



IMEG

The Independent Medical Expert Group

Report and recommendations on medical and scientific aspects of the Armed Forces Compensation Scheme

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The Rt Hon Mark Francois
Minister of State for Defence Personnel, Welfare and Veterans
Ministry of Defence
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Dear Minister

During the past year the Armed Forces Compensation Scheme (AFCS) Independent Medical Expert Group (IMEG) has considered a number of topics identified by Lord Boyce's Review of AFCS as requiring further investigation.

These include:

Mental health

Hearing loss

Facial Disfigurement

Recognised Diseases including multiple sclerosis: epilepsy: meningitis and encephalitis and asthma.

Several are complex and we have been greatly helped by having the opportunity to consult with experts in the different fields which we have reviewed as well as representatives of the Veterans' Charities, including the Royal British Legion, Combat Stress, and Action on Hearing Loss. Multiple sclerosis is the most common disabling neurological disorder developing in young adults. We received valuable input from the Chair of Mutual Support, the armed forces multiple sclerosis support charity and our final report was reviewed by Professor David H Miller, Institute of Neurology, Queen Square, an internationally recognised authority on multiple sclerosis. In March 2012 members of IMEG visited Headley Court and benefitted greatly from discussion with wounded serving personnel and staff, notably about facial disfigurement.

IMEG is fortunate to have Brigadier Robin Cordell Headquarters Surgeon General, Head of Policy and Strategy as an observer to provide effective links to the Surgeon General's department and in-service healthcare.

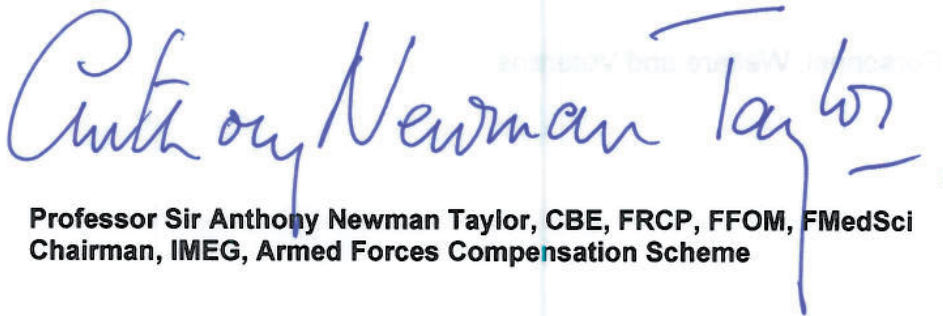
The accompanying report sets out our findings and recommendations and our reasons for making them to you. I presented our findings and recommendations to members of the Central Advisory Committee on Pensions and Compensation on May 1, 2013.

All IMEG members have contributed to the discussions and have agreed the findings and conclusions. These reflect the scientific and medical evidence on the various issues at this date. We believe them to be fair to service personnel and in line with the intentions of the Scheme.

Since our last report Col David Richmond CBE has left the army and we have welcomed Major Steve McCully, RM as a representative on IMEG of AFCS award recipients. Col Robin Vickers, Army Pay Colonel deployed and has been replaced by Colonel Fiona Gardner.

I am most grateful to David Richmond and Robin Vickers for their contributions and wish them well for the future. I would also wish to thank the current members of IMEG and our Secretariat for their unfailing commitment to the work of the Group.

Yours sincerely

A handwritten signature in blue ink that reads "Anthony Newman Taylor". The signature is fluid and cursive, with a horizontal line underlining the name.

Professor Sir Anthony Newman Taylor, CBE, FRCP, FFOM, FMedSci
Chairman, IMEG, Armed Forces Compensation Scheme

Independent Medical Expert Group (IMEG) – List of Members

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Lay Members

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Col Robin Vickers (until December 2010)

Col Fiona Gardner (from March 2011)

Col David Richmond CBE (until May 2012)

Major Steve McCulley (from December 2012)

Secretariat

Manmeet Gill (until August 2012)

Dr Richard Thompson (from August 2012)

Karen Hollingdale

Observer

Brig Robin Cordell MBA, MRCGP, FFOM

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Executive Summary and Recommendations

The recommendations made by IMEG in their first IMEG report (2011) applied exceptionally to claims made from the start of the Armed Forces Compensation Scheme (AFCS). For its first report IMEG therefore focussed on issues requiring legislative amendment in February 2011, leaving other aspects of relevant topics for subsequent reports.

The topics reviewed in more detail in IMEG's second report are hearing loss, mental health symptoms and disorders, facial disfigurement and recognised diseases, specifically asthma, multiple sclerosis, epilepsy, meningitis and encephalitis. Since the first IMEG report (2011) the group has met six times and held additional discussions with subject matter experts and by correspondence.

Topic 1 - Mental health symptoms and disorders

Compensation for mental health symptoms and disorders is a complex topic with different perspectives and the need for wide consultation. The IMEG review involved literature search, discussion with military and civilian experts and with veteran organisations, including Combat Stress.

The areas identified in the Boyce review for particular scrutiny were:

- i) the differences between mental and physical disorder and whether a wholly separate compensation approach was appropriate.
- ii) whether there should be a tailored interim award power for mental health disorders because there can be particular difficulty in determining the prognosis of mental health disorders soon after diagnosis.
- iii) how to address the challenge of establishing attribution confidently and accurately given the multifactorial nature of mental health problems.
- iv) the diagnostic process for mental health problems and basis of diagnosis in the scheme.
- v) how to assess severity of mental health disorders.

In addition IMEG reviewed delayed onset and delayed presentation of disorders, mild traumatic brain injury and alcohol and drug related disability.

On the substantive issues listed above IMEG came to the following conclusions:

- i) While appreciating the reasons for the proposed separation of compensation approaches to mental and physical disorders, IMEG **does not recommend** a separate approach. The major focus of the AFCS is functional compromise for civilian employment, paid as Guaranteed Income Payment (GIP), which is applicable equally to physical and mental health disorders.
- ii) IMEG considered the requirement and options for a dedicated interim award. We concluded that there was no need for a tailored provision for mental health problems because the present interim award system should be sufficient.
- iii) Mental health disorders are subjective and multifactorial with causal factors which are predisposing, precipitating and maintaining. In addition mental health symptoms are part of a continuum and need to be viewed as "more or less" rather than "present or absent" conditions.

These features mean that decisions on attribution can be challenging and should be always accompanied by reasons for the evidence for attribution.

- iv) Although the epidemiological evidence does not support it, there is a considerable risk that mental health symptoms in individual serving personnel or veterans will be labelled as Post Traumatic Stress Disorder (PTSD). Robust accurate diagnosis of mental health symptoms and disorders is important to ensure appropriate treatment. Diagnosis should be based on a recognised classification system, preferably World Health Organisation (WHO) International Classification of Diseases (ICD) 10, with diagnoses made by a clinical psychologist/psychiatrist at consultant grade with trauma and, ideally, military experience.
- v) Given the link in the Scheme between GIP and civilian employability, assessment of severity for AFCS should focus on loss of functional capacity and include information on clinical management and treatment received.

IMEG also reviewed mild traumatic brain injury (mTBI) noting the wide range of neurological severity within the definition. Current research activity, with new imaging tools such as Diffusion Tensor Imaging, by identifying objective evidence of axonal injury in the brain in some cases, is likely to lead in the future to subdivisions of mTBI category of prognostic value. It is **recommended** that IMEG maintains an overview of the topic.

Topic 2 - Hearing Loss

In most military disability schemes hearing loss is the biggest single category of claims and awards. In earlier decades most claims in military schemes related to chronic noise injury. With greater awareness and improved prevention and protection, chronic noise injury was not anticipated to be an issue for AFCS and to date has not been. However recent conflicts have led to hearing loss of sudden onset following acute acoustic trauma and blast damage.

In this review, IMEG considered the clinical features of blast damage, acute acoustic trauma and hearing loss and vertigo due to head injury. This work included literature search, discussion with military and civilian clinical experts and with the ex-service charities and Action on Hearing Loss (AOHL).

Hearing loss due to chronic noise injury from workplace noise typically produces symptoms in middle life after 10 or 15 years exposure. This contrasts with damage caused by acute acoustic trauma or blast damage, where, in the military setting, there is hearing difficulty of immediate onset in a young person with previously good hearing. Of particular concern to IMEG was the further course of hearing loss with age when a young person suffers discrete circumscribed acute noise damage. The international literature was scrutinised for studies on hearing function over the remaining lifetime when a young adult suffers acute discrete noise injury which then ceases. No such study has been reported nor are we aware of any in progress.

Threshold for compensation

The major issue considered by IMEG was the threshold for compensation, currently set at 50dB averaged over 1, 2 and 3 kHz. These criteria are consistent with the threshold for compensation for hearing loss in the War Pensions and Industrial Injuries Schemes. IMEG recognises that this is a high threshold, which in War Pensions and Industrial Injuries Schemes equates to 20% disability. A major focus for AFCS is on the impact of functional compromise for future civilian employability of injury or disease attributable to service. In the context of the threshold for compensation for hearing loss in AFCS, this has therefore been a major consideration.

The evidence at the present time is not sufficient to make a recommendation for change, which would be robust and based on clear scientific evidence. In particular we have been aware of: the extent of variation in audiometric measurements, in good hands, in the same individual (6-11dB); the lack of a direct and consistent relationship between measured audiometric impairment, hearing disability and, of particular importance for AFCS, future civilian employability; the need for AFCS to ensure equity of awards within and across the range of injuries. Taken together these do not justify a recommendation for change in the audiometric threshold at the present time.

Because of the lack of relevant published evidence, essential to allow well informed recommendations about the compensation threshold in this population, we **strongly recommend** that a prospective study be undertaken of in-service cases with hearing threshold shift of 35-50dB averaged over 1, 2 and 3 kHz. This should report within 3 years of publication of IMEG's second report. The study should address the relationship between measured hearing threshold and self-reported hearing disability, military employability grading and restrictions on civilian employability. The need for quality assured audiometry testing and enquiry in relation to the causes and consequence of hearing impairment make it essential the study is undertaken prospectively with the informed consent of the participants.

It is **also recommended** that if the findings of this study provide clear evidence which indicates the need to reduce the level of hearing threshold for compensation that consideration be given to backdating awards to the date of IMEG's second report.

In addition, **we recommend** the compensation threshold should be kept under review with close scrutiny for any pertinent developments.

The evidence to date suggests that the number of individuals whose service related hearing loss falls below the compensation threshold and is confirmed as between 40-50dB averaged over 1, 2 and 3 kHz in each ear is small. **IMEG recommends** NHS supplied digital hearing aids be provided to individuals in this category as clinically appropriate. Because they will in the main be young adults, IMEG **further recommends** that receiver in the canal (RIC) or in-the-ear (ITE) digital aids should be provided whenever possible, as advised by the clinician in charge.

IMEG also considered:

- The relationship of differences between the level of hearing loss leading to reduced military employability grading and AFCS compensation; and
- The most appropriate audiometric frequencies and weightings to assess hearing disability.

IMEG recognises that the criteria for military employability (PULHHEEMS) are not the province of IMEG. Nonetheless we appreciate that, because these are not aligned with the criteria applied in AFCS, there can be perceived injustice where a person in service is downgraded because of hearing loss, but is not eligible for AFCS compensation. IMEG recognises that simplicity, transparency and coherence would greatly benefit if AFCS and PULHHEEMS criteria were aligned. IMEG also recognises that the frequencies used to measure hearing threshold are the subject of some debate, but have found no compelling or scientific evidence to indicate a reason to change from the current 1, 2, 3 kHz. IMEG **recommends** that consideration be given to use of the same audiometric descriptors for medical employability standard and compensation determination.

IMEG recognises that because the criteria for military employability in relation to hearing are based on measured audiometric hearing thresholds, quality-assured audiometry for this purpose and for AFCS are essential. IMEG **recommends** that the same quality assured audiometric data should inform both employability standard and any AFCS claim. Because of the potential implications of the audiometric data for military employment, IMEG **also recommends** routine use of objective testing i.e. Cortical Evoked Response

Audiometry (CERA) or Otoacoustic Emissions (OAE), or both, whenever downgrading to H3 or lower or medical discharge is under consideration and such tests should be undertaken and interpreted by suitably experienced experts.

Topic 3 - Recognised Diseases

A key difference between AFCS and the War Pensions Scheme is that where sporadic disorders have onset in young men and women while in service, the onus and standard of proof in the War Pensions Scheme means that entitlement must be given despite the fact that this does not necessarily reflect medical understanding of the causes of disorders. The evidence based approach of AFCS, where on balance of probability, many disorders cannot be accepted as attributable to service, is seen as a detriment and the matter was raised with Lord Boyce during his review. As a result he charged IMEG with development and maintenance of a list of diseases which typically might have onset during service and for which there might be a recognisable set of service circumstances which make the development likely. In such circumstances the disorder can be “presumed” due to service without detailed consideration of the specific case facts.

Because multiple sclerosis (MS) is the most common disabling neurological disorder arising in young adults, IMEG considered MS, as well as epilepsy and meningitis and encephalitis. The report on MS was further reviewed by Professor David H. Miller, Institute of Neurology, Queen Square who is an internationally recognised authority on MS.

No circumstances were identified where MS could be presumed attributable to service in this scheme. There are situations where meningitis, encephalitis and epilepsy may be accepted as due to service. IMEG also considered asthma and again identified circumstances where it can be considered causally related to service

Topic 4 - Facial disfigurement

Following discussion with patients at Headley Court, IMEG revisited the facial scarring descriptors in the AFCS tariff and **recommended** some revision of those with the most severe cosmetic effects. The suggested increases aim to better reflect the profound stigma, psychological effects and impact on accessing employment even where individuals are well qualified.

In Table 1, Item 4, Level 6 should be increased to Level 5 with GIP maintained at Band B (75%). In Table 2, Item 11 should increase from Level 7 to Level 6 with GIP rising from Band C (50%) to Band B (75%). Similarly Table 2, Items 15 and 30 should attract lump sum awards one level higher; Item 15 moving from Level 8 to Level 7 and Item 30 from Level 11 to Level 10. In both cases, GIP band remains the same. IMEG **recommends** an increase in GIP band for Table 2, Item 11, to bring the deemed impact on civilian employability of this injury into line with the injury described at Table 1, Item 4. Discussion at Headley Court confirmed the enormity of these cosmetically similar injuries and their likely adverse impact on employability, especially getting into employment.

For accuracy and to reflect current UK practice, some revision of the wording of descriptors in the Burns (Table 1) and Injury, wounds and scarring (Table 2) tables is **also recommended**. Table 1 descriptors should be recast using the terms “superficial”, “partial thickness” and “deep/full thickness”. Similarly Table 2 descriptors currently using the form “High velocity gun shot wound, deep shrapnel fragmentation or other penetrating injury etc” which should read “High energy transfer gunshot wound, deeply penetrating missile fragmentation or other penetrating injury (or all or any combination of these) etc” in the appropriate descriptors.

AFCS current approach

Table 1

Item	Level	Description
4	6	Burns, with deep second degree, third degree or full thickness burns to the face or face and neck including one or more of the following: loss of or very severe damage to chin, ear, lip or nose, resulting in or expected to result in residual scarring and poor cosmetic result despite treatment and camouflage.
5	7	Burns, with deep second degree, third degree, or full thickness burns to the face or face and neck resulting in, or expected to result in, residual scarring and poor cosmetic result despite treatment and camouflage.
7	9	Burns, with deep second degree, third degree, or full thickness burns to the face or face and neck resulting in, or expected to result in, residual scarring and satisfactory cosmetic result with camouflage.

