

## **“Military Medicine In The 21st Century”: Exercise Triple Serpent 2005**

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### **Introduction**

Exercise Triple Serpent 2005, Surgeon General's conference, was held on 27th April 2005 in MOD Main Building. Attended by nearly 200 healthcare professionals, medical support officers and non-medical support staff, both military and civilian, the theme for this year's conference was 'Military Medicine in the 21st Century'. The 3 conference sessions were chaired by Air Cdre Tony Batchelor (Commandant, RCDM), Brig Mike von Bertele (D Med Op Cap, DMSD) and Brig John Graham (D Med Pol, DMSD).

In his keynote address, the Surgeon General, Surg VAdm Ian Jenkins, emphasised the continued importance that deployed medical capability played in supporting the Armed Forces (AF) increasing involvement in expeditionary activity. In order to ensure that defence medicine developed in line with the challenges likely to confront the UK AF in the future, the DMS needed to study existing and emerging weaponry and wider threats, and the patterns of injury and disease that they could produce. This would inform the development of prophylactic countermeasures, surgical techniques, treatment regimes; and then policy and doctrine, supported by relevant research. Finally, these processes would direct future manning and training requirements, ensuring that the DMS continued to command respect within MOD and the Front Line Commands through the sustained delivery of high level services in difficult, prolonged and varied operations.

One of the initiatives to enable the DMS to deliver its objectives was to put British military medicine on a sound academic and evidence based footing. There were particular challenges in keeping abreast of developments in civilian healthcare practice, including clinical governance issues, and in adapting them to the operational environment. In some specialist areas, military research was at the cutting edge of technology, especially in relation to collaborative work with industry to develop more efficacious and less reactogenic vaccines; another example was the use of Factor VIIa and haemostatic techniques in combat casualty care. In addition, work with researchers both in the UK and overseas was providing a better insight into veterans' health issues, leading to a greater understanding of ill-defined conditions and the role of behavioural therapies. SG finished his address by emphasising the need for the continued

education of the Chain of Command on the non medical determinants of health to ensure a coherent approach to ensuring optimal health and wellbeing for Service personnel and dependants.

### **SESSION 1 – ROYAL CENTRE OF DEFENCE MEDICINE**

#### **Military Emergency Medicine in the 21st Century – Col TJ Hodgetts L/RAMC**

Col Tim Hodgetts (DCA and CA(Army) A & E) opened the session with a presentation providing an overview of developments in the academic specialty, achievements, and the future direction of military emergency medicine. After a brief description of the history of the specialty and the department's structure, some examples of clinical practice developments were highlighted. RCDM had developed guidelines for the use of various haemostatic techniques, namely, the elastic field dressing, combat application tourniquet (C-A-T) and haemostatic powder (Quik-Clot®). The development of clear clinical guidelines for medical personnel were to be supported by training scheduled for the Op TELIC 6 roulement; the development of audit tools for in-theatre monitoring; and a pre and post training survey to determine the contribution to the moral component. This guideline would be one of many guidelines for operations, the scope of which included medical emergencies, the operational formulary and yellow card reporting. The guidelines would ultimately be published by the Joint Doctrine and Concepts Centre (JDCC) in a variety of formats.

Col Hodgetts believed that RCDM had already made many contributions to improved clinical practice. This included the development of an in hospital cardiac prevention system based on military research undertaken within an MDHU; and input into the urgent operational requirement for the battlefield ambulance. In terms of research, RCDM had contributed to the Deployed Medical Capability Study and the Operational Surgical Services Review and had provided the underpinning research to develop near patient testing of exhaled air (further research to commence at DSTL later this year) to facilitate the early diagnosis of infectious disease. Commercial protection for innovative paediatric resuscitation techniques developed

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in Iraq was currently being undertaken by MOD.

In terms of training, RCDM had developed an approach to battlefield first aid based on a simple system that could be applied to any incident; the training had been adopted by armed forces from other countries and by civilian emergency services. Other training courses underpinned by RDMC input included the Major Incident Medical Management and Support (MIMMS) course, the National Disaster Preparedness Course for Hospitals (NDPCH) and BATLS/BTNC training. RCDM had also been asked by the Swedish government to provide an independent advisor to join a commission assessing the national response to Swedish nationals affected by the Asian tsunami.

In summary, RCDM was already being recognised internationally as a centre for excellence for military medicine from research and teaching to clinical practice.

