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## ORIGINAL PAPERS

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### **Training Injuries – How Clinicians Can Help Commanders Avoid Them**

A reflection on three training injuries symposia held by the Army Training and Recruiting Agency (ATRA) in 2001, 2002 and 2003 at the Royal Military Academy Sandhurst (RMAS).

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#### **ABSTRACT**

**The aim of this paper is to reflect on the proceedings of three training injuries symposia run by the British Army's training organization from 2001 to 2003. The essence of the presentations are reproduced, highlighting the role of medical staff in advising commanders on how injuries might be prevented. The importance of placing the emphasis on prevention rather than rehabilitation as a means of reducing the impact of training injuries is first examined. Pre-employment medical selection standards, the design of training courses, nutrition, smoking, training injuries among women, heat injury and the psycho-social environment are then all reviewed. Finally, the outcome of workshop discussion groups are presented as practical guidance for medical officers and other clinicians, advising commanders on how training injuries amongst their personnel might be minimised.**

#### **Introduction**

The number of Service personnel unavailable for deployment for medical reasons is of concern in the Armed Forces. The Annual Report on the Health of the Army for 2001 revealed that as at December 2001, 10.4% of the trained strength of the Army was medically downgraded. 72% of these manpower losses resulted from injury and musculoskeletal disorders, sustained through military training and sport (1). This underestimates the true figure of non-deployability as others are on shorter term light duties certificates, and many soldiers are lost to the Army through injury during Phase One and Phase Two training.

The Army Training and Recruiting Agency (ATRA) held symposia on Training Injuries at the Royal Military Academy Sandhurst (RMAS) on 14 February 2001, 14 March 2002 and 4 June 2003. The author was involved in the organization of the first two meetings in his capacity as the Senior Medical Officer (SMO) at the Academy, and returned as a delegate for the most recent conference.

Those attending the first meeting were mainly doctors, physiotherapists and physical

training (PT) instructors. Considerable effort was made for the latter two conferences to attract commanding officers of ATRA establishments and their staff so they might share in the examination of the causes of training injuries, and consider how they might be prevented. The aim of this article is to place the outcome of the discussions on record and to suggest how Army primary healthcare staff might advise commanders on how injuries might be prevented. In terms of the medical management of sports and training injuries, the reader is referred to the extensive literature on this subject; the focus of the symposia was on how commanders and medical staff may work together to reduce injury rates, rather than the treatment of injuries once they have occurred. A similar article has been submitted to Army Doctrine and Training News in order to inform the wider audience of all those involved in military training.

#### **Commitment starts at the top**

Major General D Leakey CBE, Director General Army Training and Recruiting, demonstrated his clear commitment to preventing injuries in his opening address at the most recent conference. In the previous two years, the Commandant RMAS, Major General P C C Trousdell CB, similarly set the scene by describing the central role of commanders in the prevention of injuries.

Injuries are a concern for all involved in military training, as injury has a significant impact on the individual and the Army. The injured trainee may be removed from training, either temporarily, or permanently through discharge. A significant injury from ATRA's perspective is one that impacts on training, and in the wider Army, on availability for deployment or indeed further employment. It should be stressed that whereas in many cases a single incident may cause injury, musculo-skeletal conditions arising from sustained physical exertion are just as much of a problem in the training environment. In a review of medical discharges since records began in 1861, Bergman and Miller reported that in 1981, 22% of all medical discharges were due to musculo-skeletal disease. In 1991 this element accounted for 53% of all discharges,

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but by 1998 this figure had reduced to 34%, attributed to changes in military training for recruits and the replacement of the combat high boot (2).

Both generals stressed that the prevention of training injuries is a responsibility of the executive Chain of Command, and is not primarily a medical issue, although medical staff will inform preventive strategies by advising on patterns of injury. Commanders have the responsibility for keeping injuries to the minimum consistent with the aim of military training – to produce men and women capable of fighting, or supporting fighting, in the rigorous conditions of military operations. The role of medical staff is to inform the risk assessment process by providing commanders with the data they need to take effective preventive action.