Table 2

Item	Level	Description
11	7	Severe facial lacerations including one or more of the following: loss of or very severe damage to chin, ear, lip or nose, which have required, or are expected to require, operative treatment, but with poor cosmetic result despite camouflage.
12	7	High velocity gun shot wound, deep shrapnel fragmentation or other penetrating injury (or all or any combination of these) with clinically significant damage to bone, soft tissue, structures and vascular or neurological structures of the head and neck, torso or limb, with complications, which have required, or are expected to require, operative treatment with residual permanent significant functional limitation or restriction.
15	8	Severe facial lacerations which have required, or are expected to require, operative treatment, but with poor cosmetic result despite camouflage.
30	11	Severe facial scarring which produces a poor cosmetic result despite camouflage.

Recommended changes

Table 1

Item	Level	Description
4	5	Burns, with partial, deep or full thickness burns to the face or face and neck including one or more of the following: loss of or very severe damage to chin, ear, lip or nose, resulting in or expected to result in residual scarring and poor cosmetic result despite treatment and camouflage.
5	7	Burns, with partial, deep or full thickness burns to the face or face and neck resulting in, or expected to result in, residual scarring and poor cosmetic result despite treatment and camouflage.
7	9	Burns, with partial, deep or full thickness burns to the face or face and neck resulting in, or expected to result in, residual scarring and satisfactory cosmetic result with camouflage.

Table 2

Item	Level	Description
11	6	Severe facial lacerations including one or more of the following: loss of or very severe damage to chin, ear, lip or nose, which have required, or are expected to require, operative treatment, but with poor cosmetic result despite camouflage.
12	7	High energy transfer gun shot wound, deeply penetrating missile fragmentation or other penetrating injury (or all or any combination of these) with clinically significant damage to bone, soft tissue structures and vascular or neurological structures of the head and neck, torso or limb, with complications, which have required, or are expected to require, operative treatment with residual permanent significant functional limitation or restriction.
15	7	Severe facial lacerations which have required, or are expected to require, operative treatment, but with poor cosmetic result despite camouflage.
30	10	Severe facial scarring which produces a poor cosmetic result despite camouflage.

Topic 1 – Mental Health

Background to this Report

1. The Boyce Review (1) identified mental health disorders as a topic for early attention by the IMEG. The scope is wide and issues are complex. Because of time constraints, the first IMEG report (2011) focussed on issues for inclusion in new legislation from February 2011. In particular it addressed the impact of attributable mental health disorders on capacity for civilian employability, paid as GIP.
2. Consistent equitable compensation awards for mental health disorders present major challenges. These include the subjective nature of these disorders and their multifactorial origins. Despite the availability of effective therapeutic interventions, perceived stigma can delay access and engagement (2) and, in the military context, there is risk of over diagnosis of PTSD. The UK Armed Forces are a selected population with similar mental health disorders to those in the equivalent civilian population, the exception being low rates in the Armed Forces of severe enduring psychotic illness compared to civilians. Military personnel are at higher risk of traumatic psychological problems due to single events or cumulative experience. As in other countries, because of the “healthy worker effect”, rates of suicide amongst members of the UK armed forces are generally lower than in the general population (3) although a recent study which confirmed this general finding found an increased risk in young men aged less than 20 years (4). There has been little research into suicide risk in those who have left UK military service. One cohort study (5) which linked national databases of discharged personnel and suicide, including undetermined deaths, over the period 1996-2005 found that, compared with the general and serving age-specific populations, the risk of suicide, although no greater than in the general population overall was raised in young males (< 24 years) who had served in the army, had short service and low rank. The group with highest risk also had lowest rates of contact with mental health specialists. Mental health problems linked to family relationship problems, debt, and “stress in the workplace” also occur (6). PTSD as a single diagnosis is uncommon. In about 80% of cases it occurs in association with co-morbid conditions of one or more of anxiety, depression, substance misuse. Alcohol is part of military tradition, playing an important part in bonding and group cohesion but, as in wider UK society, alcohol misuse amongst younger personnel (especially women), is an important issue. Research from King’s Centre for Military Health Research, London has shown that up to age 35 years, alcohol misuse rates, including binge drinking, in both men and women, are about twice as high in military personnel (13%) compared with the wider general UK population. Alcohol misuse may pre-date or accompany other diagnoses including PTSD (7) and mild traumatic brain injury (8). The relation between mental health symptoms and illness and contact with the criminal justice system, including in the military community, is a subject of frequent media and political comment. Research in UK personnel is limited, but a recent data linkage study of personnel deployed to Iraq and Afghanistan described offending during the life time of participants and assessed the risk factors for violent offending. Violent offending was the most prevalent type and was associated with pre military violence and low military rank. Deployment itself was not independently associated with violent offending but being in a combat role, having increased exposure to traumatic events, post deployment alcohol misuse, having PTSD and high levels of self-reported aggressive behaviour were positively associated (9).
3. The distinction of symptoms from a discrete mental health disorder can be difficult. A mental health disorder is characterised by symptoms which cause functional impairment, interfering with family and social relationships, impairing performance at work and often associated with alcohol or drug misuse and which meet formal criteria described in one of the classification systems. Holding a combat role is associated with an increased prevalence of PTSD (10). While following the psychological and physical trauma of warfare many people report symptoms such as distressing memories and nightmares. In the

majority of cases, these do not require treatment and are not, and do not become, a discrete disorder or cause functional impairment.

4. While serving, stigma, concerns about adverse effects on career progression and standing amongst peers, can make military personnel reluctant to seek help, especially for mental health disorders. Further delay can also occur after service, because military personnel may be wary of civilian professionals, considering them too unfamiliar with military experiences to be of help. This delay in presentation is not unique to military populations and should be distinguished from the less common delayed onset of disorders (11). It is to be hoped that recent anti-discrimination campaigns in civilian and military communities will help to address this. In the military context delayed onset of PTSD is an important phenomenon and may represent about 50% of all cases in military personnel (12).
5. Effective evidence-based therapeutic interventions for most common mental health disorders, including PTSD, are now available and identified in the Guidelines produced by the National Institute for Health and Care Excellence (NICE). These can reduce symptoms and improve or restore function, especially if the disorder has not become long-standing. This should be the case for most AFCS claims at this time, as the Scheme is restricted to injuries and disorders due to service on or after 6 April 2005. Since then, both UK military and civilian health policies have prioritised mental health awareness, resilience building, tackling cultural barriers, and encouraging military personnel to access and use mental health services. AFCS provisions should support this. The AFCS applies to both regular and reservist personnel and criteria for attribution and assessment of severity are the same. There is no evidence of an increase in common mental health problems amongst UK regular forces who have deployed to Iraq or Afghanistan as compared with non-deployed personnel. For regulars there is a significant effect of deployment on alcohol misuse and amongst reservists who served in Iraq or Afghanistan there is an increased rate of PTSD symptoms. The presence of PTSD symptoms amongst deployed reservists was 5% which contrasts with the low rate of 1.8% amongst non-deployed reservists (13). Support for and from the family at home is increasingly recognised as an important factor in ensuring the mental well-being of personnel (14).

AFCS current approach

6. As physical injury and disorders nearly always have a psychological impact, awards for all the descriptors across the tariff tables take account of mental health symptoms, where diagnostic criteria for a specific disorder are not wholly met. AFCS stand-alone awards for mental health disorders do not depend on meeting specific diagnoses such that, for example, PTSD is inherently worth neither more nor less than anxiety disorder. Rather, the legislation considers them both as discrete diagnosable disorders leading to varying levels and durations of functional compromise. The legislation also provides that awards are given for diagnoses made by a "relevant accredited medical specialist" who confirms that the criteria for a mental health disorder, included in the ICD 10 or Diagnostic and Statistical Manual (DSM) IV classifications, are met. Values of award depend on the associated severity. This is expressed in terms of "functional limitation and restriction" as defined in the legislation, (Article 5 of the 2011 Order), taking into account the duration of incapacity, actual or anticipated. As the GIP element of the AFCS award addresses limitations in civilian employability, functional limitation and restriction is in the context of civilian employment.
7. Following the first IMEG report (2011) Table 3 now reads:

Mental disorder, which has caused or is expected to cause, functional limitation and restriction at 6 weeks, from which the claimant has made, or is expected to make, a substantial recovery within 26 weeks.

Level 14

Mental disorder, which has caused, or is expected to cause, functional limitation and restriction at 26 weeks, from which the claimant has made, or is expected to make, a substantial recovery within 2 years.	Level 13
Mental disorder, which has caused, or is expected to cause functional limitation and restriction at 2 years, from which the claimant has made, or is expected to make, a substantial recovery within 5 years.	Level 12
Mental disorder, causing functional limitation and restriction, which has continued, or is expected to continue for 5 years.	Level 10
Permanent mental disorder, causing moderate functional limitation and restriction.	Level 8
Permanent mental disorder causing severe functional limitation and restriction.	Level 6

Definitions

- i) “Moderate” means “unable to undertake work appropriate to experience, qualifications and skills at the time of onset of the illness, but able to work regularly in a less demanding job”, and
- ii) “Severe” means “unable to undertake work appropriate to experience, qualifications and skills at the time of onset of the illness and, over time, able to work only in less demanding jobs”.
- iii) “Permanent” is defined in the legislation at Article 5 (7) (a) - Functional limitation or restriction is “permanent” where following appropriate clinical management of recommended duration, an injury has reached steady or stable state at maximum medical improvement; and no further improvement is expected.

Issues for consideration

- 8. The Boyce Review considered mental illness as one of its twelve core issues recommending further work on
 - a) the differences between mental and physical disorders and whether they were such that a wholly separate approach was appropriate. The Review report also invited consideration of
 - b) a tailored interim award power for mental health disorders recognising the difficulty in determining prognosis soon after diagnosis.

In addition, the first IMEG report (2011) identified further topics for this review.

- c) Causation and attribution of mental health disorders. Their multifactorial aetiology makes it a challenge to identify key causal exposures and make confident attributions on the relationship between mental health disorders and military service.
- d) The diagnostic process and basis of diagnosis of mental health disorders in the Scheme. This includes how best to ensure valid and reliable diagnoses and the use of evidence; who should make diagnoses and should self-report be routinely supplemented by additional evidence? An important related aspect is which classification system should be used in the Scheme?
- e) How to assess severity of mental health disorders in terms of functional capacity and duration, maintaining equity for mental health disorders of different severity and in relation to awards for all other types of disorders in the Scheme. Assessment should also avoid perverse incentives and take account of the effective interventions available for common mental health problems.

9. In addition to scrutiny of the scientific literature, written and oral evidence was taken from the Royal British Legion, Combat Stress and Veterans' Aid, from the Defence consultant advisers, and from senior civilian experts working in relevant fields. This was followed by discussion of the topics with IMEG members led by Professor Alexander and the Chairman. The Chairman also met with members of the Medical Advisory Committee (MAC) of the British Members Council of the World Veterans' Federation and later the Medical Advisory Committee Mental Health Sub-group submitted a paper and policy statement in which they supported the points raised by the Royal British Legion and Combat Stress and by the Medical Director of Combat Stress. The charities were invited to raise issues, including areas for improvement in the present arrangements and asked to provide general comment on the adequacy of the Scheme. The serving and civilian experts were asked to specifically comment on the issues listed at (a) – (e) above.

a) Differences between mental and physical disorders and separate approaches

10. In their written evidence, the Royal British Legion and Combat Stress considered that the differences between physical and mental health disorders are such that there should be a separate chapter or section of the Scheme with different approaches for mental health claims. The expert witnesses were on the whole less supportive of this approach. The Legion and Combat Stress proposed some change to AFCS nomenclature and tariff table headings to make them less stigmatising, more acceptable to military personnel and veterans, e.g. Table 3 heading "Mental Disorders" should, they felt, be replaced by "Psychological Injury". They also presented a selection of published evidence on the poor employability prospects associated with mental health problems. They proposed that there should be scope for mental health awards to have variable GIPs reflecting individual circumstances and not tied to the basic award tariff level as is the case presently.

Comment

11. The War Pensions Scheme has always made awards for physical and mental disablement on the same basis and uses the same framework of assessment and award for both. This principle has not been controversial and from the outset the AFCS took a similar approach. Both in wider society, and in the armed forces community, efforts to challenge the stigma of mental health problems and encourage people to seek help early, have often stressed the similarities between mental and physical disorders. This includes the fact that, in most cases of mental health problems due to military service, effective treatment should be the norm. In a scheme covering both physical and mental health disorders, where both types of disorder often co-exist, administrative separation could also risk inequity and undermine consistent decisions and awards. The AFCS descriptor structure acknowledges that all personal injury or illness has an emotional dimension with psychological symptoms recognised in all descriptors. It provides for a separate award if a related discrete diagnosable disorder arises, either at, or around, the time of the physical injury or later. The Scheme focuses on, and pays the highest awards for, those most seriously physically injured and disabled due to service, and current evidence is that this group is especially at risk of associated mental health problems. The Scheme must then be able to provide transparently, combined awards applicable to both physical and mental health disorders. This is most readily achieved by a unified system.
12. In terms of the proposed changes to nomenclature and tariff table headings IMEG recognises the need for the client group to be comfortable with, and have confidence in, the Scheme. However, traumatic psychological events or exposures are not the only or the most common background to attributable mental health symptoms and illness in military personnel; the proposed change in nomenclature might therefore disadvantage some personnel. Such a move would be inconsistent with wider community arrangements and could unintentionally undermine ongoing work on stigma.

13. It was suggested, a point endorsed in the MAC submission, that IMEG consider the decoupling of lump sum awards and GIP, according to individual case facts. As a public no fault, relatively high volume scheme, a key aim in AFCS is to provide equitable decisions and support a model of disability, which avoids perverse incentives and enables individuals to move on with their lives. In our society, that includes, wherever possible, support into paid work. That aim is best met, is most transparent and is easiest to understand, where there is a single rules-based assessment system applicable to all disorders and injuries. This is also administratively most convenient and simple. Most claimants in the Scheme are young, and with evidence confirming expected recovery given appropriate clinical intervention, it would be unhelpful to the great majority of claimants to suggest anything other than an anticipated good outcome with return to normal life. This view was supported by the civilian and military experts consulted. AFCS applies only to service related injury caused on or after 6 April 2005. From the beginning of AFCS, the approach of the military community and wider society has been to prevent disorders becoming chronic and resistant to effective interventions. The hope and increasing reality is that for most service-attributable mental health disorders, function can be improved. To move to decoupling lump sum and GIP could act as a disincentive to engage with treatment and rehabilitation. As set out in the legislation (Article 5 of the 2011 Order), AFCS descriptors and awards aim to reflect the state of maximum medical improvement reached following the provision of best practice treatment. For the less common cases which, over time, fail to improve, the revised tariff (May 2011) is appropriate. IMEG received evidence from the Legion and Combat Stress on the negative impact of mental health problems on employability, and in the current tariff the more disabling disorders are paid a lump sum and GIP, reflecting the impact on civilian employability. The published evidence confirms that employment difficulties are a particular issue with severe enduring psychotic illness which is uncommon in the military population and unlikely, on the balance of probabilities, to be accepted as attributable to service. A fundamental principle of the AFCS is to consider the impact of the attributable injury or disorder on function in the context of paid civilian employment. The first IMEG report (2011) specifically looked at the impact of mental health problems on capacity for work and recommended that for the most severe mental health problems, GIP of 75% was appropriate. It was also suggested in evidence that employers might be given financial incentives to employ people with mental health difficulties. This is not a matter for IMEG, and itself raises potential stigma and discrimination issues. IMEG considers topics and issues from many perspectives but its recommendations to minister must be based on available peer-reviewed evidence.

