Clinical

Morbidity rates on Vanguard Class submarines during nuclear deterrent patrol: a retrospective review over 13 years

M K O’Shea, M J Scutt

Abstract
The submarines responsible for the United Kingdom’s nuclear deterrent have carried a junior doctor as their medical officer since the program’s inception. The Vanguard Class of submarine carries approximately 150 men and deploys for about 3 months at a time. One of the central tenets of submarine operations is to remain undetected and as such the submarine will only surface in an emergency, which may include the evacuation of casualties. The prime reason for carriage of a medical officer is to mitigate against the need to evacuate personnel for medical reasons.

We examined the medical section of the patrol reports submitted upon completion of each patrol over a 13 year period to determine both the rates of medical and dental attendance onboard and also the occurrence of potential medical threats to patrol integrity.

The most common reasons for attendance were dermatological and musculoskeletal, consistent with previous studies of this population and working environment. There were few dental cases due to the high rates of dental fitness in the pre-sailing crews. Patrol threatening cases occurred at a rate of approximately 1 per 3 patrols, with acute appendicitis being the most common presentation. This progressed to evacuation at a rate of 1 per 15 patrols, with the successful onboard management in 79% of cases.

The junior doctor onboard has limited monitoring equipment and formulary, no diagnostic equipment, basic surgical equipment and no opportunity to seek senior advice, and is therefore reliant on clinical judgement. Despite the limitations placed on the doctor on board these submarines they have proven to be effective in reducing the rate of medical evacuation.

Introduction
The deployment in 1968 of the Resolution Class SSBN (Ship Submersible Ballistic Nuclear) submarines marked the beginning of the United Kingdom’s continuous at sea nuclear deterrent, with at least one submarine always on station ready to deploy her missiles. These have subsequently been replaced with a flotilla of four Vanguard Class SSBNs, which currently provide the UK’s independent strategic nuclear deterrent.

HMS Vanguard, the first of class, was commissioned into service in 1993 and has since been joined by HMS Victorious, HMS Vigilant and HMS Vengeance. These submarines carry the Trident II D5 ballistic missile system and are the largest of any navy (with the exception of the United States and Russian Federation). Their dived displacement is approximately 16,000 tons, and each carries a complement of approximately 150 men. The crew live and work in an isolated, fully enclosed environment with an artificial re-circulated atmosphere for prolonged periods. An SSBN on patrol may remain submerged for in excess of 3 months and endurance is only limited by the logistical aspects of carrying and storing victuals.

Fundamental to the provision of the continuous at sea nuclear deterrent is the
necessity for the submarine to remain undetected during its patrol. This means that once dived, the submarine will not return to the surface until it has been relieved by its replacement commencing her patrol, unless forced to by an emergency. Such emergencies may include the evacuation of members of the Ship's Company for medical reasons.

To mitigate against this risk, submariners are a relatively young, healthy population of adult males who undergo rigorous medical assessment to determine both initial and continued suitability for submarine service. In addition, in order to minimise the potential need to break patrol for medical reasons, a doctor in the form of a submarine qualified Medical Officer (MOSM) has been borne on every deterrent patrol since inception. The practice of the routine carriage of a doctor is limited to the SSBNs of the French and Royal Navies. This is due to the deployment of multiple SSBNs by other navies such that they may compromise the position of a single unit during an evacuation without compromising the strategic deterrent.

Royal Navy MOSMs are General Duties Medical Officers, having completed their medical school training and minimum postgraduate experience, but not having entered higher professional training. Prior to joining the flotilla, each MOSM will undergo basic military and subsequently submarine-related training. The latter consists of a four month intensive course including subjects as diverse as engineering principles, submarine organisation and nuclear physics, to the more medically applicable topics of radiation protection and atmosphere control.

Deployment as a MOSM presents a real challenge to junior doctors, working in an inimitable environment where medical personnel, resources and equipment are limited. In addition, the covert nature of a deterrent patrol demands that no communications are transmitted from the submarine, except in the direst of emergencies, and therefore no senior medical advice may be sought by a MOSM on patrol.

While there have been several recent studies concerning the health at sea of submariners of foreign navies, most notably the USN, there have been no such reports relating to the Royal Navy for almost 30 years (1).

In this study we set out to assess the nature of medical consultations occurring at sea on Vanguard Class nuclear deterrent patrols, and the impact of significant cases on these patrols.

