trauma requires a combined orthopaedic and plastic surgery approach, plus a microvascular capability to allow definitive reconstruction of higher-energy, or more distal trauma. Extensive experience from Zagreb during the Croatian and Bosnian wars shows that early reconstruction significantly improves outcomes in terms of fewer operations, reduced time to bony union, a shorter hospital stay, and fewer complications. The Primary Casualty Receiving Facility (PCRf) on board RFA Argus provides the Royal Navy's role 3 capability. Embarked personnel possess the ability to perform microsurgery, and materiel deficiencies that exist on board are minor. Whether surgery requiring this level of dexterity could be performed on a

moving platform has not been previously tested. **Materials and Methods:** The wing and thigh vessels from a 1.6Kg chicken sourced from the ship's galley provided a suitable model, and during Ex Med Endeavour 06, an exercise casualty with a four-finger amputation provided a suitable clinical scenario. The ship's Captain was asked to maintain a course and speed that produced least pitch and roll, and to warn the operating theatre staff of any impending alterations of course. Roll was recorded by the Officer of the Watch from the bridge inclinometer. Anastomotic quality was assessed by flushing and by microscopic inspection. **Results:** Overnight during the middle and morning watches, two surgeons performed twelve microarterial anastomoses in these cadaveric vessels, varying in external diameter from 0.58 to 1.96mm. All were deemed technically satisfactory or better. Sea state was three or four throughout, and maximum roll was seven degrees. Neither surgeon found the ship's movement a distraction. Athwartships positioning of the microscope arm proved important over five degrees of roll. **Conclusion:** Performing a microvascular anastomosis on a moving platform is a viable option and the capability has been proven. Materiel deficiencies are being addressed through normal Service channels.

## Surgical Workload During Operation HERRICK

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**Background:** British military forces are heavily committed in Iraq and Afghanistan. Operation HERRICK, currently supported by a Role 2(Enhanced) medical facility at Camp Bastion, is predicted to continue for the next 10 years. There has been no large published series on surgical workload on Operation HERRICK. The aim of this study is to determine and plan future medical needs. **Method:** A retrospective analysis of operating theatre records between 10th October 2006 and 31st Oct 2007 was performed. Data was collated on a monthly basis, to assess seasonal variation, and included patient demographics, operation type and time of operation. **Results:** During the study period 968 cases required 1262 procedures. Thirty-four per cent were ISAF, 27% were Afghan soldiers, police or enemy forces and 39% were civilians, of which, 43% were children. Ninety-one per cent were secondary to battle injury and 50% were emergencies. The breakdown of procedures, by specialty, was 67% (841) were orthopaedic, 16% (199) general surgery, 8% (96) head and neck, 5% (55) burns surgery and a further 4% (50) were non-battle, non-emergency procedures. During the second half of the study period 655 cases were operated on compared to 313 in the preceding half ( $p < 0.05$ ). Twenty-eight per cent of cases were performed between 6pm and 8am. **Discussion:** Surgical workload remains consistently high throughout the study period, however there was significant seasonal variation with casualty rates being greater in the summer months, this may have bearing on the decision to deploy additional surgeons (particularly orthopaedic) and trainees in the future.

# THE SOCIETY OF TRISERVICE ANAESTHETISTS IN TRAINING ANNUAL CONFERENCE 2008

The Society's annual meeting was held on the 14-15<sup>th</sup> July 2008 at the Army Medical Directorate in Camberley. It was organised by Maj G Nordmann, assisted by Majors Lewis and Park, and was attended by over 50 delegates. On the first day there were excellent presentations on a variety of topics including a trainee update from the Deputy Dean (DPMD), Col Owen L/RAMC and the Defence Consultant Adviser in Anaesthetics and Critical Care, Gp Capt McGuire RAF, in addition to military and trauma anaesthesia updates from military and civilian colleagues. The conference was delighted to hear the inaugural Claire Ackroyd Memorial Lecture given by the Defence Professor of Anaesthesia and Critical Care, Lt Col Mahoney OBE TD RAMC. The Annual Dinner was an unequalled success and the Society members were privileged to host the Director General of the Army Medical Services, Maj Gen Hawley OBE QHPL/RAMC. On the second day there was the stimulating trainee presentation competition, the Dave Hughes Memorial Prize. This newly commissioned prize was presented by Maj Gen Hawley OBE QHP L/RAMC to the winner Sqn Ldr Robert Tipping RAF for his talk on 'Flight Reference Cards for Anaesthesia'. Abstracts of the five best oral presentations are presented below.