Recommendation

14. Whilst appreciating the reasons for the proposal, IMEG considers that the Scheme should not develop a separate approach or chapter applicable to claims for mental health disorders or change the current nomenclature and tariff headings. The focus of AFCS is on functional compromise for civilian employment, paid as GIP. This applies equally to physical and mental attributable injury and disorder. There are differences between physical and mental health disorders: diagnosis of physical disorders is more objective, and adjudication guidance should be produced for Scheme administrators and medical advisers, stressing differences relevant to compensation determination. **IMEG recommends** that the present structure and direct relation between lump sum tariff awards and GIP for all injuries and disorders should be maintained and its application to mental health disorders monitored.

b) Specific interim award provision for mental health disorders

Comment

15. AFCS legislation provides that reference to duration of effects in a mental health descriptor means from the date the claimant first sought medical advice for the disorder. Recognising that it can be difficult to estimate prognosis soon after diagnosis of a mental health problem, the Boyce Review

raised the possibility of a specific AFCS mental health interim award. Many AFCS claims for mental health disorders are made before an adequate course of best practice treatment has been delivered. Expert opinion indicates that it is reasonable to assume that maximum medical improvement for the types of common mental health disorder likely to be accepted in the Scheme will be achieved after at most 18 months of evidence-based treatment delivered in sessions of appropriate duration and frequency. Article 52 of the 2011 Order of the Scheme includes a general provision for an interim award for a period of effect, specified in the individual award notification. Interim awards are used where prognosis is difficult to determine. The initial interim award period must be a maximum of two years from the date on which an initial award was made. An award will normally be made final by that date. In exceptional cases, if the prognosis remains uncertain at the end of the initial two year period, the interim award can be further extended for a total of four years from the date of the first interim award. It is expected that use of this further extension will be rare. The time intervals were chosen as consistent with clinical progress for most physical and mental health disorders, subject to best practice treatment, in the general population. In most cases at two years, prognosis can reasonably be predicted even if not actually reached in every case. Interim awards carry no appeal rights, so Article 52 time limits aim also to produce justice and fairness for claimants. In order that the provision should not act as a disincentive for claimants to engage with treatment, believing that, if they were improved at the end of treatment, they might be due a lower award, the legislation provides that where the final decision is to award a higher value tariff than was originally the case, the difference between the amounts paid as interim and final awards, is due. Where the final decision is that a lower value tariff is appropriate, then no additional award is paid, but no money is recoverable from the interim award.

Recommendation

16. There is no need for the Scheme to introduce a tailored interim award provision for mental health disorders where, at the outset, outcome is uncertain. The use of the Scheme's existing interim award provision should be sufficient. The provision also includes protection for the initial interim award where treatment leads to improved function. For most cases claiming under AFCS where discrete diagnoses, including PTSD, are made, the expectation should be of evidence-based treatment restoring useful function. As for all other injuries and disorders in the Scheme, awards should take into account the phasic nature of some disorders and maximum medical improvement.

c) Attribution

Comment

17. As with most occupational personal injury schemes and civil damages, awards under the AFCS depend on establishing a causal link between the claimed injury/disorder and some aspect of service. The AFCS is an individual jurisdiction with awards paid where attribution to service on or after 6 April 2005 can be established, on the balance of probabilities. To do this requires collection and analysis of evidence on the case facts, service and medical, knowledge of contemporary medical understanding of the causes of the disorder and, finally, a judgement as to whether in the particular case, service factors, events, exposures or circumstances are more likely than not to have caused the disorder to develop or worsen. The MAC mental health submission raises the issue of judgements by lay assessors. Decisions in the AFCS are made by lay staff. That is also true of the War Pensions Scheme. However for War Pensions, the law provides that administrative staff act on certificates on attribution and assessment from the Scheme medical advisers. For AFCS, administrators have the option to seek medical advice in any case. Following the Boyce review, as Departmental policy, there are a number of situations where to ensure robust defensible decisions, advice on the collection and interpretation of evidence is routinely obtained from the Scheme medical advisers. Scheme medical advisers are appointed following a successful career in a clinical or other relevant medical speciality and undertake further

training in medico-legal determination, the Scheme legislation and Departmental policy. It is of note that while sharing the underlying need to establish a causal link to service, decisions in US Department of Veterans' Affairs (DVA) disability benefits are not informed by medical advice to the decision-maker, and for direct service connection disability benefits to be paid, the following applies:

"To establish a scientifically robust causal connection between a physical or mental health disorder and alleged environmental or occupational exposure requires four main types of evidence.

- Evidence of a generally accepted scientific association i.e. the exposure involved is generally accepted as associated with the claimed illness or injury.
- In an armed forces context the relevant exposure/circumstance should be during and due to military service.
- The illness or injury must have had its onset or worsening after the relevant exposure or event.
- To show that the service exposure was at least as likely as not to have been the specific cause there should be evidence that the service related exposure was high or prolonged compared to other possible causes" (15).

18. Attribution, and application of such a template, is probably the most difficult single aspect of the determination of AFCS compensation for mental health disorders. Problems arise because of the very nature of mental health symptoms and illness. Major challenges include the reliance on self-report and lack of objectively verifiable features. In contrast to physical injury and disorders, their disabling effects tend to permeate many aspects of a person's identity, behaviour and attitudes. Emotional symptoms occur in normal people and cover a wide continuum, ranging from normal reactions to pathological states. This means that diagnosable mental health disorders are rarely categorical e.g. compared to many physical disorders where a peptic ulcer or cancer is either present or absent. Making a firm diagnosis must take account of personality traits, the phasic nature of symptoms and the person's normal state. Diagnosable mental health problems should be thought of not as "all or none" but as "more or less" disorders.
19. In addition, mental health disorders are always multifactorial, shaped by a person's constitution, early life, family values and experiences, intelligence, education, as well as the wider societal and cultural factors. The evidence is that for most people who serve, including those from challenging backgrounds, being in the military has a positive effect on their life trajectory. There are risks associated with the recent and current focus on mental health symptoms and illness especially in the military compensation and treatment context. War changes people, just as does any major life experience (16). For most people, combat is distressing, especially in the short term, but adverse reactions, including distress, naturally reduce over time. There is also evidence, including in the context of the recent and current conflicts, that, despite their pain and suffering, many individuals come through traumatic events the stronger (17) with co-existing positive and negative consequences.
20. Not everyone who goes to war becomes ill and there is no evidence that any specific stressful event or situation is sufficient in itself to produce any identifiable post traumatic mental health disorder. Factors classified as pre-disposing, precipitating and maintaining have been identified which contribute to the likelihood of an individual developing or continuing to suffer a mental health disorder post-trauma (18). We note the novel suggestion of the MAC Mental Health Sub-group that, in light of the multifactorial nature of mental health diagnoses, for attribution and award, a formula might be devised. The relative weights of the various factors has not been fully explored in the published peer-reviewed literature and such an approach is likely to be complex and at least initially, controversial. None of these factors has a strong predictive power (18). The Scheme takes the view, as do the civil

courts, that while a pre-disposition e.g. dysfunctional childhood or schooling may increase the risk of developing a discrete disorder post-trauma, unless the diagnosis were made in childhood, rejection of a claimed disorder as unrelated to service because it had pre-service origins is rarely appropriate. In general, while accepting that mental health disorders are always multifactorial if, on the balance of probabilities, service is the predominant cause of an injury, the claim is for acceptance. Where a disorder is not attributable to service, but certain criteria are met, worsening by service will be considered.

d) Robust accurate diagnosis

Comment

- 21.** If attribution of disorders is to be decided accurately the disorder must be present and correctly diagnosed. The experts consulted agree that reliability of certain psychiatric diagnoses (especially non-psychotic ones) can be poor. This is partly attributable to such factors as the experience and background of the clinicians, which classification system is used, the phasic nature of most psychological symptoms and the quality of psychometric measures. There are challenges in diagnosis of mental health problems, with much scope for different diagnoses on the same facts and, in military personnel, over the diagnosis of PTSD. While the AFCS tariff descriptors do not depend on specific diagnoses but duration and severity of functional compromise, diagnostic uncertainty or inaccuracy can lead to inappropriate or ineffectual treatment, and undermine AFCS equity and consistency. To improve diagnostic accuracy, three particular issues were explored:
 - a)** What evidence should be relied upon to make diagnoses? Psychiatric non-organic diagnoses rarely have objectively verifiable correlates and are heavily dependent on self-report of symptoms. For AFCS claims, questions that arise include, is the claimant's recollection or perspective, sufficient, or should confirmatory evidence be obtained routinely? If so, how and from whom?
 - b)** Should there be an AFCS mandatory diagnostic classification? There are two international classification systems, ICD 10 and DSM 1V (19)(20). These list different disorders and, in some cases, have different diagnostic criteria for the same condition. New editions of both ICD and DSM classifications are in preparation with publication of DSM V expected by mid 2013. DSM IV was published in 1994 and preparation of a new edition of the classification, reflecting research and clinical developments, has been a major task over the last five years. While there will be no overall increase in numbers of disorders, DSM V is likely to group disorders differently and may recognise different diagnostic criteria .e.g. for PTSD. Work on ICD 11 is less advanced and no publication date has yet been set. In UK clinical practice, ICD 10 is more usual, while in other countries, especially the USA and for research, DSM is the norm. In UK military practice there is currently no mandatory classification; accredited clinicians use both systems.
 - c)** Who should make the diagnosis? Should they belong to a particular profession and have specified expertise and experience, including knowledge of military life?
- 22.** In terms of evidence to inform claims determination and the role of self-report, the experts confirmed that some patients, both civilian and military, under-report while others may exaggerate or occasionally feign symptoms and effects. There is always opportunity for innocent misinterpretation and misattribution of symptoms to events and circumstances; because symptoms follow an event, they are attributed to it. Client permission to access clinical records and reports from clinicians is obtained as part of the AFCS claims process and decisions in the Scheme are firmly based on the case medical and service facts, contemporary medical understanding of the causes of disorders and the relevant law. The most robust case formulations in AFCS will be multidisciplinary and multidimensional informed by documented information from military and medical records as well as by partners and

families. It is vital to have a full clinical, social, occupational and family history, covering personal habits, consumption of alcohol etc using a through life approach. This will identify pre-service discrete problems as well as predisposing, precipitating and maintaining factors. Corroborative evidence on events, circumstances or changes in behaviour and their time course from partners, family and work colleagues may be useful but in the AFCS context can be administratively complex and raises confidentiality issues. Service medical and personnel records as well as documentation of claimed service theatres, accidents, incidents and exposures should be consulted.

Recommendation

23. Self-report will continue to be the mainstay of clinical history in the Scheme As recommended best practice, examinations should routinely include family history and adopt a through life approach to clinical and social history, starting with childhood, recognising the possibility of under-reporting and elaboration. Clinicians providing expert opinion should routinely have access to service medical and personnel records and to documented exposures, accidents etc. Advice from significant others can be helpful in certain situations but issues of confidentiality mean that this approach **cannot be recommended** as mandatory or routine.

Should there be an AFCS mandatory diagnostic classification?

24. Turning to the different classifications and disorder criteria, one option would be for the scheme to mandate diagnoses based on one or other classification system. In UK routine NHS clinical practice, ICD 10 is the required classification, while international research and clinical practice in the USA favours the DSM which requires a more specific symptom profile to be met. For the military no fault compensation schemes, clinical case notes and case formulation, presented by claimants, use both systems and so to require ICD diagnoses for AFCS, certainly in the short term, is likely to require many more expert reports specifically for compensation purposes. This is administratively complex, delays decisions and increases costs as well as causing inconvenience and potential distress for claimants.

Recommendation

25. Because of these uncertainties, adoption of ICD as standard for the Scheme **cannot be recommended** at this time. Some clinicians already provide ICD based opinions, and we would encourage a continuing move in that direction so that within five years time that practice will become universal. It is **recommended** that a short guide for decision makers and Agency medical advisers is produced setting out, the major differences between the two classifications.

Who should make the diagnosis?

26. With the exception of PTSD, (where the aetiology is embedded in the diagnostic criteria), and Adjustment Disorder, accurate attribution for mental health disorders depends first on sound diagnoses. Many AFCS claims are made in service where, as in the NHS, a multi-disciplinary approach to mental health care and support is used. In terms of who should make diagnoses for AFCS, reports should be from a consultant psychiatrist or consultant clinical psychologist. Treating clinicians should provide factual clinical evidence with identification of all causal factors rather than an opinion on attribution. It is the role of SPVA staffs (administrative and medical) to collect and analyse evidence and decide on attribution. It was suggested in evidence by some of the experts that where lower value awards are being considered, other health professionals, including senior nurse practitioners might be appropriate. This proposal was rejected by IMEG as, in the AFCS context, experience and consistency in approaches to diagnosis and assessment are required. Whether or not advice on

diagnoses and clinical course should be restricted to clinicians of consultant grade with military or trauma experience was debated. While some veterans reject civilian health professionals, others are equally anxious to cast off all military connection. As resources allow, there perhaps should be a degree of client choice. In earlier generations the links between civilian health professionals and the military were much stronger. Until the end of National Service in 1960, most GPs would have themselves served, or at least, had close contact with the military through family members. During the last few years, efforts to address this have begun with explicit reference to services for veterans in the NHS Operating Frameworks and in cross-government strategies such as on suicide prevention (21). Health and social care issues are the responsibility of the devolved administrations and suicide strategies have now been established throughout the UK with strong links and a co-ordinated approach nationwide. Although the evidence is that suicide rates are raised in young veterans with short service and discharged from the army, ex-military personnel are not a key high risk group for suicide. They merit a tailored approach to suicide prevention because of the tendency to delay help seeking. The current military and NHS activity in relation to the Murrison recommendations (22) and implementation of the Military Covenant (23) includes an e-learning package on Veterans' health sponsored by the Royal College of General Practitioners, and a continuing professional development package on military and veterans' mental health was recently launched by the Royal College of Psychiatrists. The NHS England Armed Forces Networks and equivalents in the devolved administrations provide routine contact and exchange of views and experiences across the military and civilian communities and regionally based multi-professional Veterans' Mental Health Networks are being set up around the UK. Major aims, in addition to provision of best practice, culturally sensitive and holistic veterans' services include effective partnership working with other public, private and charitable support agencies, avoidance of duplication, awareness raising, and education for civilian primary care health and other support staffs. The recent community based veterans' mental health pilots (24) had variously a lead therapist with military or civilian background. It became clear from the pilots early on that the key issue for clients was less that treating clinicians should have direct military experience, but more that they should have empathy, interest and willingness to learn and respect military life and its challenges.

27. Looking to the future there was general agreement about possible establishment of a national panel of clinical experts to provide robust diagnosis and assessment of mental health disorders for compensation. While at present, many claimants are still serving and in contact with Defence healthcare services, in the longer term, as more AFCS claims are made post-service, such a group may be particularly useful. This pattern means that, with consent, service clinical records are available to inform compensation decisions. Evidence generated over time in a clinical setting, providing information on clinical pattern and effects on function, rather than one-off examination specifically for compensation is especially helpful in reaching accurate, reliable, full and final decisions.

Recommendation

28. It is **recommended** that claim determinations should be informed by evidence-based opinion from established specialist clinicians, clinical psychologists or psychiatrists at consultant grade, with experience of trauma-related problems and ideally management of military cases. Civilian experts with appropriate expertise must be aware and respectful of military culture, values, needs and lifestyle. At present most claimants are still serving and under the care of Defence Medical Services. In time, and as the proportion of post-service claims increases, the feasibility of setting up a regionally based national panel of clinical experts, civilian and military, to provide accurate diagnoses and assessment for the Scheme, should be explored. Where a special examination is required, consideration should be given to introducing client choice in terms of consultant background. In addition to a medico-legal function, such a group with national status but based throughout the UK, could play a major role in health professional education.

e) Assessment

29. Compensation decisions in AFCS should provide consistent and equitable awards both within the tariff award tables and category of injury, and across the range of injuries and illnesses, and should reflect the principle that the more severe the disorder, the higher the award. There is no international consensus on the most effective method of assessment of severity for non-psychotic mental health problems, either in clinical terms or therapeutic outcomes or determination of compensation.