**Methods**

On completion of each deterrent patrol, a comprehensive patrol report is submitted to a variety of navy departments for analysis. Included within this is a medical section, compiled by the submarine's MOSM, detailing medical, atmosphere control and health physics matters occurring during the patrol. The medical section is scrutinised by the Deputy Principal Medical Officer (Submarines) at HMS Neptune as part of the post-patrol brief debrief process and to provide a medium for clinical governance. This document provides basic anonymised information about the number and nature of medical consultations made at sea, and describes in greater detail the significant cases.

A retrospective analysis of the medical sections of patrol reports from Vanguard Class deterrent patrols covering the periods 1994 to 2008 was conducted. In addition to the analysis of basic patrol information, this was subsequently divided into the following distinct groups of sub-analyses:

1) **Rates of medical attendance**

Consultations were divided into the following disease groups: Cardiovascular, Dermatology, Ear Nose and Throat, Gastrointestinal, Genitourinary, Neurological, Ophthalmological, Musculoskeletal (including soft tissue injuries), Psychiatric, Respiratory, Surgical (including all non-soft tissue injury trauma) and Other. This gave the number of cases for each patrol, which was then added to give a total incidence for all patrols.

The number of personnel embarked was multiplied by patrol duration to give the number of man-days for which the population had been at sea. This was then applied to the incidences to give incidence rates for each
disease group. These were then expressed as both per 100,000 man-days and per patrol.

2) Dental fitness and rates of dental attendance
A similar process to above was applied to dental presentations at sea, using the groups: Total, Crowns/Fillings, Pain, Infection and Other.

An assessment was made of the dental fitness reported on sailing. This is based on the Defence Dental Service (DDS) return of each submarine detailing the number of personnel in date for routine review or with no outstanding dental treatment required. All Royal Navy Medical Officers receive training on the basic management of dental problems that may present at sea. However, the training is designed to effect temporary solutions, to mitigate until such time as the patient can be returned to the DDS for definitive treatment.

3) Impact of patrol threatening cases
A case was considered a threat to patrol if it achieved any of the following criteria:

i) The MOSM noted it as a threat to the patrol in his report
ii) The report noted that the submarine’s Command had been briefed on the case
iii) The case notes indicated a threat to life, limb or vision
iv) The case required surgery under anaesthesia whilst at sea
v) Medical/casualty evacuation was required

Results
A total of 74 SSBN patrols were conducted over a 13 year period between December 1994 and February 2008. The total patrol duration was 4999 days at sea, with a mean patrol duration of 68 days (range of 14-102 days).

Of these patrol reports, 65 (88%) gave the number of Souls on Board (SOB) with a mean of 152 men per patrol (range 136–160 men). The number of man-days for the remaining 9 patrols was calculated using the standard Scheme of Complement (142 men) and were included in the calculation of incidence rates for both medical and dental attendance.

The number of SOB was multiplied by the individual patrol length in days to give an exposure in man-days per patrol. The patrol exposures for each patrol involved in the analyses were added to give a total exposure.

1) Rates of medical attendance
The medical data from the 74 patrol reports were analysed. Of these, only 35 (47%) contained sufficient information to allow the calculation of incidence rates by attendance type. Incidence rates were calculated from a total exposure of 362,116 man-days. The results are shown in Table 1.

2) Dental fitness and rates of dental attendance
Dental fitness was noted in 33 (45%) reports. The mean reported dental fitness was 92% (range 58-100%). It is of note that the DDS return covers only the Ship’s Company. Additional personnel borne for a patrol (i.e. trainees from other units) are not included in this figure.

The dental data from the 74 patrol reports were analysed. Of these, 64 (86%) noted the total number of patients seen for dental reasons allowing a total incidence rate to be calculated from an exposure of 655,571 man-days. The total dental incidence rate across these reports was 37.07 cases per 100,000 man-days.

<table>
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<tr>
<th>Per</th>
<th>CVS</th>
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<th>ENT</th>
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Table 1. Rates of medical attendance for 35 patrols by diagnostic group (362,116 man-days)
Of these reports, 34 (46%) contained sufficient information to allow the calculation of incidence by attendance type. Incidence rates were calculated from a total exposure of 338,948 man-days. The results are shown in Table 2. These 34 reports gave a total incidence rate of dental presentations of 35.99 cases per 100,000 man-days.