### **Changing Emergency Nursing –**

Maj A Berry QARANC, Lt JP Despres QARNNS & FS D Jackson PMRAFNS

Maj Berry, Lt Despres (RN) and FS Jackson gave an overview on changing emergency nursing to meet the challenges of future warfare and to address the gap between what the DMS expected nurses to be able to do in the future and what they were limited to undertaking within the Emergency Department at the RCDM. For instance, nurses did not formally triage, cannulate or suture within the Department; nor was there any structured training to develop good decision making skills. Restraining factors were organisational inertia, lack of funding and inflexibility in the medical hierarchy. The first step in changing the current situation required an understanding of restraining and driving forces so that efforts could be taken to minimise the former and maximise the latter. There was a clear vision in terms of objectives for the professional development of nursing students, departmental nursing staff and an Advanced Nurse Practitioner service; capacity issues were identified in terms of the availability of protocols, staff and equipment.

The initial objective was to develop partnerships; this was to be achieved by training medical students in skills such as cannulation and catheterisation and commenced in January 2005. This particular project has built a successful partnership and been given a high profile status. It has increased the number and availability of clinical skill places by improving short notice access for military personnel to Trust clinical skills training. Places for nursing personnel to undertake clinical skills training within the university medical school have also been negotiated. The project has provided mentorship support in the clinical area for the

development of military and civilian staff on an individual basis; enhanced the doctor/nurse relationship; and improved patient care. Currently, the Emergency Nursing department were identifying the gaps between current training and the operational requirement. The Tri-Service Emergency Nurse Working Group was responsible for looking at the military and educational training requirements for emergency nurses in the DMS. New partnerships had been developed with the Faculty of Emergency Nursing with whom the Working Group was developing national competences in the specialty. In the future therefore, there would be a clear pathway for the development of emergency nurses in the DMS.

### **Fit for Practice; Fit for Operational Purpose –**

Maj T Taylor QARANC & Lt Cdr S-A Bagnall QARNNS

Maj Tracy Taylor and Lt Cdr Sally-Anne Bagnall, both from the Defence School of Health Care Studies (DSHCS), provided an overview of nurse training in the DMS. Following 2 weeks of military orientation to ensure seamless transition to Phase 2 training, student nurses enter a 3 year training programme which is underpinned by an RCDM training policy emphasising the maintenance of discipline and conduct. The current annual attrition rate is 2%. Whilst clinical placements are arranged by the University of Central England (UCE), the DSHCS endeavours to facilitate exposure to military clinical practice to maintain military ethos. Up to 11 weeks personal and professional development time is made available in the 3 years during which students are actively encouraged to pursue military activities; this helps to ensure that the individual is prepared for the transition to a junior military staff nurse.

Post registration, all nurses are given the opportunity to study for the BSc (Hons) Defence Nursing Studies or stand alone Defence Nursing specific modules. Currently, 62 students are enrolled on the degree pathway. Future developments are related to different methods of delivery (e-learning /distance learning); the provision of academic opportunities within staff development programmes; and the expansion of the BSc (Hons) nursing programme.

### **The Impact of Corneal Refractive Surgery on the RAF –**

Wg Cdr RAH Scott

An interesting presentation on the impact of corneal refractive surgery on the RAF was provided by Wg Cdr Rob Scott who is based at RCDM. After describing the various

Corneal Refractive Surgery (CRS) techniques, Wg Cdr Scott then outlined the benefits and risks. For individuals who require visual correction, spectacles may give a poor visual experience; in addition, there are integration problems with helmets and night vision devices. Whilst contact lenses provide good optical performance, they may be unsuitable in deployed environments where the ability to maintain the standards of hygiene required may be difficult, or in an NBC environment which is incompatible with contact lens use. Successful CRS provides visual correction without these limitations. Radial keratotomy is unsuitable, particularly for aircrew, due to altitude regression, diurnal variation and a weakened cornea. Specific complications of photorefractive keratectomy (PRK) include the fact that it may be painful due to de-epithelialisation, corneal stromal haze and ablation edge effects such as halos. There have been a number of small studies looking at the military perspectives of using PRK in US military pilots (180 USN and 80 USAF). In a study of 30 USN pilots, night vision was significantly worsened in one patient; in the remainder, subsequent ejection from aircraft had no effect and glare/halo effects were transient. In a separate study of 150 USN pilots, target recognition worsened in 2%; 82% reported better carrier landings; and 98% better instrument ratings. In a further study of 80 USAF pilots, PRK had no effect on the ability to cope with altitude or G loading and there was no decrease in head up display readability. Laser epithelial keratomileusis (LASEK) may cause less post-operative pain and lead to a faster recovery with possibly a lower risk of glare. Laser in-situ keratomileusis (LASIK) reduces the amount of haze; increases the ablation area so decentration is less of a problem and higher myopes can be treated; and is less painful. However, there are risks associated with flap loss, damage and instability and post-operative dry eye is relatively common although this normally resolves in 6 months. Whilst LASIK is approved for use by the CAA for civilian aircrew, it is not generally approved for military aviation because of corneal flap instability (from mild trauma or windblast during ejection) and night vision problems. Previous CRS will render a potential candidate unsuitable for aircrew selection and candidates are screened for undeclared CRS. For those serving personnel who do wish to pursue CRS, surgery is at their own risk and expense. Whilst it is likely to confer operational advantages in the longer term, individuals are unfit for operational deployment for a year post op; aircrew require visual function testing before being declared fit to fly.