### The size of the problem

In the most recent Annual Report on the Health of the Army (3), injuries and musculo-skeletal diseases are reported to account for 72% of the 1008 medical discharges during 2002. This is reported to represent a rate of discharge from the Army due to injury of 2.9 per 1000 men and 3.8 per 1000 women. The percentage of injuries due to training and exercise was reported as 44% for men and 60% for women.

At each of the ATRA symposia, Lieutenant Colonel Fiona Folkes, Consultant in Occupational Medicine, presented the number of discharges for medical reasons from ATRA training establishments for each year. Analysis of the Financial Year 2002/03 discharge figures, as presented at the 2003 symposium, showed that approximately 38% of discharges on medical grounds from ATRA units were due to failure at initial medical examination (those found to be medically unfit for service on arrival, but who

had passed the pre-service medical) or medical problems becoming evident during training, and 62% were due to injury sustained in training. Of these latter the great majority are due to lower limb injuries.

### Tackling the issues

In order to reduce wastage through injury, it is necessary to examine the whole process of military training. This starts with the “raw material”, i.e. the physical standard of recruits before they arrive. Measures to reduce injury once recruits are in training establishments include course design and risk assessment of each activity. Finally, time out of training and wastage rates may be reduced through rapid assessment and treatment of those who become injured, and effective rehabilitation before re-entry to the course.

The Armed Forces Overarching Personnel Strategy (AFOPS) and single Service injuries steering groups have identified the requirement for rehabilitation. In the author's own area of responsibility a Regional Rehabilitation Unit (RRU) has been established as a component of the (United Kingdom) Defence Medical Rehabilitation Plan (4). The main driver for this is to reduce the number of personnel across the Armed Forces who are unfit for military operations (generally referred to as being “downgraded”). The success of this project is currently being assessed by means of an external audit, but by way of illustration the initial analysis of the first ten months' raw outcome data (from 7 Mar to 31 Dec 03) is presented graphically at Figure 1. Of the 136 who had by that time been admitted for four weeks' intensive rehabilitation, 40 were upgraded to the Army's medical employment standard P2 FE (fully fit for all military duties). Of the remainder, 82 were assessed as being P3 LE (fit for limited duties but usually deployable on operations anywhere in the world) and 14 remained graded P7 HO (fit for limited military duties but not deployable on operations). It should, however, be emphasized that the reported levels of functional improvement, measured on a visual analogue scale in all those admitted, increased on average by 60%. Similarly, the perceived pain level score for those admitted reduced on average from 4 out of 10 to 2 out of 10. Even though only about 30% of those admitted for rehabilitation were graded fully fit on exit, the overall improvement in function and reduction in pain among these personnel increased their fitness for task. It is also worth noting the reduction in number of those graded P7 on entry; there were 22 Service personnel so graded as unfit for operations on entry, but on exit only 14 were graded P7. The third who have been upgraded are now operationally deployable. The data presented above will require further

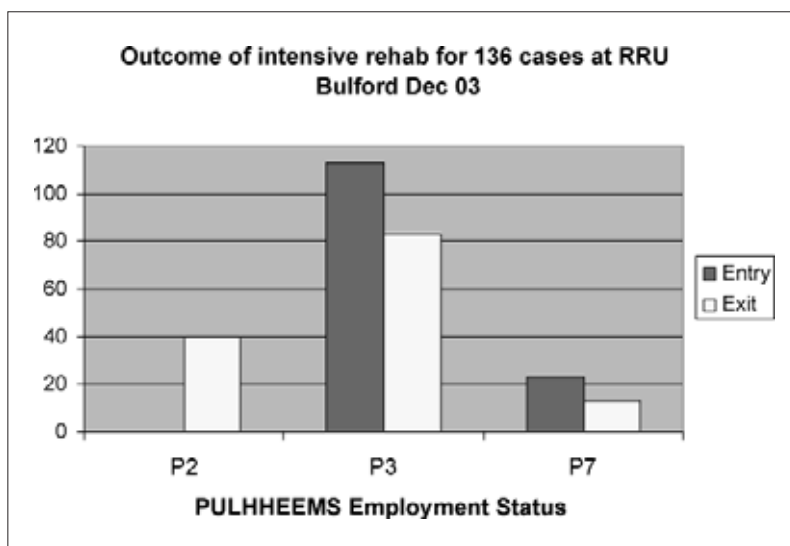


Fig 1. Preliminary results of the outcome of rehabilitation for 136 cases admitted to the Bulford Regional Rehabilitation Unit (RRU) in its first ten months since opening in 2003. The graph depicts the number in each medical category (P2 = fully fit; P3 = fit for operational deployment but on restricted duties; P7 = fit for restricted duties in the home base only) at initial assessment (entry) and on completing four weeks of intensive rehabilitation (exit).