3) Impact of patrol-threatening cases

Each patrol report made specific comments relating to the occurrence of medically significant cases, or the lack thereof, during a patrol. As all reports commented on potential patrol impact, the total exposure was 759,254 man-days. A total of 24 patrol-threatening cases were noted. Of these, 5 cases (21%) progressed to emergency evacuation from the submarine, while 19 (79%) were managed medically onboard by the MOSM and his department. The rate of patrol threatening cases is shown in Table 3, while the breakdown of diagnoses for the patrol threatening cases is shown in Table 4.

In addition, several significant pre- and post-patrol events occurred necessitating

<table>
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<tr>
<th>Per Filling/Crown</th>
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<th>Infection</th>
<th>Other</th>
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<td>Patrol</td>
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<td>0.62</td>
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Table 2. Rates of dental attendance for 64 patrols by diagnostic group (338,948 man-days)

<table>
<thead>
<tr>
<th>Per Patrol Threatening Cases</th>
<th>Patrons Broken</th>
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<tr>
<td>100K man-days</td>
<td>3.19</td>
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<td>Patrol</td>
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Table 3. Rates of Patrol-Threatening Cases and Broken Patrols for 74 patrols (759,254 man-days)

<table>
<thead>
<tr>
<th>Evacuation required^1</th>
<th>Evacuation circumvented^2</th>
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<tr>
<td>Acute appendicitis (x2)</td>
<td>Acute appendicitis (x5)</td>
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<td>Chemical eye injury</td>
<td>Chemical eye injury</td>
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<td>Chest pain</td>
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<td>Severe traumatic hand injury</td>
<td>Compartment syndrome</td>
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<tr>
<td></td>
<td>Iritis</td>
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<td></td>
<td>Acute opiate withdrawal^4</td>
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<tr>
<td></td>
<td>Chemical eye injury</td>
</tr>
<tr>
<td></td>
<td>Paronychia with tracking cellulitis</td>
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<tr>
<td></td>
<td>Quinsy</td>
</tr>
<tr>
<td></td>
<td>Renal colic (x2)</td>
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<tr>
<td></td>
<td>Shoulder dislocation</td>
</tr>
<tr>
<td></td>
<td>Soft tissue infection</td>
</tr>
<tr>
<td></td>
<td>Spontaneous tension pneumothorax</td>
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<td></td>
<td>Temporal arteritis</td>
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</table>

Table 4. Type, number and outcome of patrol threatening cases for 74 patrols (759,254 man-days)

1. MEDEVAC or CASEVAC
2. Onboard medical management
3. General anaesthetic
4. A patient with chronic pain requiring prescribed compound opiate analgesia suffered withdrawal symptoms upon abrupt self-directed cessation of medication
casualty evacuation from the submarine, either just prior to commencing, or just following completion of, the patrol, and therefore were not patrol threatening events per se (Table 5).

**Discussion**
The objectives of this study were to determine both the basic rates of medical and dental attendance during deterrent patrols and also to assess the challenges faced by the junior doctors providing the sole medical care onboard and what impact, if any, their presence had on preserving the integrity of the patrol by averting the need to evacuate members of the crew for medical reasons.

**Data collection**
A total of almost 5000 days were spent at sea over the 74 patrols studied. With each submarine carrying an average of 152 men and a typical patrol lasting approximately 10 weeks, all within a submerged, completely self-contained and undoubtedly hazardous environment, there is considerable potential for illness to occur, either of primary aetiology or secondary to accident or injury.

Of initial note upon reviewing the patrol reports was the non-standardised and highly variable reporting formats employed by successive MOSMs in the medical sections. This hampered complete data collection and fewer than half of the 74 patrol reports contained sufficient information for the calculation of morbidity rates by attendance type, which clearly reduces the power of the present study. The medical sections ranged in length and detail from a few lines containing general medical comments to several pages detailing medical and dental consultations comprehensively in a standardised format. This is consistent with a review of surgical problems presenting at sea during Royal Navy Resolution Class SSBN patrols (the predecessor to the Vanguard Class submarines) published almost 30 years ago, in which the authors found data collection difficult due to incomplete reports giving little detail of patient management (1).

Interestingly, dental consultations were seemingly given greater import as 86% of the 74 patrol reports recorded complete attendance information.