## Flight Reference Cards For Anaesthesia R Tipping

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Anaesthesia and flying have many similarities and differences. One of the most significant similarities is the way that an anaesthetic can be broken down into phases, just like a flight. Aviation uses checklists (known in military aviation as Flight Reference Cards) as an aide memoir to help a pilot ensure that it is safe to proceed to the next phase of flight. This abstract suggests a framework around which a similar set of checklists could be formulated. It represents work in progress and while interest has been expressed in sponsorship for a project of this type to be pursued, there is considerable work required before a final product is published. **The Project:** It is suggested that a set of checklists be developed; one for each phase of anaesthesia, representing at least the minimum standard that should be reached before progressing to the next phase. These checklists would be aimed primarily at the complete novice anaesthetist to provide them with a framework upon which to base their future practice. They would also provide the more experienced anaesthetist with an aide memoir for those times when they are convinced that they have forgotten to do something but cannot for the life of them remember what it was!

To make the checklists as easy to use as possible (and therefore more likely to be used), they should be pocket sized, easy to read and laid out in such a fashion as to facilitate the rapid assimilation of the information on the list. They should represent guidelines and not strict protocols, which should be adhered to without independent thought. They should be a framework on which to base further learning, not a substitute for it. Ideally, they would cover not only the phases of 'normal' anaesthesia but also the possible emergency situations with advice on their management. Again it should be stressed that they should not be a substitute for learning the immediate action drills in the event of an emergency but should provide a guide on how to further manage the clinical case once the immediate actions have been performed. **The Future:** While this project is still very much in its infancy, it is as well to consider additions that could be made for future iterations of the project. Interest has been expressed in adding Intensive Care checklists, whether they are for the management of a patient 'fighting the ventilator', unexpected hypoxia or hypotension or for the assessment of the patient on the ward, either before admission or after discharge from the Intensive Care unit. Checklists also lend themselves well to the management of inter- and intra-hospital transfers, a function undertaken relatively rarely in conditions that are far from ideal. Anything that makes the clinician feel more comfortable in these

situations and increases patient safety in what is a high-risk area of practice is to be considered.

Further development of the concept might involve incorporating these checklists into a larger Handbook of Military Anaesthesia, which could include a much wider description of the administration and practice of anaesthesia, whether in the deployed or the UK-based setting. The machine check might, for instance, include the TriService Anaesthetic Apparatus in addition to the standard anaesthetic machine. The new Military Anaesthesia module within the Royal College of Anaesthetists' training syllabus may provide a framework for further development of the scope of the project. **Summary:** This article has given the conceptual basis behind the use of checklists in anaesthesia. It has suggested areas that lend themselves well to the creation of checklists to enhance patient safety and the confidence of, particularly novice, clinicians. They provide the possibility for a department (or more widely the whole anaesthetic cadre) to define minimum standards of care whilst providing a convenient way of presenting these standards to facilitate their application. They provide a basis for assessment and are sufficiently flexible to allow for future modification and expansion.

## Assesment Of Perioperative Performance In Paediatric Emergency Surgery. An Audit. 2006-2007

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**Objectives:** To assess the perioperative care of the paediatric surgical emergency population in Derriford in accordance with National Service Framework recommendations. **Method:** A retrospective questionnaire of 100 patients over a 1 year period addressing these issues was completed, which included a post operative visit on Day 1. **Results:** Demographics: 55% of cases were orthopaedic trauma cases. 58% of all cases were performed in the evening or over night. Pain: 16% of patients admitted via the ED had pain scores recorded. Acute admissions ward scoring was 50%. Only 60% prescriptions followed the WHO ladder of analgesia. Timing: Mean waiting time for emergencies was 4 hours and 15 minutes. 86% of patients were starved as per emergency protocols. 63% of children spent more than 6 hours without oral fluids. Post operative pain: 81% described mild pain only on day 1. Rescue analgesia was poorly utilised. Moderate pain was less well anticipated and treated than severe pain. **Dosages:** 16% of analgesia prescriptions were incorrect with under prescribing being most common. Post op Nausea

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and vomiting: Incidence was 16% and antiemetics were prescribed in 60% of all cases. Patient satisfaction: 6% of parents were dissatisfied with care, with all concerns relating to inadequate analgesia. Communication was felt to be clear overall. **Conclusions:** Most emergency cases are performed out of hours should ideally be performed during the day. Prolonged starvation, particularly time without oral fluids is an issue—each patient needs individual assessment. Professionals working in paediatrics need to be updated on pain scoring and management with easily accessible guidelines to improve standards in pain management. On going education will help to improve confidence. Communication between staff and families is good and appreciated by parents and children alike.