analysis, particularly as a control group will need to be identified to determine how many would have improved in time without rehabilitation. However, at this stage the message for commanders is that rehabilitation may reduce the numbers of those downgraded, but probably less than a third of those entering rehabilitation will reach full operational fitness (P2 FE). Of those unfit for operations, perhaps a third can be made fit for limited duties on operations. Therefore, emphasis must be placed on preventing injuries, as the efforts of clinical staff in “fixing those who are broken” will probably only succeed in a third of cases.

**Prevention – the core activity**

To take preventive action commanders need to know what injuries have occurred, and what the circumstances of the injury were. Causes of injury that resulted in placement of officer cadets into the RMAS rehabilitation group (termed the “Y List” at the Academy) for a representative period are shown at Figure 2. As a result of subsequent changes in the Commissioning Course, figures for placement on the RMAS “Y List” were reduced.

Bricknell and colleagues described a “Chain of Care” in their paper on the development of a health policy for the Army (5). This is reproduced diagrammatically at Figure 3. The sharing of responsibility for the health of soldiers between commanders and medical staff can be described as follows:

- *Prevention* – most injuries and musculoskeletal disorders among soldiers are attributable to military activity. Medical staff will advise commanders on patterns of injury, but only commanders can make the adjustments to training necessary to reduce injury. This data may

be found from the Army’s J97 morbidity reporting system or from searches of clinical data entered on the EMIS Primary Healthcare Information System (PHCIS), in use in primary healthcare centres throughout the Defence Medical Services.

- *First aid* – when soldiers are injured, it is their colleagues (or in the training environment especially, the accompanying trainers) who will render first aid pending the provision of trained medical support.
- *Treatment* – this is a medical function, and will incorporate clinical assessment, investigations, medical treatment, physiotherapy and surgery as appropriate.
- *Rehabilitation* – the medical aspects of rehabilitation, such as physiotherapy and remedial exercise, and assessment of fitness for work will be a medical responsibility. However, the major contribution will be from commanders as they make the adjustments necessary as recommended by their medical advisers.

**The Chain of Care**



Fig 3. The Chain of Care. Commanders have the principal responsibility for the prevention of injuries and rehabilitation of soldiers back to work, assisted and advised by medical staff. The treatment of injuries and the medical aspects of rehabilitation are medical functions. (After Bricknell et al 2000).

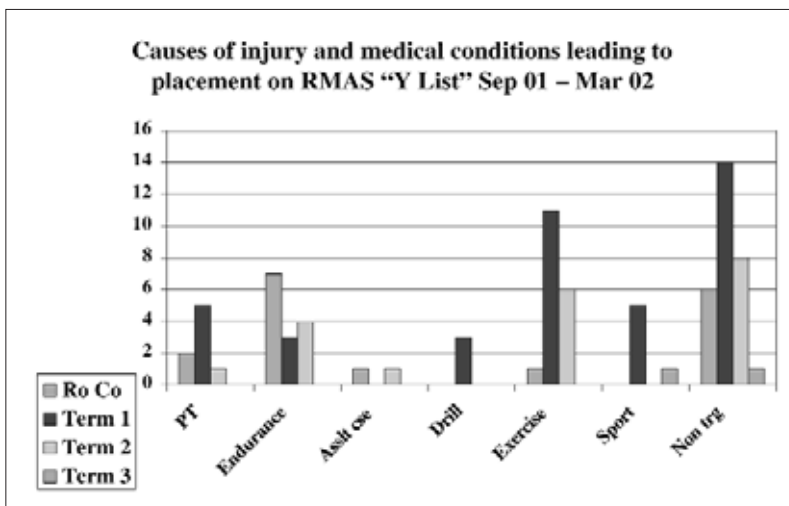


Fig 2. Officer cadets placed on the RMAS “Y List” by cause over the six month period Sep 01 to Mar 02. Ro Co is Rowallan Company, a preliminary course; Term 1, 2, 3 refers to the term in which the injury was sustained or the individual was placed on the “Y List” for medical conditions unrelated to training. Exercise refers to field training exercises. Over this period 51 officer cadets were placed on the “Y List” due to training injuries, and 29 for medical reasons unrelated to training.