Recommendation

30. To support consistent equitable awards, an assessment protocol for mental health problems should be drawn up. As discussed in the Boyce Review report, in the longer term the protocol might also be applicable in other circumstances, such as for social security benefit determination. The resultant single multipurpose report would be less disruptive to claimants as well as being more consistent, efficient and cost effective. To produce a robust instrument will require considerable investment of time, effort and expertise and input from a range of experts and stakeholders. Assessment of severity of mental health disorders for AFCS should focus on function, as reported by the claimant and ideally confirmed by other evidence. For a full and final award the aim is to take account of the disabling effects of the accepted injury or disorder and the occurrence of any co-morbid or secondary disorder. It also assumes access to appropriate clinical management over a life time. Importantly for attributable disorders, assessment should aim to reflect the phasic nature of the disorder as opposed to a snap-shot at a particular time. In addition to the measures discussed above in relation to more valid and reliable diagnoses, and confirmation of claimant evidence, the following are **recommended**:
- i) AFCS case assessment for mental health disorders should routinely include information on clinical management and treatment received. This might involve completion of a simple form by the treating clinician, covering the dates, nature and duration of treatment received and outcome, and the experience and expertise of the clinician.
 - ii) Consideration should be given to the use of a limited battery of standardized psychometric measures of functional capacity particularly to judge progress over time. There are a large number of available tests but those selected should be standardised, valid and reliable.

Other Issues

A. Delayed onset and delayed presentation

31. The AFCS has normal time limits for claiming. Mental health problems in veterans, particularly in earlier years, may be first diagnosed some time after service termination. While this pattern may still prevail, for the future, awareness raising and campaigns to reduce stigma will hopefully reduce delay in seeking help amongst AFCS clients. There is a special AFCS provision for physical and mental health disorders with delayed onset or, more commonly, delayed presentation.

Article 3(b) and (c) of the 2011 Order provides that the definition of "late onset illness" includes:

- a) a mental health disorder which is capable of being caused by an incident occurring seven or more years before the onset of the illness; or
- b) a mental health disorder capable of being caused by an incident occurring less than seven years before the date of onset of the illness, which disorder is capable of causing the person suffering from it to be unable to seek medical help for the disorder within seven years of the date of onset of the illness. The legislation also provides that claims for injury benefit for late onset

illness should be made within three years of the day the late onset illness was first diagnosed. In such cases, at present, diagnosis of a mental health disorder should be by a relevant accredited medical specialist.

B. Mild traumatic brain injury (mTBI)

- 32.** To make a diagnosis of concussion or mTBI Headquarters Surgeon General uses a definition similar to that recommended by WHO and the US military. All three of the following criteria must be met:
- a)** a history of related head injury or involvement in a blast
 - b)** a Glasgow Coma Score (GCS) no lower than 13 at 30 minutes post – injury. The totally responsive patient scores 15/15. The GCS is an internationally accepted grading scale to assess the level of consciousness. It records the patient’s response to graded stimuli of eye opening, motor response and verbal response: all four limbs are observed for responses to pain (25).
 - c)** One or more of the following:
 - i) Alteration of consciousness (AOC)/mental state – this may present as a variety of transient physical, cognitive or emotional symptoms. Commonly this will include confusion, disorientation, feeling or looking dazed and difficulty concentrating.
 - ii) Loss of consciousness (LOC) – for no more than 30 minutes duration post-injury.
 - iii) Post traumatic amnesia (PTA) - for no more than 24 hours duration post-injury.
 - iv) Transient neurological abnormalities – such as focal signs or seizures. For a diagnosis of concussion or mTBI, symptoms must be specifically related to a precipitating event which involves physical or blast trauma to the head and not to drugs, alcohol, medications, other illness or injury, psychological trauma or language difficulties.
- 33.** Blast injury, including that to the head, has been common in the recent conflicts. Moderate and severe brain injury are clinically recognisable and absolute numbers are small. However, there are a larger number of personnel who, often, together with injury to other body parts, report closed head injury or meet the definition of concussion or mTBI. While rates of moderate and severe traumatic brain injury are comparable in US and UK troops, rates of concussion or mild brain injury, often first diagnosed at an interval from combat are much higher in US troops (26)(27). ICD 10 post concussive symptoms include headache, impaired memory, balance and concentration, tinnitus, sensitivity to light or sound and irritability, reduced tolerance to stress and alcohol, and insomnia. Soldiers experiencing post concussive symptoms also report poorer general health e.g. fatigue, being unable to work, and increased rates of psychological problems e.g. depression (28).
- 34.** The 2004 WHO meta-analysis on outcomes of mTBI in civilians, where blast injury was not an issue, indicated good outcomes and return to function in the great majority of cases (29). This report together with observations in military populations suggest that concussion/mTBI represents a continuum of damage, with most cases resolving fully within weeks or at most three months post-incident and a smaller sub-set having a poorer prognosis, with symptoms continuing a year or more after the incident. Present evidence would continue to support holistic multidisciplinary treatment and an optimistic encouraging approach to this type of injury. However more recent neuro-imaging techniques notably Diffusion Tensor Imaging has detected in some cases of mild TBI, diffuse axonal injury (30). Even more recently, using this technique, a sub-group of mTBI patients with cognitive impairment was associated with evidence of axonal injury (31). This developing body of evidence from new neuro-imaging techniques offers the potential for early detection, characterisation and ultimately, perhaps, directing treatment of potentially more serious concussive injuries. Given the nature of the recent and current conflicts and the importance of blast incident and injury, this is a topic which in

both operational capability and compensation terms may warrant future more detailed consideration by IMEG.

35. The clinical features currently accepted as comprising 'Mild Traumatic Brain Injury' (mTBI), cover a wide range of clinical neurological severity. It is therefore not surprising that, within this definition, there is considerable clinical heterogeneity. Thus, there are individuals at the milder end who recover rapidly and fully, while at the other end of the range, there are individuals with persistent symptoms, and evidence of axonal injury demonstrable on brain Magnetic Resonance Imaging (MRI), together with lasting objective neuropsychological sequelae. Further research is likely to add to the findings briefly referred to above. It is possible that in due course, the broad clinical category currently referred to as mTBI will be subdivided using a combination of clinical features (including neuropsychological testing) and MRI appearances.

C. Alcohol and drug related disability

36. Alcohol and drug-related disorders are commonly present, in civilian and military populations, together with other recognised mental health disorders. Research to date on causation and attribution of alcohol use disorders including their relation to trauma and contribution to other disorders is incomplete. Alcohol-related disablement has been claimed under the War Pension Scheme for many years. War Pensions policy, supported by High court case law, has been to consider health problems (physical and mental) arising from alcohol use and misuse as fundamentally arising from a "matter of personal choice" and, as such, not compensable. In 1994 the War Pensions Scheme was amended to enshrine that policy in the law. This now excludes disablement due to injury due to the consumption of alcohol except in the very narrow circumstance where there is an accepted mental health disablement assessed at 50% or more and which has caused the pensioner to start or continue to use alcohol. This provision, now recognised as generous, was intended to cover the rare circumstance where in a conscript service a person at high risk of psychotic illness might be enlisted and become ill while serving. The AFCS has a similar provision excluding benefit for injury or worsening of an injury caused wholly or predominantly by the consumption of alcohol. Given recent and current in service health promotion, healthy life-styles and education on substance misuse as an antidote to emotional symptoms, in the case of AFCS, the exclusion is total.

D. Manual for clinicians: providing evidence in the scheme

37. Finally we **recommend** production of validated manual/guidance for clinicians providing evidence on mental health disorders in the Scheme. This would cover general aspects and challenges of mental health disorders and their attribution – diagnostic pitfalls - PTSD – through life history – at risk vulnerability, predisposing precipitating and maintaining factors - corroborative evidence – how to detect under-reporting or elaboration - how to assess severity - focus on function - best practice treatment – psychometric outcome measures.

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Topic 2 – Hearing Loss

1. Hearing loss, more correctly permanent hearing threshold shift, caused by exposure to noise is a well recognised hazard in military and civilian life. Noise induced hearing loss due to many sources of occupational noise exposure, such as work in the mining industry, a textile mill or a foundry, is a prescribed disease in the Industrial Injuries Scheme.
2. In general, hearing loss in these circumstances is due to continuous hazardous noise exposure at work experienced over many years. This causes hearing loss, which increases slowly over time, with disabling hearing loss developing in middle or late middle life. Hazardous noise can be considered to produce a hearing loss earlier than would be expected as a consequence of the normal ageing of the auditory system. In later life (late 70s, 80s) the average difference between those who have, and those who have not, experienced noise exposure during working life is small.
3. The most commonly used test of hearing relies on threshold assessments of air conducted pure tones by means of manual or automated audiometry. Subjects listen in a sound proof/attenuated booth to pure tones at different frequencies from 0.5 kHz to 8 kHz and register when these are heard. The effect of hearing impairment is to increase the threshold at which these tones are heard. While the sense of hearing is multifaceted, in general, the most disabling effect of hearing loss is loss of speech sensitivity or discrimination, initially perceived in a noisy background. It is commonly considered that this disability correlates best with increased audiometric hearing thresholds at low and mid frequencies, i.e. up to 3 kHz and less so with threshold levels at the higher frequencies of 4 - 6 kHz, which are often impacted by impulse noise. There is no international agreement as to the best method to quantify auditory disability, nor the frequencies used in disability assessment, but in the UK courts and no fault compensation schemes, this is expressed as an average of audiometric thresholds measured at 1, 2 and 3 kHz. The audiometric frequencies affected by noise depend on the spectrum of the noise exposure. Broad band noise exposure typically first causes an isolated dip or notch centred at or around 4 kHz, above the primary speech discrimination frequencies. The functional impact of increased threshold at the higher frequencies of 4 kHz and above is incompletely understood. If hearing recovers to pre-exposure level, the shift in hearing threshold is described as temporary, i.e. temporary threshold shift. If hearing loss persists 20 to 30 days after removal from the noise, it is considered to be permanent - permanent threshold shift. The presence of temporary threshold shift does not accurately predict permanent threshold shift. In susceptible individuals, continued exposure to hazardous noise for up to thirty years results in an increasing permanent, high frequency loss, which gradually spreads to involve the lower frequencies of 3, 2 and 1 kHz, the primary speech discrimination frequencies, in that order and in the highest measured frequencies of 6 and 8 kHz (1).
4. The AFCS applies to injury and illness caused by service on or after 6 April 2005. With emphasis on noise reduction, hearing loss prevention and noise protection measures, sensorineural hearing loss due to chronic workplace noise injury, which was previously common in relation to military workshops, transport depots and aircraft noise, should now be uncommon and claims for hearing loss due to chronic noise unusual in this scheme. Recent operations have however, led to claims for hearing loss due to weapons related impulse noise or blast damage.

Hearing loss due to impulse noise

5. Impulse noise and blast damage produce pathological changes distinct from those of chronic noise injury. Any associated permanent hearing threshold shift occurs acutely over a short period, not over many years, usually impacts higher frequencies and affects a younger population. The audiometric pattern due to acute acoustic trauma can be variable; while gunfire produces a 3 or 4 kHz higher

frequency audiometric notch, blast injury does not typically lead to this audiometric configuration. High frequency audiometric notches at 6 kHz have previously been reported to be an artefact and related to the type of ear-phone used (2). Most studies of gunshot and blast acoustic injury emphasise the preponderance of high frequency loss, while low frequency and flat hearing losses across the frequency range have been considerably less frequently reported. In a recent Finnish recruit study (3), acute acoustic trauma was associated most commonly with changes in the frequencies above 2 kHz. The seminal report of Kerr and Byrne (1975) on blast injuries in a confined area reported that 6% of affected ears (n=80+) had hearing loss of at least 40dB averaged over the speech frequencies (4).

6. Initially, acute acoustic trauma and blast, like chronic noise exposure, may cause a temporary threshold shift. At lower frequencies this may recover well with time, especially if due to gunfire, while loss at the higher frequencies, may persist, although more frequently recovers. In one series of military recruits who had suffered acute acoustic trauma, the average number of affected audiometric frequencies was five, with permanent threshold shift at any frequency, typically 20dB worse than the initial pre-exposure screening level (5). Often only one ear is affected in acoustic trauma and tinnitus is common immediately after the trauma. When people suffer acute acoustic trauma and are then removed from noise, any associated hearing loss, at one year after initial exposure, can be regarded as permanent (6).
7. Blast trauma may occur in an open or enclosed space, when pressure may be amplified. It results from a single stimulus and, for the first five or ten minutes, there may be severe deafness with all audiometric frequencies affected, although permanent sensorineural hearing loss is more common in the higher frequencies. Tinnitus is almost always present, but usually resolves in parallel with hearing improvement. Tympanic membrane rupture and middle ear damage may occur. If there is rupture of the oval or round window, labyrinthine failure with profound balance problems will result. In this situation vestibular failure and hearing loss will be permanent but, as a consequence of cerebral compensation, symptoms of vertigo will improve over time. If the blast injury is associated with head trauma, labyrinthine concussion or temporal bone fracture may compound any noise trauma and the patient presents with both auditory and vestibular symptoms, ranging from auditory and vestibular failure to benign paroxysmal positional vertigo. In the Kerr and Byrne study (4) of blast in the enclosed space of a restaurant, the perforated tympanic membranes healed spontaneously, in more than 80% of cases. Almost all those present experienced some sensorineural hearing loss, at least initially, with many recovering rapidly to normal hearing within a few hours. One year after the explosion about 30% had high frequency loss of, on average, greater than 30dB at 4 and 8 kHz in one or both ears. While some had some tinnitus most were not aware of any hearing problem. About 10% had loss which affected both high and speech frequencies but in some, only one ear was affected and they were asymptomatic. 6% had a loss of 40dB averaged over the speech frequencies in both ears and reported a hearing problem.
8. In addition to scrutiny of the international scientific literature, for the review of hearing loss, IMEG took oral and written evidence from the Royal British Legion and Action on Hearing Loss and from acknowledged UK experts in academic, civilian and military practice. The Chairman also met with the Medical Advisory Committee of the British Members' Council of the World Veterans' Federation (MAC) and the MAC Hearing Loss Sub-Group subsequently submitted its Policy Statement.

AFCS current approach

Total deafness in both ears.	Level 2
Blast injury to ears or acute acoustic trauma due to impulse noise with permanent bilateral sensorineural hearing loss of over 75dB averaged over 1, 2 and 3 kHz.	Level 5
Bilateral permanent hearing loss of more than 75dB averaged over 1, 2 and 3 kHz.	Level 6
Blast injury to ears or acute acoustic trauma due to impulse noise with bilateral permanent sensorineural hearing loss of 50-75dB averaged over 1, 2 and 3 kHz in one ear and more than 75dB averaged over 1, 2 and 3 kHz in the other.	Level 6
Blast injury to ears or acute acoustic trauma due to impulse noise with permanent bilateral sensorineural hearing loss of 50-75dB averaged over 1, 2 and 3 kHz.	Level 7
Total deafness in one ear.	Level 8
Bilateral permanent hearing loss of 50-75dB averaged over 1, 2 and 3 kHz.	Level 8
Blast injury to ears or acute acoustic trauma due to impulse noise with permanent sensorineural hearing loss in one ear of more than 75dB averaged over 1, 2 and 3 kHz.	Level 10
Blast injury to ears or acute acoustic trauma due to impulse noise with permanent sensorineural hearing loss in one ear of 50-75dB averaged over 1, 2 and 3 kHz.	Level 11
Blast injury to ears or acute acoustic trauma due to impulse noise.	Level 13

9. Awards between levels 2 and 11 are also paid a GIP from service termination for life.

Bilateral chronic noise induced hearing loss is compensated under the AFCS using descriptors beginning, "bilateral permanent hearing loss etc" where there is:

- 1) evidence of exposure to hazardous noise due to service on or after 6 April 2005
- 2) bilateral permanent sensorineural hearing loss with an audiometric configuration consistent with noise damage and audiometric threshold of 50dB or more averaged over 1, 2, 3 kHz.