## Perioperative Hypothermia Audit In Derriford Hospital, June 2008

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**Introduction:** Following the introduction of NICE guidelines in April 2008 regarding perioperative hypothermia it was deemed necessary to assess current performance against the prescribed standard. Previous policy was that patients could be returned to wards with temperatures of 35.5°C or greater, however, the new guidelines require core temperature to remain 36°C or greater throughout the perioperative period and first 24 hours. The guidelines advocate the use of forced air warmers in all patients undergoing more than 30 minutes anaesthetic time and use of fluid warmers if more than 500mls IV fluid is given. This would be a significant financial burden to the department. It was felt necessary to assess whether the core temperatures were remaining adequate using less aggressive warming in appropriate cases. **Method:** A data collection sheet assessing tympanic temperatures before, during and immediately after anaesthesia was drawn up. Data was also collected on patient demographics, ASA, magnitude and specialty of operation and device used for temperature control. The author selected a date for data collection based on his availability (16th June). Eligibility criteria were all patients undergoing general or regional anaesthesia in the main theatre complex, between 08:00 and 18:00. Local anaesthetics were excluded. A total of 47 data sheets were collated. **Results:** Out of 47 patients, 29 had their temp recorded below 36°C at some point (61.7%). With respect to the higher risk elderly population (>65 years) 11 out of 13 (85%) had a temperature recorded <36°C at some point between arrival in the theatre complex and leaving recovery. Of interest, using the previous 35.5°C target, 5 arrived in recovery below target and 1 left recovery cold. Eight of the 47 patients went to theatre with temp recorded below 36°C although the new guidelines advocate not starting anaesthesia except in emergency. Whilst in theatre 18 of the 47 patients' temperatures dropped below 36°C. A further 2 of the 47 dropped to below 36°C in recovery. With respect to using fluid warmers, NICE advocate use for all cases using greater than 500mls IV fluid. During the audit 12 were used, all for >1000mls. The majority of patients had 1000-2000 mls IV fluid without a fluid warmer.

Forced air warmers were used variably:

- <15 minutes anaesthesia = 1/1
- 30-60 minutes anaesthesia = 2/17
- 60-90 minutes anaesthesia = 8/14
- 90-185 minutes anaesthesia = 7/10
- 185-250 minutes anaesthesia = 0/2
- Not recorded = 2

**Summary:** There needs to be a change of culture with regards to temperature. (Even young, fit patients got cold in theatre, despite hospital blankets). This needs to start with having thermometers in all anaesthetic rooms and measuring temperature pre-induction and peri-operatively. Theatre temperatures played a significant role and forced air warming should be commenced as soon as possible when used. Greater use of forced air warmers should be considered and be universal in those over 65 years old. Fluid warming needs greater consideration but it was felt that economically the best approach would be to use warming cabinets to pre-warm litre bags of Hartmann's solution and normal saline for smaller cases. However, for larger cases fluid warmers should be universally used. In recovery there needs to be a change in policy from 35.5 to 36.0°C as acceptable temperature and all cold patients need active warming.