**The raw material – medical standards of recruits commencing basic military training**

All entrants to the Armed Services have a pre-service medical arranged by recruitment officers, and the majority of those with conditions precluding service are screened out. However, some still arrive at training establishments with problems, either because they were not evident to the examining doctor at their pre-service medical, or because new conditions have arisen in the interim. The assessment of fitness for work is a key function of occupational health practice, the aim being to ensure that those who are more likely to come to harm from their work are

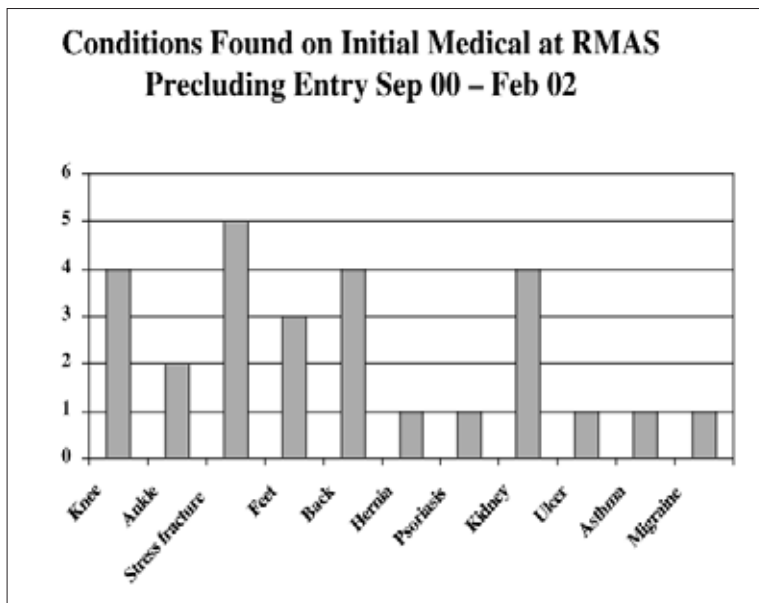


Fig 4. Conditions for which individuals attending to commence officer training were found unfit on initial medical examinations at RMAS from Sep 00 to Feb 02.

identified so that an appropriate adjustment may be made. In the case of military service, there are some conditions that are likely to result in the individual coming to harm during military training or operational deployment. The range of conditions for which new entry officer cadets were excluded from RMAS on this basis following their initial medicals (while the author was the SMO) are shown at Figure 4.

There is a perception among some trainers that those who become injured are inherently weak (the author's observation on trainers attitudes at RMAS). Whereas some officer cadets at Sandhurst have been placed in the assessment, rehabilitation and treatment group (referred to at RMAS as the "Y List") for medical problems unrelated to training, twice this number were placed on the RMAS "Y List" because they were injured in training.

Therefore, those who are downgraded generally do not have pre-existing conditions; they acquire these in training. Having established that there is usually no underlying medical condition, the next question is whether their physical fitness on arrival is the problem.

### The Physical Demands of Military Training

Dr Mark Rayson of Optimal Performance presented a paper on the outcome of his study into the physical demands of the Common Military Syllabus for Recruits (CMS(R)). The object was to assess the physical demands of CMS(R) and to make comparisons between the demands on recruits of different gender, fitness and within different Arms and Services. Four platoons were followed at Army Training Regiment (ATR) Winchester: three comprised Adjutant General's Corps (AGC) recruits and one comprised Infantry recruits.

The Infantry platoon and one of the AGC platoons were all male; of the others one was mixed gender and one was all female.