A compensation threshold of 50dB averaged across 1, 2, 3 kHz equates to 20% disability (and the threshold for compensation) in the Industrial Injuries Disablement Benefit Scheme and the War Pensions Scheme.

10. From before the Second World War there, has been international discussion of the methods for quantitative hearing disability assessment. Some schemes have relied on the relation between measured audiometric impairment and loss of speech perception, as measured by a variety of performance tests e.g. speech in noise or quiet. Accepting that hearing ability is multifaceted and not limited to speech perception, other systems have focussed on self reported disability, most recently, expressed in quantitative terms.
11. A variety of audiometric descriptors have been proposed at different times, over the last sixty years, as best representing performance at speech tests, but there remains no agreement as to the best descriptors. When the correlation co-efficients between different self-rated measures of disability and a range of audiometric descriptors are compared, the results strongly suggest that the choice of frequencies is largely arbitrary. There seems no advantage in a whole audiogram average as opposed to average over 1, 2 and 3 kHz. Technical audiometric factors influencing choice of frequencies include audiometric reliability. Frequencies at the extremes of the audiogram i.e. 500 Hz and 6 kHz and above are generally deemed less reliable in terms of repeatability, while bone conduction thresholds above 3

kHz are difficult to measure. Another issue is the possible effect of audiometric notches, particularly, if, as is common with noise damage, they are narrow but deep. These could inflate the hearing threshold average in the region of the notch. These issues do not provide a consistent evidence base to inform any change to the present audiometric frequencies used in MOD no-fault military compensation schemes (7).

12. While 1, and especially 2, and 3 kHz are important in speech perception, the functional significance of hearing deficit at the higher frequencies is incompletely understood. This is not the same as considering that hearing loss at other than these frequencies has no associated impact on function. At present, however, for civil and other compensation purposes, the disabling consequences of other types of hearing loss, including blast damage and acoustic trauma, are assessed on the same basis as hearing deficit due to chronic noise injury.
13. Both the Boyce Review and the first IMEG report (2011) led to changes in AFCS hearing loss descriptors and awards. The Boyce Review revalorised Table 7 awards for hearing loss, maintaining the awards for total deafness of one and two ears and increasing awards for all other descriptors by one tariff level. These changes were incorporated into legislation from August 2010. The first IMEG report (2011) increased the awards for total deafness in one and two ears bringing them into line with awards for the loss of sight. Total deafness is defined in AFCS as resulting from 90dB or more hearing deficit averaged over 1, 2 and 3 kHz. Circumstances or injury leading to total deafness as a result of service are rare compared with service attributable blindness.
14. Having considered how the scheme should approach tinnitus, for which there are no objectively verifiable tests, IMEG recommended that tinnitus should be taken into account in all AFCS awards for hearing descriptors. IMEG also considered weapons related acute acoustic trauma and recommended expansion of the existing “blast damage to ears” descriptors to include hearing loss due to “acute weapons related acoustic damage” and the addition of new descriptors for associated asymmetrical hearing loss. Reflecting the sudden onset of symptoms in acoustic trauma cases, and accepting that for the same level of permanent hearing loss, the longer term functional effect will be similar irrespective of causation, it was recommended that descriptors relating to blast or acute acoustic trauma should receive a lump sum award one tariff level higher than the equivalent award for chronic noise injury, any GIP being the same band for both types of injury.
15. Awards statistics confirm that from the start of the Scheme there have been less than 5 awards¹ for the more profound bilateral hearing losses of any cause i.e. more than 75dB bilateral loss averaged over 1, 2 and 3 kHz. Reflecting Defence industrial workshop conditions, Health and Safety practice since 2005 and the short time interval since the introduction of the scheme, there have been no AFCS awards for bilateral permanent hearing loss due to chronic industrial type noise injury.
16. Where there has been an AFCS award for acute acoustic trauma with unspecified level of hearing loss, pure tone audiograms at about a year from the trauma incident have been reviewed to gain some insight into the audiometric configuration and the average level of hearing deficit over 1, 2 and 3 kHz, and at low and higher audiometric frequencies. The sample was not random, people were of a range of ages and we cannot be certain of the quality of audiological testing, beyond the absence of any obvious signs suggesting low reliability and validity. In about 200 cases examined, the case history and audiometric pattern were not always typical but were compatible with a diagnosis of noise – or blast related damage. Results showed that of the total of 200 cases reviewed:

¹ To maintain confidentiality where there are very small absolute numbers of cases or awards, MOD statistical convention is to use the expression “less than five awards”. This applies to AFCS awards to date both for bilateral total deafness and for total deafness in one ear.

- The most common (over 90%) average threshold over 1, 2 and 3 kHz was 25 - 35dB.
- For the higher frequencies, (3, 4 and 6 kHz) average threshold was 40 - 60dB
- At the lower frequencies (0.5, 1 and 2 kHz) the most common deficit was 15 - 30dB.
- Less than five of the sample audiograms showed a straight line pattern across the frequencies.

Other causes of sensorineural hearing loss in the AFCS population

17. In the main, the military population is young with an average total service length of less than ten years. The effect of age on hearing is, therefore, generally less important in military personnel than in civilian industry, where, as a person is exposed to noise, he is also ageing. There is some evidence that the proportion of noise induced hearing loss, unrelated to occupation, is increasing in Western societies from traffic noise, construction sites and, especially in young people, from social noise, playing in bands, visiting pubs and clubs (8). In the military context, a recent Swedish study found that even with strict entry hearing criteria, 20% of those enlisted, reported experiencing hearing problems. More than a third had difficulty hearing in crowds, a quarter reported tinnitus and about 15% were said to be overly sensitive to noise. In most cases these effects were occasional, but 7% reported constant problems (9).
18. In the last ten years, there has been a new focus on genetic aspects of hearing loss with new insights into genetic susceptibility to noise damage (10) and, additionally, work, in the main on animal models, raises the future potential of gene therapy for sensorineural deafness (11).
19. That noisy work is associated with hearing loss has been recognised since the 18th century, since when a significant body of published work in humans has accumulated. However, there remain many unresolved issues, including the exposure-response relationship, the wide spectrum of individual susceptibility, the effects of different types of noise exposure and the effect of noise injury at different ages.
20. It has been appreciated for many years that the effect of occupational noise on hearing can seem quite different depending on the population chosen as the basis for comparison. There is risk of overestimating noise damage where the comparison group is highly screened, and of underestimating where the comparison is with a typical unscreened population, which will include some people who have or have had ear disease and have been exposed to noise. A recent multivariate regression analysis on a large (8000) US population aged 20 - 69 years (1999-2002 National Health and Nutrition Examination Survey) concluded that the occupational noise exposure effect was significantly associated with cigarette smoking, leisure noise exposure and educational attainment. Failure to adjust for these factors led to overestimation by a third of the effect of occupational noise (12). These issues are pertinent in occupational personal injury compensation schemes which would not be expected to award for non occupation related injury.

Hearing loss and vertigo from head injury

21. To date AFCS claims where sensorineural hearing loss and, or vertigo, is an issue secondary to head injury have been few, but in a military context the topic is important.

AFCS current approach

22. Hearing loss and vertigo are common in patients with head injury, due most often to injury within the membranous labyrinth. Because of the mechanism and prognosis, the approach in the scheme is to include hearing loss and vertigo related to head injury in Table 6 of the tariff, Neurological Disorders Including Spinal, Head and Brain Injury, with awards taking account of hearing deficit rather than on Table 7.

Table 6

Item	Level	Descriptor
5	1	Brain injury resulting in major loss or limitation of responsiveness to the environment, including absence or severe impairment of language function, and a requirement for regular professional nursing care.
11	2	Brain injury where the claimant has some limitation of response to the environment; substantial physical and sensory problems; and one or more of cognitive, personality or behavioural problems, requiring some professional nursing care and likely to require considerable regular support from other health professionals.
17	4	Brain injury where the claimant has moderate physical or sensory problems; one or more of cognitive, personality or behavioural problems and requires regular help from others with activities of everyday living, but not professional nursing care or regular help from other health professionals.
22	8	Brain injury from which the claimant has made a substantial recovery and is able to undertake some form of employment and social life, has no major physical or sensory deficits, but one or more of residual cognitive deficit, behavioural change or change in personality. ^(a)
27	11	Brain or traumatic head injury with persistent balance symptoms and other functionally limiting neurological damage including permanent sensorineural hearing loss of less than 50dB averaged over 1, 2 and 3 kHz.
(a) The claimant is unable to undertake work appropriate to experience, qualifications and skills at the time of onset of the illness, but able to work regularly in a less demanding job.		
* An award for brain injury in levels 1, 2 or 4 includes compensation for associated sexual dysfunction, incontinence of the bowel and bladder, and epilepsy.		

23. The audiovestibular effects depend on the site and type of damage sustained. Temporal bone fractures and labyrinthine concussion are involved.
- 80% of temporal bone fractures are longitudinal, typically following blows to the parietal and temporal regions of the skull. The fracture often causes a laceration of the tympanic membrane and bleeding from the ear. Facial nerve weakness may occur but is usually temporary. Damage can also occur to the ossicles along with tympanic membrane injury and blood in the ear canal, which results in conductive deafness. There may be additional sensorineural deafness of variable degree from labyrinthine concussion. With time, both the conductive and sensorineural hearing losses improve but in many cases there is a residual high frequency loss. Frequently after this injury, patients complain of transient vertiginous attacks, which usually subside over a few months post injury spontaneously or with appropriate medical management.
 - Blows to the back of the skull (occiput) may cause a transverse fracture of the temporal bone. Frank bleeding from the ear is uncommon in this situation, although blood may be present in

the middle ear. Facial palsy occurs in half the cases and may be permanent. The fracture crosses the vestibule of the inner ear, with labyrinthine failure and profound hearing loss and vertigo, nausea and vomiting. These latter symptoms may subside over a few weeks due to cerebral compensation, although there may be unsteadiness and a tendency to fall to the side of the affected ear for many months requiring medical management. Hearing loss does not recover.

- iii) Labyrinthine concussion occurs when a blow, usually severe enough to cause loss of consciousness, but without fracture of the labyrinthine capsule causes sensorineural deafness and vertigo. The deafness may be permanent but the persistent vertigo is usually temporary lasting only a few months. Benign paroxysmal positional vertigo (BPPV) is the most common vestibular presentation after head injury and post-traumatic BPPV has a poorer prognosis than other aetiologies of this condition. Characteristically, clusters (lasting weeks or months) of brief (10 - 20 sec) positional episodes of vertigo occur over months or years with long intervals of freedom between episodes (13).

The relationship of hearing disability to audiometric threshold

- 24. Based on WHO 1980 definitions, impairment is abnormal hearing function usually measured by pure tone audiometry (PTA), disability is self reported reduced ability on common hearing tasks or as assessed by performance tests and handicap is psychosocial disadvantage in the person's circumstances. As evidenced in the Swedish recruit study (9) referenced at para 17, the three concepts are usually but not always related i.e. impairment gives rise to disability in the individual which in turn leads to handicap but not necessarily proportionately. Despite the limitations they underpin approaches to compensation for personal injury both in the civil courts and in the UK no fault compensation schemes including the AFCS. Civil damages, where negligence must be proved, reflect claimant individual circumstances and response to the injury, while AFCS awards aim to address the expected average disabling effects of the injury/disorder. The AFCS provides compensation for pain and suffering in the lump sum awarded, and for potential loss of earnings in future civilian employment in the GIP.
- 25. In the case of attributable hearing loss, recommendations in relation to appropriate descriptors and tariff require (a) knowledge of the level of loss of auditory function which is most commonly measured by audiometric testing (b) the consequent disability which is primarily perceived as loss of speech discrimination and (c) the social and economic handicap caused by the attributable hearing loss, which in AFCS is focussed on the impact on civilian employability. Because of the variability discussed above in the relationship between measurable functional impairment, perceived disability and consequent handicap in relation to civilian employability, reliable judgements about the level of disability and extent of handicap in the workplace from the measured level of audiometric permanent threshold shift are difficult. Impulse and continuous noise injury may lead to abnormal function of the ear i.e. impairment, measured by pure tone audiometry, while the subsequent disabling effects are generally measured by self-report, using a questionnaire, or by performance testing e.g. speech identification in noise. There are also limits to these approaches to disability measurement. Self report is easy to administer and has face validity but it is subjective and is not easily replicated, even within subjects. Performance tests provide supplementary information but can only directly measure one dimension of hearing function and are limited by the frequency spectrum of the particular speech test. This topic has attracted much interest over many years. A classic critique of the innate limitations and challenges e.g. scaling of individual disability, individual variation and the essentially arbitrary nature of the various approaches to measuring the consequences of hearing loss, especially noise related loss, for compensation was published in 1988 (14).

26. There is marked inherent variability in measured hearing threshold levels amongst individual people of the same age and sex (15) and normal people also differ in their concept of hearing normality, their susceptibility to noise injury and the effects of ageing. A number of studies have investigated the relationship between permanent audiometric threshold shifts and hearing disability but as yet there is no agreement on the matter. The Inter Society Working Group on Hearing Disability (ISWGHD) devised a system to predict disability from measured audiometric threshold for a typical person in a population (7). However the methodology, the underlying assumption that disability is the reciprocal of ability, and the final recommendations of ISWGHD were not universally accepted, either within the working group or subsequently externally. The method was based on data from the National Study of Hearing (16) and a self rated scale of hearing, arranged in eleven categories covering the centiles from nil to 100, where nil is totally deaf and 100 excellent hearing ability. This approach has limitations which include the fact that there are only two fixed points on the scale and hearing abilities of the members of the population studied are not normally distributed, with most people being at the good hearing ability end and few with profound levels of hearing disability.
27. A study, also based on data used for the UK National Study of Hearing looked at four components of disability based on a self-administered questionnaire. These were (i) disability for everyday speech, (ii) for speech in quiet, (iii) localisation, and (iv) handicap i.e. psycho-social disadvantage in the person's circumstances. Disability for everyday speech and handicap accounted for 68% of the variance in reported disability. Pure tone audiometry was carried out with focus on i) low –mid frequency loss and ii) high frequency slope. All four disability components correlated with low-mid-frequency hearing loss and were independent of high frequency loss. There was, in this study, a general relationship between self reported disability and age i.e. a given hearing loss was more disabling in younger than older age groups, but at all ages there was wide individual variability between measured threshold and reported disability. For losses above about 40dB, conductive or mixed loss was more disabling than sensorineural loss. Other reported studies of the relationship between hearing threshold and speech discrimination have, like this one, been cross-sectional in design and have not distinguished between acutely acquired hearing loss and hearing loss developing over several years. Socio-economic group had no discernible effect; but in subjects with a classic noise induced high frequency pattern, men were more disabled than women for the same hearing deficit. The strongest correlation with changes in pure tone audiometry at lower frequencies was with everyday speech discrimination (sensitivity) ($r=0.6$); there was also reasonable correlation, $r=0.55$, with handicap. Correlation between audiometric threshold and speech in quiet and localisation was generally less good, regardless of audiometric descriptors used. Localisation ability was best reflected in worse ear threshold shift. Speech discrimination reduction was generally associated with raised permanent hearing thresholds at lower frequencies i.e. 1, 2, and 3 kHz, and little affected by higher frequency thresholds, 4 to 6 kHz, the frequency band most often impacted by impulse noise (17).
28. Studies have also tried to map impairment and disability to identify the measured audiometric threshold which equates to the onset level of disability (18). The data are also cross-sectional. Regardless of population studied, the results suggest that as well as wide variability in reported disability for the same audiometric threshold, there is no clear point at which disability begins, but rather a continuum.
29. Because of individual variability, for sensorineural hearing loss, with little difference between the two ears, if self reported hearing ability expressed in centiles (19) on a scale of 1 - 100 is plotted against audiometrically measured hearing threshold, for a wide range of reported hearing ability (e.g. in the centiles 100 - 60), there is very little difference in measured median hearing threshold. Finally these studies and scales as required in some compensation schemes focus only on one injury, hearing deficit. AFCS must consider the whole body impact of injury and disorders and make consistent and equitable awards across the range of disorders and injuries.