While such variability in reporting is the responsibility of each individual MOSM, we noted that the degree of detail and standardisation of reporting improved over time with successive patrols, such that the first 37 patrol reports contained 10 detailed medical sections (27%) while the later half of the 74 reports contained the majority of these (25 reports, 68%). It should also be noted, however, that all of the patrol reports did specifically comment on the occurrence of significant cases during a patrol, reinforcing the importance of such cases in relation to their potential threat to patrol integrity.

**Medical and dental attendance rates**
The majority of the 35 reports used in calculating rates of medical attendance used the same 12 broad categories given in Table 1. The most common presentations were for dermatological and musculoskeletal complaints (145.0 and 135.0 presentations per 100,000 man-days, respectively). The remainder consisted of ‘other’ (100.6), gastrointestinal

<table>
<thead>
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<th>Pre-patrol cases</th>
<th>Post-patrol cases</th>
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<tr>
<td>Corneal abrasion</td>
<td>Shoulder dislocation</td>
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<tr>
<td>Overdose (x2)</td>
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<tr>
<td>Pancreatitis</td>
<td></td>
</tr>
<tr>
<td>Tonic-clonic seizure</td>
<td></td>
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<tr>
<td>Suspected testicular tumour</td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Type and number of significant pre- and post-patrol cases
(74.8), surgical (57.1), ENT (39.9), respiratory (28.8), ophthalmological (26.3), genitourinary (23.6), neurological (15.2), psychiatric (12.2) and cardiovascular (4.4) presentations (per 100,000 man-days, respectively).

The rates of attendance by type reflect both the medical status and fitness of the population concerned, together with the environment they inhabit while at sea for prolonged periods. The submarine population consists of a relatively young group of men who have undergone basic medical examination to meet the standard requirements to serve in the Royal Navy and further scrutiny to ensure fitness to join, and thereafter continue to serve in, the Submarine Service. In addition, these men live and work in the unique environment of the submarine where accommodation and recreation space is restricted and daily work consists of mainly repetitive tasks undertaken in confined spaces containing vast arrays of machinery and other equipment and contact with various chemicals (e.g. cleaning agents, oils, lubricants and laboratory analysis reagents).

Therefore, the predominance of dermatological presentations, mostly resulting from soft tissue infections and dermatitis (both non-specific and contact dermatitis), together with musculoskeletal complaints (principally soft tissue injuries and occasional minor fractures) secondary to habitation within such a confined environment with a constant requirement to traverse between decks using ladders etc, is unsurprising. Similarly, cardiovascular complaints should occur infrequently among this population, which is indeed the case.

The ‘other’ category of presentations consisted of typically minor, general symptoms which did not comfortably occupy one of the other specific diagnostic groups, such as headache. It is also an illustration of the submariner’s requirement to present to the sickbay for consultation and treatment, no matter how minor the complaint, whilst alongside and at home most would self-medicate with over-the-counter preparations, consistent with the civilian population. At sea, each man has a specific role to fulfil and illness can have a significant impact on working routines as other members of a department accept the duties left by a sick colleague. Thus the crew understand that early presentation and treatment are necessary in an attempt to avoid this. This also reflects the constant availability of, and ready access to, the medical officer that the men onboard have, together with the significant amount of time they have to ponder the potential significance of their symptoms.

Regarding dental attendances, the generally high percentage of dental fitness among the crew is reflected in the fact that on average there are only 3-4 dental cases per patrol. While maintaining dental fitness is the individual’s responsibility, it falls to the medical officer to remind and encourage the crew to attend annual and pre-sailing assessments and treatment, thus potentially mitigating against the need to undertake treatment at sea, for which the MOSM receives only rudimentary training.

On review of the literature, comparison of these data with other studies is problematic for a number of reasons.

It is unsurprising that due to the unique environment and population type there are very few and limited published studies. The only other review of presentations at sea during Royal Navy submarine deterrent patrols was confined to surgical conditions (1). Whilst direct comparison is difficult due to differences in data manipulation, the authors reported that the majority of the presentations were either musculoskeletal (31%) or soft tissue infections (21%), similar to our findings. Furthermore, this is consistent with other studies of morbidity rates onboard United States Navy submarines undertaking patrols which have also noted a preponderance of musculoskeletal/trauma and dermatological consultations (2-5). Interestingly, one study also reported a significant rate of respiratory presentations, primarily upper respiratory tract infections. We are aware from personal experience and anecdotal evidence that similar presentations occur early in UK patrols and differences in
reporting probably reflect variations in data collection and manipulation.