The results showed that the overall physical demands of CMS(R) were too high for the physical capability of some recruits selected under then extant standards. The requirement to maintain sustained activity for more than 12 hours per day increased the risk of injury. Especially during combat endurance, some recruits were exercising for prolonged periods above the recommended training zones; these were mainly females. A particular problem was the demanding level of physical activity from week 1 of the course, there being no gradual progression at this time. Through commanders' action this has now been changed and injury rates as presented at the 2003 symposium have improved.

Even transiting around the camp involves moderate cardiovascular strain. Approximately one third of the time spent transiting was in the recruits' training zone (i.e. additional unscheduled physical training). This needs to be borne in mind by medical personnel when advising trainers on the design of training programmes.

A key finding, which bears out the impression of most trainers and clinicians, is that those who were aerobically fit on entry coped best. Indeed, the key marker for proneness to injury was lack of aerobic fitness, measured by one and a half mile run time. Those who were less fit on arrival were more likely to become injured.

The implication of this work is that the number of trainees lost through injury and musculo-skeletal disease can be reduced by good course design and Risk Management. It is not possible to eliminate all risks; these young men and women must be prepared for the arduous nature of operations. However, losing individuals through needless injury is wasteful in terms of the Army's most precious resource – skilled and motivated manpower.

### Nutrition and Injury

At the 2002 Symposium Dr Anna Casey, Research Leader in Human Metabolic Physiology and Nutrition at the QiniteQ Centre for Human Sciences, described her research into the relationship between nutrition and injury. Nutrition is central to the maintenance of health, as well as physical and mental performance.

The UK Department of Health Committee on Medical Aspects of Food policy (COMA) advises that a healthy diet should comprise 50% carbohydrate, less than 35% fat and 15% protein. However, the requirements for healthy adults undergoing vigorous training change such that the carbohydrate intake should increase to 60% of total energy intake with a corresponding decrease in fat to 25% (6). Protein

requirements remain the same. The diet of the average recruit comprises 45% carbohydrate, 40% fat and 15% protein. This impacts on physical fatigue and rate of recovery, which increases the risk of physical injury.

Dr Casey therefore recommended that training establishments examine their catering arrangements in order to promote carbohydrate and reduce the relative amount of fat consumed. RMAS provides extra calories for officer cadets in their first term by means of a fourth meal.

### Smoking and Injury

At the 2002 Symposium Lieutenant Colonel John Etherington, Consultant in Rheumatology and Rehabilitation at the Defence Services Medical Rehabilitation Centre (DMRC) Headley Court, described his research into the relationship between smoking and injury carried out at ATR Pirbright.

The study followed 2170 male recruits. Smokers were 35% more likely to be injured in training compared to non smokers. By way of comparison, previous US Air Force studies found that smokers were 80% more likely to be injured in training compared to non smokers (7). The Americans calculated that the increased risk of smoking was associated with an excess training cost of \$18 million. The US military subsequently banned smoking in training organizations.

Data from 1999 published in the most recent Annual Report on the Health of the Army (3) showed that 45% of male Army recruits, and 42% of female recruits, were current smokers. This is higher than among recruits in the other two Services. This presentation highlighted the immediate cost of this major health problem in relation to the availability of military manpower. Preventive strategies were discussed in groups at the symposium, as reported later in this article.

### Training Injuries in Women

The physical demands of basic military training are high, and are associated with a high incidence of stress fracture in recruits. At the 2002 Symposium Dr Julie Greeves, Research Leader in Biomechanics, Exercise and Nutrition at the QiniteQ Centre for Human Sciences, described her research into training injuries among female recruits.

Women are at a greater risk of sustaining stress fractures in the early stages of military training (8), partly because they generally have lower levels of physical fitness than men, but also because their bones (being narrower on average than men's bones) are less able to withstand rapid and substantial increases in physical loading.

The increased stride in activities where step length is outside the individual's control (during drill and running in a mixed

male/female squad) generates greater forces through the lower limb and pelvis than would be generated at the stride length natural for women. This will always be a problem when women are required to undertake vigorous activity with their male colleagues.