The subsequent pattern and rate of hearing loss over time in a young adult with a noise induced hearing loss as a consequence of either continuous or impulse noise, when noise exposure ceases.

- 30.** Acute acoustic trauma and blast induced hearing injury in the military no-fault compensation schemes have been considered separately from chronic noise induced deafness to acknowledge the different mechanism and typical young age of the affected person. The nature and natural history of hearing loss due to chronic industrial noise exposure means that most of the relevant literature concerns older adults, who, over many years, simultaneously experience gradual change due to noise and ageing. Knowledge of the impact on hearing function over the remaining lifetime, when a young adult suffers acute, discrete, noise injury or more continuous noise which ceases, requires longitudinal study of a suitably large population of young adults with hearing loss due to noise injury. No such studies have been undertaken and published. Those that have addressed the question of subsequent hearing loss after removal from noise exposure, have focussed on older people, usually at the end of a working life of continuous noise exposure. Their findings have been inconsistent. In general, studies in older people have found that those who had worked in noisy occupations at study entry had higher hearing thresholds across the frequencies. In one study, of persons in their early 70s, age related hearing loss was greater in those with a history of noise exposure; in the mid 70s the rate of decline was similar in those with and without a history of noise exposure and by age 80 years, the difference in hearing loss between those with and without a history of noise exposure was minimal (20). In another study with subjects aged 60 - 81 years at entry and followed for between 3 and 11 years (average 6.4 years), noise history had an effect on the initial threshold levels measured at the start of the study, but the rates of threshold change after that were not different whether or not there was a history of noise exposure (21). This contrasts with the findings of the 2000 Gates study (22) in older people which suggested that noise injury to the ear continued to have a damaging effect on hearing, long after the noise exposure ceased. There are however limitations in this study. First it makes the underlying assumption that all high frequency notches are due to noise. It discusses only mean hearing loss and provides no information about variation amongst individual starting levels, nor of the variation over time. The change in threshold in dB over 15 years was calculated from only two measured hearing levels during the follow-up period. Despite the average age at the onset of 64 years, there is no discussion of the confounding nature of noise and age on measured overall hearing impairment. Lastly the authors assume that after retirement, people were no longer exposed to noise. No enquiry was made about possible sources of noise injury e.g. gardening equipment, DIY machinery and, importantly in the US, recreational shooting.
- 31.** The hypothesis underlying the studies described in the last paragraph is that the effects of noise and age on hearing are generally additive except in the very old when they become less than additive. An explanation of this phenomenon is that the number of individual cochlear hair cells is finite and damage or loss can only occur once, whether due to noise or ageing (10) with no increase in rate of decline after cessation of exposure.

Evidence received

- 32.** The Royal British Legion and Action on Hearing Loss in their evidence to IMEG raised a number of questions set out below (i) – (iv). The first three were also discussed in the MAC Hearing Loss Sub-Group Policy Statement.
- i)** Whether the present audiometric threshold of 50dB averaged over 1, 2 and 3 kHz for compensation of service related permanent hearing loss under AFCS is appropriate.
 - ii)** The need to consider any discrepancy between the level of hearing loss leading to reduced military employability grading and eligibility for AFCS compensation.

- iii) The most appropriate audiometric frequencies and weightings to assess hearing disability and how to weight better and worse ears.
- iv) The relationship between compensation for total loss of hearing in one ear compared with bilateral permanent loss of just less than 50dB averaged over 1, 2 and 3 kHz.

i) Audiometric threshold for compensation in AFCS

33. The basis for the current threshold for compensation in the scheme was questioned, with the MAC submission recommending that the compensation threshold be set at 35dB retrospective to April 2005. It was suggested that the current process was a matter of administrative convenience in the early years following the introduction of compensation for noise induced hearing loss (Occupational Deafness) in the Industrial Injuries Scheme. The MAC submission proposed, although without specific supporting evidence, that a level of 35dB loss would lead to a “clearly debilitating effect” on communication and employability and considered that hearing aids are inadequate at improving discrimination in those with hearing disability caused by noise. Finally it made the general point that the AFCS approach is less generous than other international jurisdictions.
34. It is the scientific evidence, and in particular any published evidence relevant to the topic, particularly emerging since 2000, which is the focus of this IMEG review and which must form the basis of its conclusions and recommendations. It should however be noted that, despite several subsequent reviews of Occupational Deafness, in the absence of new identified scientific evidence since 2002, the Industrial Injuries Scheme has not changed the audiometric criteria for compensation, i.e. 50dB averaged across 1, 2 and 3 kHz.
35. It is recognised that the current AFCS compensation threshold represents a specific level of auditory deficit and not the onset of disabling hearing loss; and that many other schemes around the world have a lower threshold of compensation. Most experts would agree that above 30 - 40dB bilateral sensorineural hearing loss averaged over 1, 2 and 3 kHz, a young person is likely to report difficulty with speech discrimination. In some cases, there will also be some emotional effect and dependent on circumstances, impact on employment. Those with a bilateral deficit of over 40dB would similarly almost always benefit from hearing aids, particularly modern digital aids (23).
36. In most countries, pure tone audiometry remains the most commonly used method for diagnosis and assessment of hearing loss for compensation purposes but there is no international agreement on audiometric descriptors or disability scales or underlying ethos or assumptions and fair comparison across the different schemes is very difficult. For hearing loss, different schemes use different measures of hearing disability or impairment, make awards which start at different levels of loss, and differentially award rates of accrual of hearing loss. Some schemes make awards only where employment is compromised. The schemes may be for hearing loss only or, as in AFCS, cover a wide range of disorders, with the added requirement to preserve consistency and equity in assessment and awards both within and across injuries and diseases.
37. Consistency and equity in awards depends crucially on high quality audiometry for both diagnosis and assessment. Accurate diagnosis and assessment of hearing problems is also important for clinical management and employment screening and surveillance at recruitment, and in-service for allocation of duties and retention in post. Audiometers should be regularly calibrated to defined standards, and ear phones and booths meet appropriate technical standards. Staff carrying out tests should be qualified and trained in audiometry technique to defined standards and understand the physiology of hearing.

38. Accurate diagnosis of noise related hearing deficit remains challenging. Not every notch or dip at 4 kHz is a sign of noise damage (24). Valid pre-exposure comparator audiometry is highly desirable in diagnosis and potentially available in the UK military context. Tests should be planned and timed in relation to noise exposure, taking account of temporary threshold shift.
39. Pure tone audiometry is subjective and, therefore, confirmation of hearing threshold levels requires ready access to more objective assessment techniques, such as otoacoustic emissions (OAE) and CERA (25). A study of an Irish military population claiming noise induced hearing loss found that about a quarter of all claimants had exaggerated hearing thresholds, defined as average hearing thresholds by CERA, 10dB or more better than by pure tone audiometry at 500 Hz 1, 2 and 4 kHz. The researchers concluded that the presence of a flat audiogram and a hearing threshold of 25dB or more at 500 Hz are useful predictors of non-organic hearing loss and, when present, CERA was recommended to determine objective auditory thresholds (26). It is important that these tests also are administered and interpreted by experts. CERA testing can take time and may be difficult for some patients. OAE testing on the other hand may be used as an initial rapid test of cochlear function detecting potential problems ahead of observable change in pure tone threshold or as a screening tool to identify a discrepancy between subjective audiometric thresholds and objective auditory responses. It does not require a behavioural response from patients, and provides an initial assessment of hearing sensitivity within a limited range, although not a full quantitative assessment (27).
40. Test-retest variability in an individual in audiometric threshold measurement in good hands can be between 6 – 11dB (28). Robust decisions on both employability and compensation therefore require technical standards which are valid and reproducible. Decisions about compensation and future military employment require access to supporting objective measurements, i.e. CERA. Since it became clear that the UK deployment to Afghanistan was associated with risk to hearing, action has been taken by the chain of command and Headquarters Surgeon General to improve awareness of good hearing hygiene, best practice hearing protection, the need for regular hearing surveillance and allocation of employability status and to address and unify technical standards of audiometry, diagnosis etc in the geographically scattered and diverse military medical platform. Achievement of consistent high quality audiometry standards and access to specialist techniques such as CERA and OAE are a challenge. Delivering best practice hearing surveillance needs cooperation from the chain of command, to ensure the person's availability for testing. It also needs engagement by the man or woman, who may be reluctant to admit to hearing symptoms, with the risk of medical downgrading and restricted military employability/career prospects. MOD and the services are working with Action On Hearing Loss to emphasise the potentially permanent and life changing consequences of failure to use hearing protection.
41. There is no international agreement on the compensation threshold for noise induced hearing loss and contemporary scientific understanding does not provide a compelling case for any particular process or level. There remain many variables and unknowns and for robust and defensible decisions, ready access to quality audiometry and objective assessment methods must be a priority.

Recommendation

42. IMEG recognises that the current threshold for compensation is high. However the evidence at the present time is **not sufficient to make a recommendation** for change, which would be robust and based on clear scientific evidence. In particular we have been aware of: the extent of variation in audiometric measurements, in good hands, in the same individual (6-11dB); the lack of a direct and consistent relationship between measured audiometric impairment, hearing disability and, of particular importance for AFCS, future civilian employability; the need for AFCS to ensure equity of awards within and across the range of injuries. Taken together these **do not justify a recommendation** for change in the audiometric threshold at the present time.

43. Because of the lack of relevant published evidence, essential to allow well informed recommendations about the compensation threshold in this population, we **strongly recommend** that a prospective study be undertaken of in-service cases with hearing threshold of 35-50dB averaged over 1, 2 and 3 kHz to report within 3 years of publication of IMEG's second report. The study should address the relationship between measured hearing threshold and self-reported hearing disability, military employability grading and restrictions on civilian employability. The need for quality assured audiometry testing and enquiry in relation to the causes and consequence of hearing impairment make it essential the study is undertaken prospectively with the informed consent of the participants.
44. It is **also recommended** that if the findings of this study provide clear evidence which indicates the need to reduce the level of hearing threshold for compensation that exceptionally consideration be given to backdating awards to the date of IMEG's second report.

In addition, we **recommend** the compensation threshold should be kept under review with close scrutiny for any pertinent developments.

45. The importance of accurate diagnosis and assessment of hearing loss and the continuing work to deliver consistent high quality assured audiometry (at appropriate times relative to exposure and regular time intervals), best practice hearing protection and surveillance across Defence are essential elements. Account should also be taken of military medical employability hearing standards, downgrading and medical discharge policy. It is **recommended** that the same quality assured audiometry data, should inform both military employability standard and any AFCS claim. Because of the potential life-changing impact for the person and operational consequences for the service, we **also recommend** routine use of objective testing, i.e. CERA or OAE or both, wherever downgrading to H3 or lower, or medical discharge is under consideration, with tests undertaken and interpreted by suitably experienced experts.
46. While the evidence to date indicates that numbers in this category will be small, for those whose service related hearing loss falls below the compensation threshold and is confirmed as between 40 - 50dB averaged over 1, 2 and 3 kHz in each ear, we **recommend** NHS supplied digital aids, as clinically appropriate. Conscious also of the potentially stigmatising effects of use of hearing aids, especially in young adults, we **further recommend** that RIC or ITE digital aids should be supplied whenever possible, as advised by the clinician in charge. Where hearing loss is due to service, Priority NHS access applies, based on clinical need. Recognition that the consequences of acute hearing loss sustained as a young adult, including psychological sequelae, may differ from that due to chronic noise injury becoming apparent in middle age or older, implies the need for a longitudinal investigation of the impact of acute noise injury over time, including disabling effects, audiometric changes and employability.

ii) The need to consider any discrepancy between the level of hearing loss leading to reduced military employability grading and eligibility for AFCS compensation

47. Pure tone audiometry became widely available in the 1970s and the current military system of assessing hearing acuity was introduced in 1981 (29). Reflecting the different operational requirements, principles are shared but slightly different standards apply to the three services. The present military approach to hearing and medical employability, including retention in service, does not depend on any particular level of hearing threshold but on the individual case facts and specialist otolaryngological and occupational health opinions. The military approach involves routine surveillance of overall hearing acuity, detection of the presence and progress of noise damage and the provision of hearing protection suitable for the individual and his circumstances. Allocation to a PULHHEEMS hearing standard is based only on hearing acuity. Pure tone audiometry is carried out at

defined time intervals and, as required, clinically. Hearing acuity tested by pure tone audiometry at 250 Hz to 8 kHz is used to determine the PULHHEEMS category in each ear using the sum of the thresholds (dB) at low frequencies i.e. 500 Hz, 1 and 2 kHz and high frequencies 3, 4 and 6 kHz.

The standards are as follows

PULHHEEMS SUM (dB)	0.5, 1 and 2 kHz	3, 4 and 6 kHz
H1	not more than 45	not more than 45
H2	not more than 84	not more than 123
H3	not more than 150	not more than 210
H4	more than 150	more than 210

In addition the noise exposure history and audiometric pattern is used to establish whether noise induced hearing loss is present.

48. General minimum service entry standard is H2 and for aircrew, H1. Once in service, deterioration in high frequencies is presently taken as indicative of noise damage and so a need for enhanced protection and increased surveillance. Where a serving member is H3 or H4, temporary downgrading and specialist otolaryngological and occupational health opinions are obtained. H3 in one or both ears may make a person not fully deployable. H4 in one or both ears normally leads to medical discharge. Each case is however considered on its facts with account taken of the person's service occupation, employability and skills limitations and possible military job options. Objective auditory data should be reviewed at this time. These issues are complex and, although not convinced that AFCS compensation should be based on the same criteria as present UK military medical employability standards, we agree with the MAC that simplicity and transparency as well as coherence would greatly benefit if AFCS and PULHHEEMS criteria were aligned.
49. The income stream element of AFCS awards aims to recognise the impact of all accepted injuries and diseases on civilian employment. In terms of civilian employability some degree of hearing loss is common in UK working age adults. Based on the National Study of Hearing, 17% of UK adults have a hearing impairment of 25dB or more averaged over 0.5, 1, 2 and 4 kHz in the better ear (BE) (16). Loss of hearing seldom leads to time off work and there are few civilian jobs where perfect hearing is essential. Dependent on the requirements of the job, issues are person comfort, stress and strain associated with struggling to hear and above all safety for self and others. Employer issues include responsibility to reduce noise at source, hearing conservation, prevention, protection, and pre-employment screening and surveillance. As people are ageing with time in occupations, special attention needs to be paid to those with pre-existing or developing hearing impairment.
50. As discussed above, normal hearing is difficult to define, particularly in the context of occupation. It is age related and despite the efforts to define population ranges and predicted effects of noise exposure, there is wide individual variation in terms of measured threshold and perceived disability. Many service leavers are presently attracted to work in security, which has no defined hearing standards in the UK, and to the uniformed services and transport. Specific employment standards exist for relatively few UK civilian employments other than for civilian flying. For occupations such as the police, fire and ambulance, railways and merchant navy, there are published national audiometric standards (30) but, as with the military, these are guidelines rather than mandatory. Local issues such as competition for the job, and its status, specific job requirements, whether addressing recruitment or in employment surveillance, all come into play. Defective hearing does not preclude driving, including public service vehicles, unless a person is totally unable to communicate in an emergency. As in the

military, quality assured audiometry with access to objective testing by experts is essential for valid decisions on civilian employability. For both military and civilian employability, decisions to discharge medically, do not depend solely on audiometric hearing acuity but on a range of case specific factors.

iii) Choice of audiometric frequencies

51. We note the comment by the MAC that the descriptors for assessment should be changed to better reflect frequencies involved in blast injury or acute acoustic trauma. While an interesting idea, as the MAC submission confirms, such a change would be for the future and could only follow extensive research, bearing in mind the challenges and restrictions of study of acute acoustic trauma or blast injury in the 21st century. Careful review of the contemporary literature and discussion with expert clinicians active in the fields confirms that prediction of self-reported disability is not strongly influenced by audiometric descriptors. Some experts recommend inclusion of 0.5 kHz but the evidence is not compelling and there is no scientific reason to change from the existing 1, 2 and 3 kHz. Similarly UK public schemes use a binaural average which weighs better and worse ears in the ratio 4:1. Use of the 7:1 favoured in the US does not lead to significant difference in the correlation between audiometry and everyday speech disability (7).