**The Role of RCDM in Defence Medical Research** - Col MJ World L/RAMC Assistant Director Academic Studies RCDM and Professor of Military Medicine.

Col World gave a presentation that illustrated how RCDM identified those aspects of military medical practice where research investment is required to achieve optimal medical outcomes and provided commissioning advice for any research investment. He demonstrated that the data currently available did not enable RCDM to identify areas for research investment. However, operational data showed the potential to assist commanders in making decisions and to assess outcomes and highlighted deficiencies in information which have to be corrected if research is to be directed at the most prevalent morbidities.

In the context of the statement that “the art of war is arguably the timely deployment of sufficient forces to achieve the military objective with minimal or no casualties at the lowest possible financial cost” he concluded that RCDM provided a unique interface between military and civilian biomedical scientists and clinicians and was in a good position to facilitate efficient research collaboration. Research on mitochondrial function in the critical patient was cited as a practical example of such collaboration.

## **SESSION 2 – DIRECTORATE OF MEDICAL OPERATIONAL CAPABILITY**

Session 2 was introduced with a short presentation of strategic medical planning by Brig Mike von Bertele, D Med Op Cap. He delivered an overview of current planning assumptions in order to explain how the current medical orbat has been derived; a brief explanation of how SMART acquisition and changes in the delivery of logistic support were being implemented; and the questions that needed to be answered to define the medical sustainability requirement. This was followed by a summary of the readiness and concurrency requirements and current operational medical commitments. The current level of these adds up to almost 1800 personnel from the 3 Services.

### **UK Medical Intelligence – Maj K Roberts RAMC**

Maj Ken Roberts, SO2 Medical Intelligence/CBRN started with a short introduction to the various intelligence organisations: the Joint Intelligence Committee (responsible for uniting UK secret intelligence assessments, advising government and coordinating collection and

generating current intelligence groups in crises); the Secret Intelligence Service; Government Communications HQ; the Security Service (which counters all external threats to the UK and supports the law enforcement agencies); and the Defence Intelligence Staff (DIS) (which supports defence policymakers, planners and warfighters). Medical intelligence (incorporating any foreign medical, bio-scientific and environmental information impacting on the conservation of the fighting strength of friendly forces and the formation of assessments of foreign medical capabilities in both the civilian and military sectors) was then looked at in more detail. The pillars of UK medical intelligence consists of foreign military and civilian medical capability and trends; infectious disease risks (local incidence and prevention); environmental risk factors (environmental contamination and toxic industrial chemical threats); foreign life sciences and biotechnology of military importance (monitoring research developments for military, dual-use and civilian applications); medical aspects of weapon systems; and conflict-related psychological issues.

This was followed by a summary of strategic medical intelligence. DMSD strategic medical intelligence was multi-faceted including maintenance of the UK medical intelligence database; acting as the UK's point of contact with the Quadripartite (Australia, Canada, US and UK) Medical Intelligence Committee Steering Committee (QMIC), the QMIC Analyst Working Group, NATO and other bipartite agreements; and providing medical intelligence to the Permanent Joint Headquarters (PJHQ).

PJHQ and the single Services were the main users of DMSD's operational medical intelligence but other government departments also acted as customers. Medical Intelligence Assessments (MIA) were comprehensive documents encompassing environmental factors (topography and climate, socio-economic factors, public health arrangements, animal and plant hazards and environmental and industrial hazards); epidemiological factors such as the incidence, distribution and control of communicable diseases; and health service and support infrastructure (secondary and emergency healthcare capabilities, medical supply, blood banking and clinical laboratory facilities).

Constant change was anticipated in the future because of changes in the military mission (evolving warfare concepts; complex and dynamic global missions; and multinational deployments) and because of environmental change (the proliferation and emergence of disease, environmental and health service deterioration, transnational health issues and the biotechnological explosion).