ATRA statistics presented at the 2003 symposium show that women are at increased risk of discharge on medical grounds as compared to men. The Odds Ratio, i.e. the risk for female recruits of being discharged due to training injury compared to male recruits, is increased, but has improved over the last four years. In 2001/02 the Odds Ratio was 3.3:1 and 1.9:1 in 2002/03 (i.e. reduced from more than three times to double the risk).

The deduction from this work is the intuitive conclusion that men and women are physiologically different. Course design must recognize these differences, particularly in terms of the physical demands placed on trainees. Medical staff observing higher injury rates among women than men might explore course design with commanders if these differences do not appear to have been addressed.

### Heat Injury

Heat Injury is a significant problem in training, on exercise and on deployment to hot climates such as the Middle East. This has been the subject of intense study including the production of a Joint Service Publication (9). There is, however, a distinction between the extremes of climate experienced in Iraq in 2003 and Exertional Heat Illness (EHI) as seen in training establishments. Indeed, levels of serious heat injury on Op TELIC were commendably low due to the diligent adherence of commanders to medical advice (10).

At the 2002 symposium Dr Adrian Allsop, senior physiologist at the Institute of Naval Medicine (INM), and Captain Alison Everest, Regimental Medical officer (RMO) 1st Battalion the Royal Anglian Regiment, described research into EHI carried out at RMAS. From January 1998 to the end of December 2000 fifty seven officer cadets presented to the medical centre with collapse during exercise, and were initially treated as Exertional Heat Illness (EHI). There was a fatal case in June 1998. Reviewing these cases, it seemed apparent that twenty five of these were not heat illness, but it was difficult to distinguish between EHI and simple fatigue at the time.

In addition to the death at RMAS, there have been deaths from EHI at CTCRM Lympstone in 1997, on a Royal Navy Aircrew survival course in 1992 and on Army diver training in Portsmouth in 1986. However, many more suffer severe damage to their health short of fatality, and significant numbers have been discharged from the Army as a result of EHI. The

diagnosis is dependent on the measurement of raised core temperature, although regrettably in practice temperature is not always taken (11).

Temperature rises with exertion, therefore all those exercising would be expected to have a raised temperature, but the level or rate at which the rise in temperature becomes heat illness has not yet been determined. In order to provide a safe baseline, the definition of EHI used over the last two years at RMAS has been a rectal temperature of greater than 39 °C, serious cases being defined as those over 40 °C. This was based on the extant Defence Council Instruction (DCI) which required the immediate admission to hospital for all those with core temperature over 40 °C. However, if there was a delay in taking a rectal temp and the person had been cooled at the scene of injury, or if otherwise clinically indicated, they would still be treated as EHI even if their temperature was normal when recorded. Assessment of severity cannot simply be based on temperature, as the clinical condition of the individual will

dictate the urgency of treatment. The principal “red flag” symptom is confusion, suggesting poor oxygenation of the brain. Urgent resuscitation is required in this situation (securing the airway, cooling and administration of oxygen) whatever the core temperature (9).

Captain Everest described the two pilot trials she had undertaken at RMAS during 2001. With help from INM, she assessed normal, healthy volunteers undertaking the Advanced Combat Fitness Test (ACFT) and Basic Combat Fitness Test (BCFT). The ACFT and BCFT have not caused any severe case of heat illness at RMAS in recent years, although they have resulted in severe cases elsewhere (11). However, the BCFT is a standard test undertaken throughout the Army and the ACFT is run in many field units. The ACFT and BCFT were, therefore, used so that the study might be repeated elsewhere.

Fifteen healthy male volunteers from the senior term took part in each of the two studies (carried out on different groups), in which their temperature was measured whilst undertaking the ACFT in the first study and the BCFT in the second. In both studies no individual’s temperature was raised greater than 38.8 °C. The trigger level of 39°C for automatically considering EHI in a collapsed individual was, therefore, felt reasonable. A graph illustrating the results of the first study is shown at Figure 5.