## Operation Telic 8 & 9: Battle Casualties In Basra City

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**Introduction:** The Shatt Al Arab Hotel (SAAH) was for four years a Forward Operating Base for a Battlegroup (BG) tasked with patrolling the city of Basra, Iraq. The junior doctor led Medical Reception Station (MRS) had a patient population at risk (PAR) during Operation TELIC 8 & 9 (April 2006 - April 2007) of approximately 600 soldiers and civilian contractors, surging to a maximum of 1000. The MRS was tasked to provide Role 1 pre-hospital emergency care (PHEC) to the BG and to coalition troops transiting through the BG area of operations. Such care provides rapid life saving interventions such as control of catastrophic haemorrhage, basic airway and breathing management, fluid replacement and prevention of hypothermia. Casualties requiring further treatment were transported to a field hospital. Receiving a greater number of battle casualties than expected, we identified a paucity of published research relating to expected casualty numbers, severity and return to duty rate for this type of asymmetric operation other than war (OOTW) in an urban setting from a Battalion or Regimental Aid Post in the post-war phase. This paper reports the number, triage category, mechanism of injury, injury patterns, and return to duty rate over a one year period for the BG. **Methods:** All patients listed as EPIGULF code 21 (injury due to hostile action) in the SAAH MRS B/Med33 (Casual Sick Book), between 29 April 2006 and 8 April 2007 were reviewed. Data was extracted prospectively (except for the first two months of the study) from Pre-Hospital Care Report forms and EMIS electronic records to establish triage category, mechanism of injury, weapon used, any vehicle if relevant, the point of definitive care, and whether the casualty returned to rejoin the BG to complete the tour of duty. Soldiers injured in sporting or training accidents or due to environmental factors such as heat illness were excluded. **Results:** During the study period the MRS received 133 live battle casualties. Triage categorization was: T1=16%, T2=14%, T3=70%. The number of casualties fell from Op Telic 8 to 9: n=71 vs n=62, however their severity increased. Improvised explosive devices (IED) accounted for 38% of injuries, indirect fire (mortar and rocket attack) 25%, bricks 14%, Small arms fire(SAF) 9%, and rocket propelled grenades 4%. Injuries were distributed predominantly to the head (40%) and limbs (37%), with the trunk affected in only 10% of cases. One hundred battle (75%) of casualties returned to Iraq to finish their Operational Tour, 27 (20%) required extensive rehabilitation in the UK, four T1 (3%) casualties died of their wounds (DOW) in Iraq. Fifty percent (n=66) of all battle casualties were successfully treated at Role 1

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and did not require further evacuation. All patients with traumatic amputations received at the SAAH MRS were managed successfully, where appropriate, using the Combat Application Tourniquet without any apparent complication. **Conclusions:** All casualties who reached the Role 1 facility alive and did not have a head wound lived. The rapid use of novel haemostatic techniques may have mitigated the effect of traumatic amputations. The injury patterns and return to duty rate is comparable to other coalition forces in Iraq. The increase in casualty triage severity during the study may be due to the emergence of deliberate small arms fire and increased efficacy of IED despite improvements in counter measures. This research demonstrates the range and severity of casualties treated at Role 1 over a one year period. It confirms the need for robust, clinically realistic pre-deployment PHEC training, and adequate prior trauma experience for deploying military healthcare providers. It may complement other sources of casualty data whilst planning future OOTW in an asymmetric urban environment.

## Inadvertant Intra-Arterial Injection During Cardio-Pulmonary Resuscitation

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**Introduction:** Intra-arterial injection was common practice in the Korean War, but was abandoned by 1965 due to fewer

complications with the intra-venous route. The incidence of unintentional intra-arterial cannulation and injection has been reported to be as infrequent as 1 in 56,000 to as common as 1 in 3,440 with potentially devastating effects to patients. There are no published figures for accidental intra-arterial injection in the field where casualties are treated by medics who often do not perform cannulation on a regular basis. **Case Presentation:** This presentation describes the case of a 73 year old man who presented to AED following an out of hospital cardiac arrest. He was initially found to be in VF which reverted to sinus rhythm with one single DC shock. He was intubated and transferred to AED. An 18G cannula was sited in the left anti-cubital fossa by the paramedic team. A total of 4mg of adrenaline and 300mg of amiodarone were administered through the cannula. It was noted that his proximal left forearm and hand was cold and white and the radial pulse was absent. Removal of the bung on the end of the cannula resulted in a pulsatile flow of blood. **Treatment:** The cannula was immediately flushed and 40mg lignocaine, 80mg papaverine, 200mcg isoket were administered and an infusion of heparinised saline was commenced. A left interscalene block was performed. There was limited improvement and so this was followed by a Stellate ganglion block. A vascular surgical opinion was sought and an arch aortogram and left subclavian angiogram revealed a proximal occlusion of the left subclavian artery distal to the vertebral artery and thyrocervical trunk. This was probed with a wire and advanced to the distal axillary artery and unable to be advanced. A diagnosis of thrombosed artery was made.