Recommendation

52. It is recognised that other descriptors could be chosen, but IMEG finds no compelling evidence to require a change from the existing position. We **recommend** consideration of use of the same audiometric descriptors for medical employability standard and compensation determination.

iv) Compensation for total loss of hearing in one ear compared with bilateral permanent loss of just less than 50dB averaged over 1, 2 and 3 kHz

53. Extract from Table 7 Senses

Blast injury to ears or acute acoustic trauma due to impulse noise with permanent bilateral sensorineural hearing loss of 50 - 75dB averaged over 1, 2 and 3 kHz	Level 7
Total deafness in one ear	Level 8
Bilateral permanent hearing loss of 50 – 75dB averaged over 1, 2 and 3 kHz	Level 8

The present position is as above. For bilateral permanent sensorineural hearing loss of just less than 50dB, no award is payable. The award for total deafness in one ear was increased following IMEG Review of Paired Injuries. Previously at Level 10, it was increased to bring it into line with loss of one eye. The Level 8 award recognises effects beyond that of the direct loss of the organ itself. As discussed in the first IMEG report (2011) where there are paired organs senses or injuries and one is lost due to service, in addition to its direct functional effect, loss of the first organ due to service enhances the impact of any subsequent loss of the other organ. In relation to the bilateral loss, just below the compensation threshold level bilaterally, it is recognised that a compensation threshold level is introduced arbitrarily and it is accepted that such a loss would be likely to be disabling to a young person. However to date no claim with objectively verified bilateral hearing threshold between 45 and 50dB loss has been received in the scheme.

Recommendation

- 54.** IMEG should receive regular reports of the distribution of hearing levels claimed and awarded and this issue will be included in the prospective study.

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Topic 3 – Recognised Diseases

Introduction

1. Lord Boyce in his review of the AFCS raised the issue that while under the War Pensions scheme the majority of medical discharge cases suffering from physical disorders receive entitlement to war pension; this is not the case under the AFCS. This is a reflection of the different standards of proof required in the two schemes. The standard of proof in AFCS is ‘on the balance of probabilities’ (or ‘more likely than not’), which is the standard of proof in both civil compensation and the statutory compensation scheme for civilian occupational injury and disease, the Industrial Injuries Scheme.
2. At its inception in 1917, the standard of proof used in the War Pensions Scheme was “on the balance of probabilities”. This was changed in 1943, at the height of the Second World War, when for injuries and disorders arising in service, the burden of proof, transferred to MoD to demonstrate that a service cause was “beyond reasonable doubt” not the cause of the disease. The change was introduced at this time because inadequate record keeping was leading to large numbers of claimants unfairly not receiving compensation.
3. In his report, Lord Boyce proposed that the IMEG should develop a list of Recognised Diseases for the AFCS. By this he meant that IMEG should review the medical literature and receive evidence from experts to provide guidance about the circumstances when “on the balance of probabilities”, a disease having onset in or around service was more likely than not to be attributable to service in the Armed Forces.
4. The normal burden of proof in civil compensation and other statutory compensation schemes such as the Industrial Injuries Disablement Benefit (IIDB) Scheme is “on the balance of probabilities”. For claims under AFCS this implies demonstrating that military service is more likely than not (more than 50:50) the predominant cause of the injury or disease in the individual case. In the Industrial Injuries Disablement Benefit Scheme, for those conditions where there is sufficient evidence that this level of proof is satisfied, the disease is ‘prescribed’, i.e. attributable in the individual case to the particular cause in relation to clearly specified circumstances of exposure.
5. In the individual case, attribution is usually based on sufficient evidence to answer the questions:
 - Does the particular agent or exposure cause the disease, at least in some circumstances?
 - If so, were the circumstances of the individual case such that the agent or exposure is more likely than not to have been the cause of the disease?
6. Recognition of a particular agent as the cause of a disease, and attribution in the individual case, is most clear when the cause is specific to the disease, or nearly so, and the probability of causation is high. Such conditions are now relatively uncommon but a relevant example is occupational asthma, asthma whose primary cause is an agent inhaled at work. The majority of cases of occupational asthma are due to the development of an allergic reaction to the specific cause encountered in the workplace (e.g. flour in a baker). Asthma develops after an initial symptom-free period of exposure and recurs on re-exposure to the specific cause, in concentrations which do not cause respiratory symptoms in others similarly exposed or previously in the affected individual. Inhalation testing with the specific agent will provoke an asthmatic reaction in the sensitised individual (but not in others not sensitised). Also, for many agents evidence of a specific immunological reaction (i.e. specific IgE antibody) will be found. In principle, the specific cause of asthma can be demonstrated in the individual case.

7. The majority of diseases however are not specific to a particular cause. A particular cause may increase the frequency of occurrence of a disease, which can have other recognised causes. As an example, lung cancer is well known to be caused by smoking cigarettes. More than 90% of cases in the general population occur in cigarette smokers. A smoker of 20 cigarettes a day during adult life will increase his or her chances of developing lung cancer by some twenty-fold. In the case of lung cancer in a smoker of 20 cigarettes a day for 40 years we can say with confidence that it is likely that the lung cancer is attributable to the smoking of cigarettes.
8. However, there are also other causes of lung cancer, such as asbestos and ionising radiation. When are we entitled to attribute lung cancer in an individual to asbestos exposure? The lung cancer caused by asbestos is indistinguishable from a lung cancer of other cause, such as smoking, so it has no specific distinguishing features. We have to ask the question: in what circumstances would it be more likely than not that the lung cancer was caused by exposure to asbestos. As the individual case has no distinguishing (or specific) features, we have to look at populations of people exposed in their work to asbestos. Among these, are there any circumstances where the frequency of the disease has increased sufficiently to make it more likely than not in the individual case that the lung cancer would be unlikely to have occurred in the absence of occupational exposure to asbestos? The answer is that, among other circumstances, the frequency (or incidence) of lung cancer was more than doubled in asbestos textile workers, both smokers and non smokers, who worked for 20 years or more in an asbestos textile factory. In these circumstances we can conclude it is more likely than not the lung cancer is attributable to asbestos.
9. Why is a greater than doubling in the frequency of the disease so critical in determining attribution to a particular cause? We can consider a hypothetical 100 men working in a particular occupation (fig 1). Among these 100 men, as in the general population, the number of new cases of a particular disease is 10 each year, i.e. no different.

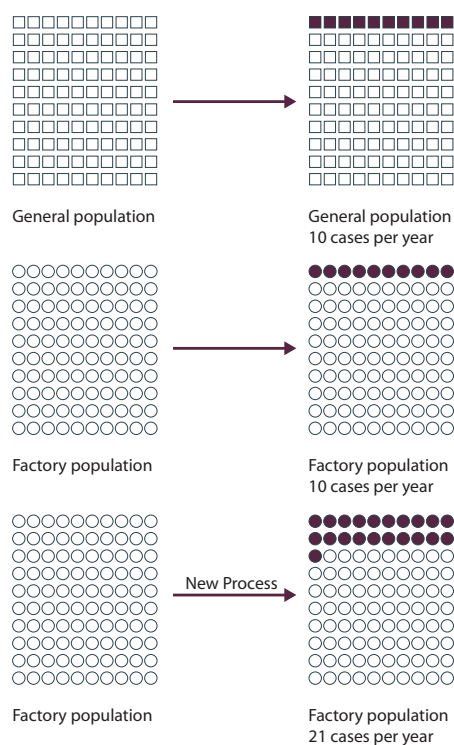


Fig 1. Increased incidence of disease from ten per year to 21 per year in factory population following the introduction of a new process.

Some time later, after the introduction of a new process, the number of cases of the disease in these 100 men increases to 21 each year, i.e. more than 2 times the previous frequency. We cannot distinguish the additional 11 cases from the 10 in whom the disease would otherwise have occurred. What we can say is that in any particular individual among the 21 cases, there is a more than 50:50 chance, or a greater than doubling of risk, that the disease would not have occurred without exposure to the particular cause. On the balance of probabilities it is therefore more likely than not that the disease is attributable to the particular cause in the individual case. We can say that 'but for' his working in this factory it is unlikely the man would have developed the disease. The balance of probabilities has shifted to 'more likely than not' and in this circumstance the disease can be attributed to the particular cause.

10. In the case of Recognised Diseases in the AFCS, we are therefore looking for evidence that service in the Armed Forces is consistently associated with an increase in the frequency of a particular disease or illness and whether there are circumstances where the frequency is more than doubled, making it more likely than not in the individual case that the disease was attributable to a cause in service.
11. It is also important to distinguish "all or none" diseases from "more or less" diseases. A well-recognised "all or none" physiological condition is pregnancy: one cannot be a bit pregnant. In contrast, many important conditions including high blood pressure, hearing loss and mental health disorders are 'more or less' conditions. These have a continuum of frequency of symptoms without a clear distinction between those with and without the condition. The definition of disease is therefore less clear and subject to expert opinion.
12. The epidemiological evidence informing these determinations should be of high quality, drawn from several independent studies and sufficiently consistent and robust that further research at a later date would be unlikely to overturn it.

A. Epilepsy

Clinical issues

1. The prevalence of epilepsy is about 5-10 per 1000 in the UK with an incidence of about 80 per 100,000 per annum. The risk is higher in childhood/young adulthood and in older age. In a general practice-based study about 60% of patients with epilepsy had tonic-clonic seizures, with 12% each, complex and mixed partial seizure types (1). Other types are uncommon.
2. An epileptic seizure occurs when there is an abnormal and excessive synchronised discharge of a set of cerebral cortical neurones. Epilepsy is a condition in which the sufferer is prone to recurrent unprovoked epileptic seizures. In clinical practice, epilepsy is said to be present when two or more attacks have occurred. Single seizures in people without epilepsy can be caused by the same trigger factors that may cause seizures in those with epilepsy.
3. Because of the complexity and tendency for seizures of different types to occur together, seizures and epileptic syndromes are difficult to define and no single classification system is ideal. The WHO and International League Against Epilepsy (ILAE) classification (1989) is most widely used for clinical epidemiological and research purposes (2).

Clinically, epileptic seizures may be classified under four broad headings:

- a) Simple partial seizures are usually brief and intense, with a variety of symptoms including focal motor, autonomic (flushing, sweating, vomiting), somatosensory, special sensory or psychic,

depending on the site of the epileptic discharge. Consciousness is preserved throughout the attack.

- b) Complex partial seizures give rise to the same symptoms but by definition there is also always impairment of consciousness. There may be automatic behaviour and reactive automatisms during complex partial seizures. The source of 60-70% of all simple and complex partial seizures is the temporal lobe, giving rise to the typical aura and motor symptoms.
- c) Secondly generalised seizures are partial seizures in which the epileptic discharge spreads to both cerebral hemispheres, resulting in a generalised seizure, most often of tonic-clonic type.
- d) In primary generalised seizures (Idiopathic Generalised Epilepsy) there is bilateral involvement of the cerebral cortex at the onset of the seizure. Consciousness is lost at the start of the fit and so there is usually no warning of an attack. Generalised tonic-clonic fits (also known as grand mal) may occasionally be associated with a prodrome of malaise, usually brief, but no specific symptoms. In some types of epilepsy, an increasing frequency of another generalised seizure type, including myoclonic jerks or absences, may herald a tonic-clonic seizure. Absence attacks (petit mal), associated with a characteristic EEG pattern, present in childhood or early adolescence and only very rarely for the first time in adult life.

Causes of epilepsy

- 4. Epilepsy is always a symptom of an underlying brain disorder and may present years or even decades after the development of the causal lesion. Causes of epilepsy in childhood are not considered further here. There are many causes of adult onset epilepsy (3)(4). Idiopathic epilepsy and epilepsy resulting from birth injury and structural abnormalities including hippocampal sclerosis and neuronal migration defects may all have onset in adult life. Other common causes include head injury; alcohol and drug abuse; infections including meningitis, encephalitis, pyogenic cerebral abscess, and toxoplasmosis in immunocompromised patients; cerebrovascular disease (including vascular malformations); and brain tumours. In some parts of the world, malaria and cysticercosis need to be considered as possible causes.
- 5. Head injury is an important cause in military populations; post-traumatic epilepsy is more likely in people with family history of epilepsy. Brain tumours account for the development of seizures in about 30% of adults aged 30-50 years. Multiple sclerosis is an occasional cause of fits, and seizures sometimes occur in degenerative conditions such as Alzheimer's disease. With increasing access to specialist clinics and high quality MRI, an underlying cause for epilepsy can be determined in about 50% of patients, and this percentage is likely to increase.
- 6. In terms of genetic contribution, there are two broad groups (5). In one group, epilepsy is associated with developmental brain abnormality and other neurological or cognitive difficulties. This includes some well defined syndromes, and is a form of symptomatic epilepsy. Genetic and epigenetic causes, but without identifiable gross brain abnormality, are also the main explanation for the group of epilepsies usually referred to as idiopathic or cryptogenic.
- 7. Post-traumatic epilepsy may follow head injuries and takes the form of focal or generalised seizures (6). It is more common in societies with a higher rate of personal violence and in military personnel who are injured in action.
 - Some patients may have only a single seizure, but in a group of patients who had a single late (>1 week after injury) seizure, 86% had another within 4 years (6). After a severe head injury, the risk of onset of recurrent seizures is known to be increased for at least 10 years (7).