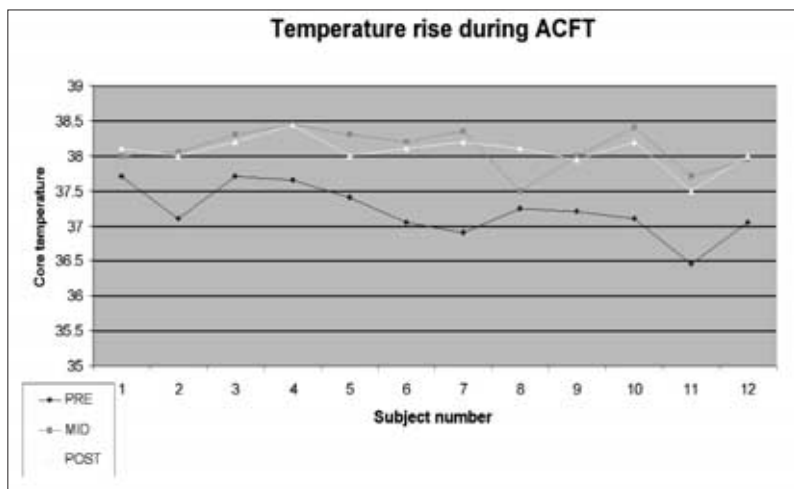


Fig 5. Observed rise in temperature in fifteen volunteers undertaking the Advanced Combat Fitness Test at RMAS in July 2001.

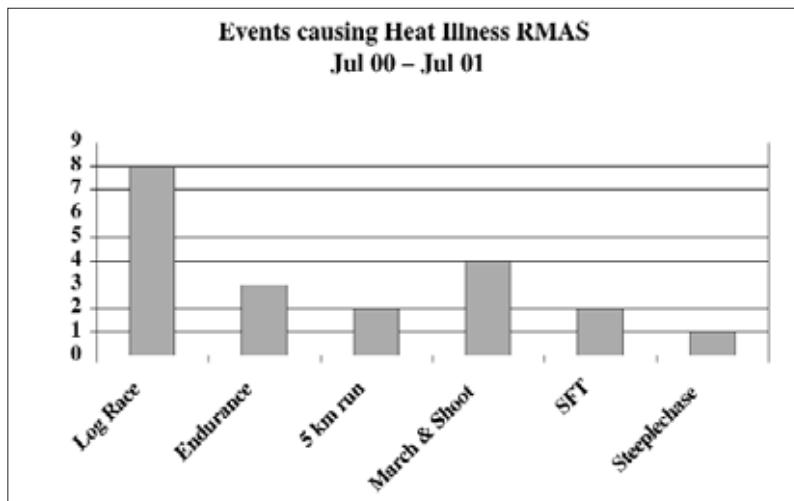


Fig 6. Events in which officer cadets sustained a significant heat injury from Jul 00 to Jul 01. The SFT is the Sandhurst Fitness Test, in essence a combat fitness test with special physical tasks and two circuits of the assault course at the finish.

### Heat Injury – Preventive Measures at RMAS

EHI is a life threatening, yet usually preventable injury. Over the period April 2000 to March 2002 there were 16 officer cadets admitted as emergencies to Frimley Park Hospital with rectal temperature above 40 °C. All these individuals were removed from training and placed on the RMAS “Y List” pending assessment at the Institute of Naval Medicine (INM). Of these serious cases, plus those more borderline cases who were managed as inpatients in the medical centre at RMAS, but referred to INM, seven of 35 officer cadets assessed over the period October 1999 to October 2001 were considered to be predisposed to heat injury and discharged from the Army. The remainder returned to training and were commissioned.

The events leading to these heat injuries were examined, as shown at Figure 6. The Log Race was the single largest producer of heat casualties, and on investigation by Colonel Training (the Chief Instructor at RMAS), the most significant factor was considered to be the mass start (the nine platoon teams starting in a line and rushing to be first into the narrow parts of the course). This event was significantly redesigned on the Commandant’s direction, reducing the competition element that the

review team determined was the principal factor in the generation of heat casualties among this group. The SFT is the Sandhurst Fitness Test; in essence a combat fitness test with special physical tasks and the assault course at the finish. It was on this event that the officer cadet died in June 1998. In line with a more general move to align all physical training tests at RMAS with those in the Field Army, the SFT has been replaced by the BCFT.