## **DMSD Response to the DSAC Working Party Report on the Provision and Utilisation of Medical Intelligence -**

Wg Cdr V Wallace

The session was concluded by a synopsis of the medical intelligence development plan. In the long term, it is proposed that the strategic medical intelligence organisation within DMSD is augmented by a post within NATO, an exchange post, and 2 posts embedded within DIS. The operational medical intelligence organisation within PJHQ will be augmented by 2 medical intelligence posts; and the tactical medical intelligence organisation at 2 Med Bde will acquire a dedicated medical intelligence officer with similar posts being developed in front line commands.

## **SESSION 3 – DIRECTORATE OF MEDICAL POLICY**

### **Millennium Cohort Study –** Cdr M Ryan US Navy

Following a short introduction from Brig John Graham, D Med Pol, the final session started with an overview of the Millennium Cohort Study by Cdr Meg Ryan US Navy, Director of the DoD Centre for Deployment Health Research. The 1990/91 Gulf War had resulted in the formation of multiple expert review panels; a spend of over \$150M US dollars on medical research; the development of an extensive risk management programme; and an overall spend of \$1 billion US dollars on deployment-associated morbidity. A large proportion of Gulf War research has been retrospective and therefore, subject to the limitations of these particular study designs. For this reason, the US Secretary of Defence was authorised to establish a longitudinal study to evaluate data on the health conditions of members of the Armed Forces before and after deployment, even after time served in the military.

The US Institute of Medicine recommended a prospective cohort study of Service members utilising deployment data as covariates allowing for the prospective measurement of deployment impact. The primary objectives of the study are to compare the adjusted risk for the development of common chronic diseases such as asthma, diabetes and coronary heart disease within the cohort. Secondary objectives will investigate functional health status through instruments such as SF-36V and Prime-MD. The methodological principles are fairly straightforward with a stratified random sample of the 2.7M US service personnel on duty in October 2000

initially being invited to participate. These individuals are being re-surveyed at 3 yearly intervals through to 2022. New accession cohorts are being added in 2004 and 2007, resulting in a total cohort of 140,000. Links are made with core survey data (including self-reported exposures, health conditions and functional status) and objective outcomes data (such as mortality data, in-patient and out-patient care) and military exposure data (such as environmental exposure, immunisation and deployment data) to assess the long term effects of military experiences.

A website has been developed to provide information and options for online enrolment into the study ([www.millenniumcohort.org](http://www.millenniumcohort.org)); this provides significant cost-savings over reliance on a postal survey. Retention and tracking of cohort members are provided semi-annually and marketing consultation ensures optimal contact routes and message content.

The full survey was launched in August 2001 with 77,047 being enrolled in the first panel. Linkage to the DoD and TriCare databases established that there was no difference in mean number of hospitalisations or diagnoses between responders to the invitation to participate, and those who had not responded to the invitation or who had refused to participate. Ongoing analyses continue to examine specific diagnoses and days lost for health reasons. There are intensive efforts to maintain data quality including analyses of completion rates and patterns; and test/re-test of approximately 150 respondents who completed both paper and internet enrolment.

In 2004, the first panel of participants were re-surveyed and the enrolment process for the second panel of participants commenced. By April 2005, 64% (45,193) of Panel 1 participants had responded; 6320 were returned with invalid addresses and new postal and e-mail addressees were sought for all non-responders. In terms of the enrolment of Panel 2 participants, 147,516 individuals received invitation; 21,225 (14% of invited panel and 53% of the goal of 40,000) had enrolled. Over 47,000 surveys had been returned with invalid addresses. Again, new e-mail and postal addresses were being sought but it is suspected that this is a population with frequent operational deployments. Maintaining contact details for participants is proving to be one of the biggest challenges of the study. Nonetheless, the Millennium Cohort appears to have robust numbers and well-engaged participants. Collaboration guidelines have been developed and analysis protocols are underway that should provide significant insight on the health effects of the current US deployments to Iraq and Afghanistan, as well as future deployments up to 2022.