The other most significant difficulty in comparing data between this and other reviews, and which is perhaps the greatest limitation of the present study, arises from variations in reporting formats and specifically the classification of presentations. One possible solution which would allow for standardised medical sections of the patrol report and thus a consistent and more complete reporting format and subsequent easier data analysis would be to employ the International Classification of Disease (ICD) onboard Royal Navy deterrent submarines. We are currently undertaking a study to determine the feasibility of this approach.

The Medical Department

The junior doctors appointed to serve as MOSMs onboard SSBN submarines undertaking nuclear deterrent patrols have unique responsibilities compared not only with their civilian peers and colleagues but also other junior military medical officers. They are typically young men undertaking their first post-registration appointments with modest medical and surgical experience. Following general naval education, MOSMs receive the same training as completed by all submariners, and in addition in areas specific to their responsibilities onboard, including atmosphere control, nuclear physics and radiation protection (in respect to both the nuclear reactor and the ballistic weapons system).

However, their primary role at sea is medical - to provide comprehensive care within the confines of limited resources and facilities and without the possibility of consulting senior colleagues for advice. Their ultimate objective is to manage emergencies effectively onboard and thus avoid the need for medical evacuation.

In addition, the MOSM will have several other ancillary roles and duties, such as assisting with watch-keeping in the control room as the Ship Control Officer of the Watch (part of the team piloting the submarine) and also navigation (plotting the submarine position). Additional administrative roles include mentoring the medical assistants both professionally and pastorally. On a lighter note, the MOSM will also usually head the ‘escape committee’, helping organise entertainment for the patrol.

A MOSM is both a doctor and an officer. As a doctor, his priority is his patient and more generally to ensure the health and continued fitness of the crew as a whole. As an officer, he has additional obligations to the submarine’s Command to maintain operational capability and must keep the Command informed of any limitations placed on the submarine that are attributable to medical reasons.

As well as the MOSM, the submarine will also carry two or three medical assistants whose primary roles onboard are to monitor health physics and to provide medical support to the MOSM. They undergo a two year emergency medical and primary care training programme to allow for the recognition and treatment of simple conditions. During emergencies first-aid parties are supplemented by the cooks and stewards.

While a comprehensive formulary and basic monitoring equipment are at the disposal of the MOSM and his assistants onboard, there are no diagnostic resources available and they must rely largely on clinical acumen when assessing the severity of a case at presentation.

Medical Emergencies and Casualty Evacuation

The world of a nuclear submarine on deterrent patrol is quite unique. The submarine will remain dived for several weeks and will not return to the surface or transmit communications in order to remain undetected (it will only receive them), and thus preserve a central principal of patrol philosophy. The only exception to the overriding principle of an SSBN remaining undetected is the occurrence of emergencies at sea, which may include the evacuation of critically ill members of the Ships Company. Such a procedure is a major undertaking, both
logistically and in terms of threatening the security of the patrol.

All significant cases that may potentially result in the requirement to evacuate a patient from the submarine are discussed with the Command onboard. There exists a variety of criteria which determine whether or not a casualty may be evacuated. The medical criteria include threats to life, to limb, or to vision, sufficient to cause permanent disability. These criteria are then further modified by the operational stance of the submarine, determined centrally by the Cabinet and the Ministry of Defence. Ultimately, Command onboard relies upon the recommendation of the MOSM for MEDEVAC or CASEVAC of an individual.

If the criteria are realised and evacuation is deemed necessary, the execution of the MEDEVAC and CASEVAC procedure may take several days. In addition, the physical process of evacuation is complex and requires a team from the Ships Company to move the casualty through the confined space of the submarine and into a position outside the submarine (while surfaced) for extraction.

In view of the unique role of the MOSM and his department one of the most interesting, and we think important, aspects of the present study concerns review of medically significant cases occurring at sea that warranted consideration as patrol-threatening events. We chose robust criteria in determining which cases were sufficiently significant to pose a potential threat to the maintenance of patrol integrity.

Patrol-threatening cases were seen at a rate of 3.19 per 100,000 man-days (approximately one case every three patrols). These ranged from injuries sustained during the course of performing duties, surgical complaints (e.g. acute appendicitis and renal colic) and some interesting medical cases (e.g. spontaneous pneumothorax and temporal arteritis).