In the year following these changes there were three cases of heat injury requiring admission to hospital; one from an endurance event (temperature 40.2°C), one from the March and Shoot event (temperature 41.5°C) and one cadet in his first week (temperature 40.5°C) where notwithstanding his being a fit individual, other factors are likely to have contributed (12).

### The Lymstone Experience

The psychology of military training is also very important. The Royal Marines' Coaching Advisory Team (CAT) described how trainers' beliefs about how military training should be delivered, and their behaviour toward trainees, has influenced outcome. Shaping trainers' attitudes towards trainees has enhanced training output.

The distinction of being permitted to wear the Green Beret is earned only through successfully completing the Commando Course, one of the most physically demanding military training experiences worldwide. In the past, instructors at CTCRM Lymstone had adopted an unsupportive attitude, the perception perhaps being that those earning the Green Beret were those that survived and reached the end of the course "if they were man enough". However, a substantial shortfall in trained marines in the Commando Brigade provided the catalyst for a substantial review of Royal Marines training.

The Royal Marines recognized that most young men entering training at CTCRM had the potential for passing the course, but a large number were lost through injury. The reassimilation of those who had undergone treatment and rehabilitation back into the course after an injury was particularly difficult. By examining the training process, it became clear that the instructors at Lymstone had negative attitudes toward some recruits that interfered with effective teaching. Through the approach introduced by the CAT, all new instructors now have greater insight into how they can encourage all recruits to reach their potential, principally through encouraging good performance, and especially by not punishing those who struggle to keep up. The ethos is now to help the recruits get through the course rather than placing barriers in the way, but without lowering the standard of the

end product. The standard of the exit tests remain unchanged, but the CAT reported that pass rates are now much higher.

### Practical advice on how to prevent training injuries

The outcome of syndicate discussion at the ATRA symposia, in which measures to reduce the incidence of training injuries were examined, was:

- That trainers once selected should be themselves trained so that they are truly equipped with the knowledge, skills and attitudes required for their role.
- That trainers' attitudes must encompass pride in bringing on all their trainees, especially those who are struggling and yet have the potential to succeed.
- That the aerobic capacity of those commencing military training should be assessed in order that shortfalls can be met through physical training. The Army's Basic Physical Fitness Assessment (BPFA) results are an appropriate tool for this.
- That there should be a graduated introduction to physical activity following commencement of basic military training.
- That all training periods be coded by the "traffic light" system. Red activities (PT, drill and exercises) should not be programmed one after another.
- That periods of rest must be programmed to follow arduous physical activity.
- That in view of the effect on the health of those for whom they are responsible, the Chain of Command must drive through organizational measures to reduce the prevalence of smoking in training establishments and elsewhere in the Army. Medical centre staff may support this process through the establishment of smoking cessation clinics, but this matter is primarily one for the employers.
- That smoking should be discouraged through restricting areas where smoking is allowed, that lesson breaks should not be an opportunity to smoke and that instructors should not smoke when with trainees.

### Conclusion

Military training must prepare personnel for the rigours of military operations, but wastage of manpower through unnecessary injury reduces the availability of our main battle-winning asset – the British soldier.

The key messages are:

- The local Chain of Command must take ownership of the problem. This is seen at the highest levels, but it is the establishment of unit Injury Prevention Groups that is key. Medical staff are essential members of such committees, but these must be chaired by an Executive officer (such as the Second in

Command) as it is commanders that will make the changes necessary to reduce injury, as part of the Risk Assessment process.

- Injuries data must be reviewed regularly, and particularly the identification of activities associated with injury, in order to inform remedial action. It is the responsibility of medical staff to ensure that commanders have reliable and up to date information on which to base their risk assessment and preventive action.

Tackling the issue of training injury requires the engagement of all involved in the process; those designing courses and determining the output standards required, and those at the “coal face” providing training, medical or other support directly to the trainees themselves. Medical staff have an important role in advising commanders on the prevention of injuries and the management of those who have become injured, but reducing the incidence and impact of training injuries is primarily a Command responsibility.

### Acknowledgements

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led to the recommendations stated in this paper. The author is particularly grateful for the support of Lt Col Fiona Folkes, SO1 Occupational Medicine HQ ATRA, and the Commandant and staff at RMAS.

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