## Prospective Studies on UK Veteran's Health –

Professor M Hotopf, King's Centre for Military Health Research

The concluding conference presentation was made by Prof Matthew Hotopf, King's Centre for Military Health Research (KCMHR) and covered prospective studies on UK veterans' health. Prof Hotopf began by providing examples of some of the retrospective studies on UK veterans to date. A study by Macfarlane *et al* had concluded that there was no difference in the incidence of cancer between the Gulf cohort and the Era (other serving personnel who did not deploy to the Gulf in 1990/91) cohort. A controlled study by Sharief *et al* investigating neurophysiological analysis of neuromuscular symptoms in UK Gulf war veterans had concluded that there were no significant differences between cohorts consisting of Gulf ill, Gulf well, Bosnia ill and Era ill. A similar study conducted in the US measuring motor and sensory electrophysiology in Gulf and non deployed veterans also found no evidence of neuropathy. However, a 4 year UK study compared Gulf, Bosnia and Era cohorts in terms of symptom prevalence and perceptions of health and physical function; symptoms and exposures were extensive and wide-ranging. The prevalence of self-reported symptoms was consistently higher in Gulf veterans; health perception as measured on the SF-36 health status questionnaire was lower (scoring approximately 65 as compared with approximately 75 for the Bosnia and Era cohorts); but there was little difference in physical function using the same instrument.

Occupational risk factors for ill health are associated with lower rank, having left the Armed Forces, age, smoking and individual reinforcement; there is no association with Service (Army, RN, RAF), reservist status, combat arm or post deployment leave. The issue of multiple vaccinations and chronic fatigue syndrome had been extensively studied with no firm cause and effect being proven.

Prof Hotopf hypothesised that there were only 3 possible explanations for the Gulf War effect: side effects from chemical and biological warfare (CBW) countermeasures; anxiety from CBW threat and general stress of war; and media/societal pressures. A review conducted by the RAND Centre for Military Policy Research suggested that over 65% of Gulf War veterans cited the anticipation of CBW attack as causing 'quite a bit' or 'extreme' stress, whilst anticipation of artillery, air and armour attack was only cited in 40 – 50% of veterans.

KCMHR is undertaking a prospective investigation of the physical and psychological health of a random sample of 19,000 UK service personnel, some of whom took part in Op TELIC and others that did not. As well as

answering immediate questions, this is also the platform for a longer-term study looking at physical, social and psychological aspects of military service in the 21st Century.

The aim is to study how the costs and benefits of military life affect people even after they leave the Armed Forces. Emerging themes from the qualitative pilot study suggest that nearly all are glad they were deployed; 'friendly fire' was an issue; the effect on family welfare and media effects; concerns about anthrax vaccine and NAPS; and issues relating to boredom, continued fatigue and unfitness. Stage 2 of the study is epidemiological measuring a wide variety of factors such as deployment history and experience, unit morale, use of exercise and current physical and psychological health using validated instruments such as SF 12 and GHQ.

Ultimately, the hope is to conduct a long term follow up study at 3, 5 and 10 years, looking at physical, psychological, social, family and occupation factors and including those cohort members who have left the Armed Forces. Maintaining the cohort will allow the continued health surveillance of a sample of those deployed on Op TELIC 1; will provide samples of data measured before future deployments; and will allow other important health and social outcomes unrelated to deployment to be studied.

### **Evaluation**

The Conference was attended by 197 delegates and 53 CPD evaluation forms were returned (27%). Of those who returned an evaluation form, 66% thought the Conference was mostly relevant; 15% rated it as highly relevant and 15% as fairly relevant; 4% thought it of little relevance. There appeared

to be little consistency in the comments relating to the relevance of the presentations although the final session was well received overall. Most adverse comments about particular presentations were balanced by positive comments from other delegates. Those who thought it of little relevance did not make specific comments. There were some comments relating to the lack of primary care and dental presentations. 60% rated the quality as good; 27% as satisfactory; 8% as excellent; and the remaining 5% as mediocre. 50% thought the Conference was quite effective for CPD purposes; 34% rated it as definitely effective; and 10% as very effective. Only one person thought it was ineffective but no additional details were provided.

### **Conclusion**

Triple Serpent 2005 was a valuable educational exercise that, throughout the day, illustrated the important role that the DMS will play in the 21st Century in relation to the modern battlefield, ensuring that operational effectiveness can be maximised. In addition it allowed members of all 3 Services to meet and share ideas outside of the normal staffing environment, facilitated by the excellent dinner hosted by SG at the Royal Green Jackets London Club later that evening.

### **Acknowledgments**

Speakers at the conference were Col Tim Hodgetts, Maj Andy Berry, Lt Julian Depres, FS D Jackson, Maj Tracy Taylor, Lt Cdr Sally-Anne Bagnall, Wg Cdr Rob Scott, Col Mike World, Brig Mike von Bertele, Wg Cdr Vic Wallace, Maj Ken Roberts, Cdr Meg Ryan USN and Prof Matthew Hotopf.