The most common cause of concern for patrol integrity was the occurrence of acute appendicitis, with 7 cases over all patrols (0.92 cases per 100,000 man-days). There were 2 cases each of renal colic and chemical eye injury (0.26 cases per 100,000 man-days). All other patrol-threatening conditions occurred once only (0.13 cases per 100,000 man-days).

While the numerical occurrence of patrol-threatening cases was not insignificant, their effect on patrol integrity was less dramatic. Of the significant cases recorded, only 5 (21%) resulted in emergency evacuation of an individual from the submarine during the patrol. As a result, while the integrity of 32% of patrols was threatened by a significant medical case, only 7% of patrols (1 in 15) required a MEDEVAC or CASEVAC. All remaining cases were successfully managed conservatively onboard in the sickbay by the Medical Officer.

Conclusions
In this study we present the first comprehensive review of medical and dental presentations occurring at sea onboard British submarines during nuclear deterrent patrols.

Over a 13 year period 74 patrols were conducted with a total submarine exposure in excess of 750,000 man-days. The major presentations were dermatological and musculoskeletal, reflecting both the nature of the personnel, their environment and occupational factors.

Patrol threatening cases occurred at a rate of approximately 1 per 3 patrols. However, evacuation was only required at a rate of approximately 1 per 15 patrols. This difference represents successful onboard management in 79% of cases.

On a final note, it is perhaps worth taking a little time to reflect upon the fact that at this very moment there is a submerged 16,000 ton Vanguard Class submarine on nuclear deterrent patrol, carrying approximately 150 men and a MOSM whose primary objective is to provide the sole medical care to the crew and ultimately, to ensure the maintenance of patrol integrity. From our review we think it reasonable to conclude that to date such MOSMs have been very effective in meeting that objective supporting the requirement for their continued appointment to these submarines.
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Declarations
The authors have no conflicting interests to declare.

References

Surgeon Lieutenant Commander M J Scutt Royal Navy
Department of Military Medicine, Royal Centre for Defence Medicine, Birmingham
Clinical

Neurosurgical trauma on the battlefield; what can we do and what should we do?

A Mellor, J K Ralph, S E Harrisson

Introduction
In May 2007 a neurosurgical team was placed at the UK Role 2 enhanced Medical Treatment Facility (UK R2E MTF) at Camp Bastion, Helmand Province, Afghanistan. It was then subsequently moved to the multinational Role 3 facility at Khandahar Airfield (KAF). The role of neurosurgery and neuro-intensive care support within Helmand has led to debate about the operational placement of neurosurgical teams, what facilities should be provided for coalition and host nation casualties, and how best the mortality and morbidity for neurological injury can be reduced.

The authors examine the frequency of military neurological injury, review the current UK practice on deployed operations and look at what should be done, both in terms of possible medical care and moral duty.

Patterns of wounding
Since World War One, the so-called “war to end all wars,” there have been countless wars, conflicts and battles around the world. The period from the end of World War Two has seen over 16,000 British Service Personnel killed on operations. Often reports have been published in open source journals allowing us to compare injury profiles between these conflicts. Some of the data concerning periods within significant conflicts in the 20th and 21st centuries is summarised in Table 1.

Audit Conclusions
Medical education is the key to effective anti-malarial prophylaxis. This audit shows that there are issues relating to the promulgation of information to medical centres in the UK that are looking after personnel deploying on operations to Afghanistan and also at the orientation package that deployed personnel receive on arrival in theatre. A significant number of deployed personnel are non-compliant with taking their AMP either because of side effects, misunderstandings about when to take the tablets or due to a false belief that malaria poses no risk to them. The audit targeted those on H9 early in their operational tour. Most were not based at the FOB at the time of the malaria case and based on the number of personnel who approached the sick bay at the time requesting AMP it is

<table>
<thead>
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<th>WW2 (US data)</th>
<th>Korea²</th>
<th>Vietnam³</th>
<th>Northern Ireland ⁴</th>
<th>Falklands⁵</th>
<th>Somal⁵</th>
<th>Gulf War ¹⁷</th>
<th>OIF/DEF ⁸ (US)</th>
<th>Op Telic ⁹</th>
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<td>67.5</td>
<td>75.8</td>
<td>68.5</td>
<td>54.5</td>
<td>67.8</td>
</tr>
</tbody>
</table>

Table 1 – Injury patterns during conflicts of the 20th and 21st Centuries.