- The risk is related to the severity of the injury. After mild blunt injuries with only a brief loss of consciousness, the risk is only slightly greater than in a control population (8).
 - With moderate injury (fractured skull and/or unconsciousness lasting between 30 minutes and 24 hours) the risk is approximately double that in a control group at 2% at 5 years, 2.5% at 10 years and 3% at 20 years. (9)
 - When the injury has been severe, with cerebral contusion, intracranial laceration and/or unconsciousness lasting more than 24 hours, the risk is much higher, at some 6% at 1 year, 10% at 5 years and 16% at 10 years. (9)
 - With penetrating head injuries, 50% of patients have active epilepsy after 15 years. (9)
 - Overall, the Relative Risk (RR)^{2*} of developing epilepsy after head injury falls with time, being 12.7 after 1 year, 4.5 up to 5 years and 1.4 after 10 seizure-free years.
8. In people with epilepsy, many factors can precipitate seizures (3). These include electrolyte disturbances (sodium, potassium, calcium, magnesium), toxins (particularly alcohol), and therapeutic and recreational drugs (including tricyclic antidepressants, anti-psychotics, anti-cholinergics, anti-histamines, methylxanthines, cocaine, ecstasy, amphetamines, some antibiotics; and withdrawal from barbiturates, benzodiazepines and therapeutic antiepileptic drugs).
 9. Seizures may also be induced by other metabolic disturbances such as hypoglycaemia, hypoxia and ischaemia. Sleep deprivation is a powerful precipitant in many patients. Major systemic diseases, including renal and hepatic failure and porphyria, may also cause seizures. In some women, there is a link with phases of the menstrual cycle, fits tending to occur more frequently in the days preceding menstruation (catamenial epilepsy).
 10. Photosensitive epilepsy is the most common form of reflex epilepsy, accounting for 0.5-8.0% of patients with epilepsy in different reported series. Patients experiencing photosensitive fits usually have idiopathic generalised epilepsy. Attacks may be triggered by flashing lights, including flickering television screens. The great majority of patients with photosensitive epilepsy present to medical attention during childhood and adolescence. Other reflex epilepsies, including reading, writing, eating and musicogenic epilepsies are very rare.
 11. Non-specific psychological stress is often cited as a precipitant for seizures. However, objective data have failed to show on the balance of probabilities that this is an independent causal factor.
 12. Whilst fever is a common cause of fits in childhood (febrile seizures between the ages of 6 months and 6 years), fever as a cause of fits per se in adults has not been clearly established. Transient fever and peripheral blood leucocytosis (and indeed, a rise in the white cell count in cerebrospinal fluid) are common after tonic-clonic seizures. Thus fever is frequently a consequence rather than a cause of fits in adults.
 13. Some patients have tonic-clonic seizures only during sleep (sleep epilepsy). Sleep may enhance focal epileptogenic discharges, and tonic-clonic seizures limited to sleep in adults should be regarded as being likely to have a focal, partial onset. In patients in whom a pattern of fits occurring only during sleep has been established, the risk of fits occurring while awake is only 13% over 6 years (3). Seizures occurring shortly after waking (awakening seizures) are common in the idiopathic generalised epilepsies, usually presenting in childhood. Fits in patients with these epilepsies are also particularly likely to occur with sleep deprivation or sudden arousal from sleep (3).

2 *** Relative Risk (RR) is the ratio of risk, usually expressed as disease incidence in exposed and unexposed populations. In this case, the ratio of the incidence of epilepsy in those who have had a head injury to the incidence in those who have not.**

Specific precipitants

Shift work

14. There is little research evidence that shift work causes an increase in fit frequency in those with epilepsy. However, sleep deprivation can provoke seizures in some people with epilepsy, and night shift working undoubtedly changes sleep patterns and reduces overall sleeping. Shift work is best avoided in those with epilepsy.

Alcohol

15. Alcohol misuse is strongly associated with increased risk of epileptic seizures. With binge drinking, seizures usually relate to alcohol withdrawal, but may also occur as a direct toxic effect, or due to associated causes including hypoglycaemia and head injury. Seizures frequently occur in chronic alcohol abuse. In people with epilepsy from another cause, there may be an increased propensity to alcohol-induced seizures.

Photosensitivity and visual display equipment

16. Reflex epilepsy is the term applied to epilepsy in relation to specific precipitants. As mentioned above, photosensitive epilepsy is relatively rare in adults and occurs more frequently in women.

Epilepsy and work in the military

17. The Equality Act (2010) means that the majority of civilian jobs are, or can be made, suitable for people with epilepsy. Consideration of whether a person with epilepsy should enter a particular employment or, where there is onset in work, whether they should be retained in employment is a matter of individual facts, hazards and risks integral to the job, scope for adjustment and the medical evidence. Driving, especially of HGV and PSV, is one of the few activities for which there is a statutory bar.
18. The Act does not apply to the military. People with proven epilepsy or who have suffered a single seizure less than four years before entry cannot enlist. An individual who suffers a single seizure while in service will be downgraded with restricted duties. He will be investigated and observed for 18 months. If by that time there have been no further fits, and following consultant neurological and occupational physician opinion, he may be reinstated. Aircrew who suffer a single fit are grounded permanently, and where aircrew personnel have more than one fit they will be medically discharged.

Epilepsy as a recognised diseases in the AFCS

19. Table 6 of the tariff is headed Neurological Disorders including spinal, head and brain injury. A footnote confirms that awards for brain injury paid at Levels 1, 2 and 4 include compensation for associated epilepsy, recognising the high risk that head injuries of such severity will have associated epilepsy. Item 29 Table 6, AFCS Order 2011, provides for other cases of post-head injury epilepsy. Where post-head injury epilepsy is uncontrolled, an additional award is payable (Item 15 Table 6 of the Order 2011). Epilepsy may also occur as a possibility rather than a probability, following meningitis or encephalitis or in relation to a tumour. Where that occurs and the primary disorder is accepted as due to service after 6 April 2005 and an award paid, an additional award for epilepsy will be considered.
20. Where a first fit is precipitated by one of the factors noted above, e.g. sleep deprivation, due to service, or in relation to a therapeutic drug dispensed by or on behalf of Defence Medical Services, the fit will be accepted as due to service. If the individual then has a second fit, the position in relation to AFCS compensation for the epilepsy will depend on the case specific facts. If recurrent fits are clearly due to sleep deprivation due to service, an award is likely, but most such patients will go on to have

fits unrelated to sleep deprivation, proving to have Idiopathic Generalised Epilepsy. In other words, constitutionally they have a low epileptic threshold. In this latter circumstance no award is payable. Therapeutic drug-related seizures are usually one-off, and a second clearly drug related seizure, either to the same or another drug, should also be regarded as a single seizure (i.e. not epilepsy). Where such a pattern arises in service and the therapeutic drug has been administered by, or on behalf of, Defence Medical Services, two awards, each for a single fit, may be appropriate. The legislation provides (Article 12 AFCS Order 2011) that recurrent seizures related to alcohol or other recreational drugs are not compensated under the AFCS.

21. Because of the restrictions on military employability, circumstances where worsening of epilepsy by service, after 6 April 2005 might arise will be very rare. Where the case specific facts meet the terms of Article 9 AFCS Order 2011, worsening may be accepted. Potentially, this might arise where an individual has an initial fit more than four years before service entry, is allowed to enlist and then experiences a further fit in service, satisfying the diagnosis of epilepsy. In addition, the fit in-service must have been precipitated by a service related factor.

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B. Meningitis and Encephalitis

Clinical Issues

1. Meningitis is inflammation of the meninges. Encephalitis is diffuse inflammation of the brain, which may have a lobar, multifocal or diffuse distribution, reflected in the presenting clinical features. When they occur together they are termed meningo-encephalitis. Most cases of these disorders are caused by infection entering the body through the upper respiratory tract, the gastro-intestinal tract, the skin or at the site of trauma. When organisms infect previously healthy adults through these routes they usually affect only the tissues at and around their site of entry or, in a few cases, cause systemic illness. It is rare for them to directly invade the central nervous system. Infecting organisms are a necessary cause of these disorders in that without them the disorder will not occur. However by themselves, they are not a sufficient cause. Factors increasing the risk of disease include immune compromise and poor general health. Other factors as yet unknown also increase the risk, as cases of meningitis and encephalitis frequently occur in young previously healthy individuals.
2. Exposure to an infecting micro-organism, which may be a bacterium, virus or of other type, e.g. Rickettsia or protozoan, is a necessary cause of these disorders. These organisms are ubiquitous and the disorders occur in civilian as well as military populations. In respect of infectious disorders the aim of the AFCS is to pay benefit where on the balance of probabilities service on or after 6 April 2005 has increased the risk of an illness beyond that of the general UK civilian community. Reflecting that aim, Article 12 of the 2011 AFCS Order includes a provision which excludes payment of benefit for injury or death in certain circumstances. These include the following in relation to infections:
 - no award is payable where injury or death is due to an illness which is an endogenous infection or
 - an exogenous infection except where:
 - the infection is acquired in a non-temperate region and the person infected has been exposed to the infection in the course of service; or
 - where, in a temperate region, there has been an outbreak of the infection in service accommodation or a workplace.

Endogenous infections are taken to be those having origin in the person themselves e.g. appendicitis, in which the infecting organism is a normal gut commensal bacterium. By contrast, exogenous infections enter the body from outside.

3. Acute bacterial meningitis usually occurs sporadically in Western countries (1-5 per 100,000 per year) (1) but can also occur in epidemics, as it does commonly, in some parts of the world, e.g. sub-Saharan Africa. In the UK, small outbreaks of meningococcal meningitis are well-recognised. Bacterial meningitis occurs sporadically as a complication of infection elsewhere in the body, following trauma to the skull or spine or in relation to neurosurgery, e.g. insertion of cerebrospinal fluid (CSF) shunts and drains. The organisms most commonly involved are *Neisseria meningitidis* (2) or *Streptococcus pneumoniae*. Both spread from the respiratory tract. Less commonly, *Staphylococcus aureus*, *Listeria monocytogenes*, *Escherichia coli* and *Haemophilus influenzae* are the infecting organisms. Meningitis following injury to the skull or spinal column usually occurs within a few weeks of the trauma but cases with intervals longer than 20 years post-trauma have been reported (3). Recurrent bacterial meningitis is uncommon and usually related to an anatomical defect which may be congenital, e.g. dermal sinus, or related to skull trauma (4).

4. Mycobacterial meningitis, most commonly due to *Mycobacterium tuberculosis*, is a life-threatening infection that is more common in some parts of the world but may occur in isolated cases anywhere. Treatment has to be continued for a year or longer, and infection with drug resistant organisms is an increasingly common problem.
5. Article 5 of AFCS 2011 Order provides that a descriptor is intended to cover the expected effects of the primary injury and its appropriate clinical management. In relation to surgery, post-operative pain and subsequent scarring are virtually inevitable consequences, and so they are taken into account in the primary descriptor and associated award. On the other hand, development of bacterial meningitis or encephalitis is not to be expected. They are possible, but not probable consequences and so where they do occur as result of service, a separate additional award would be payable.
6. Aseptic meningitis refers to meningitis not due to bacteria. Causes may include spirochaetes, fungi, parasites or viruses. Therapeutic drugs can occasionally produce a similar clinical picture (5) and it can occur in relation to cancer or leukaemia (malignant meningitis) (6). Viral meningitis is more common than bacterial meningitis in Western countries. Viruses usually invade the meninges via the blood stream. Many viruses are capable of causing meningitis by a variety of modes of transmission, and the clinical course is consequently variable. In some cases viral meningitis follows a flu-like illness, while in others, clinical onset is acute or sub-acute, with headache, vomiting and painful eye movements. Neck stiffness may be absent in mild cases and is usually less severe than in bacterial meningitis. Tuberculous meningitis is usually insidious in onset and is uncommon in young, otherwise healthy adults in Western countries.
7. Viral encephalitis is less common in the UK than meningitis (7). In the UK, herpes simplex virus is the commonest cause. The characteristic clinical features include headache, increasing drowsiness and impairment of consciousness, and focal neurological deficits including dysphasia and hemiparesis, reflecting the frontal and temporal lobe focus of the pathology. Convulsions are also common. In the Far East, Japanese B virus infection is the commonest cause of encephalitis. A wide variety of other viruses may also cause encephalitis, and clues to the possible cause include geographical location (arboviruses); season (arboviruses, enteroviruses); animal bite (rabies); preceding illness or immunisation (e.g. measles, influenza, varicella); other present illness (Herpes zoster, infectious mononucleosis, *Mycoplasma pneumoniae*, mumps, etc); or an immunocompromised state (HIV, JC virus). Other severe viral encephalitides include those caused by Ebola and West Nile viruses. Viral encephalitis is associated with considerable mortality, and persistent neurological deficit is common in those who recover. Specific drug treatment is available for some causes of viral encephalitis (Herpes Simplex, Herpes Zoster, HIV), but not others. Prevention, by appropriate immunisation, is possible for some (e.g. Japanese B encephalitis).
8. Viral meningitis may be caused by many different viruses. Mumps virus is the commonest identified cause of viral meningitis in the UK. Viral meningitis has a much better prognosis than viral encephalitis or tuberculous meningitis, and full recovery can be expected in the majority.

UK military immunisation policy

9. The policy on the immunological protection of UK personnel is published in a Joint Service Publication (JSP) 950 leaflet (8). Military immunisation policy normally reflects the UK national immunisation schedule as set out in the department of Health Green Book (9), with some military specific variation. These variations may apply to all service personnel, e.g. the need, because of possible short notice deployment, for all personnel to have in-date yellow fever certificates. Other measures apply to recruits/new service entrants. For example, those without a BCG scar or other evidence of immunisation are offered Mantoux testing and BCG immunisation; and similarly if non-immune, all recruits, new entrants and those transferring to Defence Medical Services are immunised against

varicella. Those whose principal service occupation puts them at high risk, e.g. health care staffs, are tested for Hepatitis B seroconversion after a primary course of Hepatitis B immunisation. Specifically in relation to meningitis and encephalitis, all serving personnel aged less than 25 years, all recruits, new service entrants and new members of the Reserve, regardless of age, are offered a single dose of meningococcal conjugate (men C) unless previous immunisation is documented. Immunisation against Japanese B encephalitis is given for deployment to the Far East.

Meningitis and encephalitis as recognised diseases in the AFCS

10. As rare diseases with small absolute numbers of cases and marked annual variation, there is no published evidence on the incidence of meningitis and encephalitis in different occupations, and there are no robust epidemiological studies in military populations. Since the introduction of recruit immunisation against meningococcal disease in 1992, no clusters of central nervous system infections have occurred in UK military communities (10). Following adoption of this policy, while the reduction in disease incidence for recruits post-immunisation was not statistically significant, rates in unimmunised trained personnel decreased. A similar disease pattern and fall in rates amongst unimmunised trained personnel were seen in Norwegian troops during a trial of recruit vaccination (11). These findings suggest that unimmunised recruits may act as an infection source for older trained personnel. Where cases of meningitis do occur in service, the clinical evidence, incubation periods, etc, confirms they are sporadic in nature.
11. Meningitis and encephalitis can be accepted as due to service on balance of probabilities and awards made under the Scheme where meningitis or encephalitis is appropriately diagnosed, the infective agent identified and the incubation-period determined and;
 - the illness is part of an outbreak in a military work place or camp anywhere in the world and the affected person lives or works there
 - the illness is sporadic and due to an exogenous infection which has been contracted while the person served in a non-temperate zone
 - post-traumatic acute bacterial meningitis may follow injury to the skull or spinal column or occur in relation to neurosurgery. Where the primary injury, or injury or illness leading to surgery is due to service, an additional separate award is payable.
12. Because of the nature and pathogenesis of meningitis and encephalitis, worsening by military service is not a relevant concept. In some cases, service may begin before and continues after 6 April 2005, when the AFCS was introduced. In that situation, if the case facts in terms of infecting organism and its incubation period, and timing of clinical presentation confirm that infection pre-dated 6 April 2005 and was due to service, entitlement would be given under the War Pensions Scheme even if the disorder did not present clinically until after 6 April 2005.
13. AFCS tariff descriptors do not make explicit reference to meningitis or encephalitis. It is most likely that any award would meet descriptors in Table 4 or exceptionally, Table 6. To date no claim for meningitis or encephalitis has been made.

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C. Multiple Sclerosis

IMEG consideration of this topic was informed by literature scrutiny ,discussion with subject experts and the Chairman, Dr Scadding and Dr Braidwood also had a useful meeting with the Chair of Mutual Support, the armed forces multiple sclerosis support society .

Clinical Issues

1. Multiple Sclerosis (MS) is the most common serious neurological disorder in young people affecting some 80,000 people in the UK, with a prevalence of approximately 1 in 800. Typically it has onset in previously fit young adults and thus new cases are not uncommon in the military population. The causes of MS are not fully understood but it is considered, from familial, genetic and epidemiological studies, to be a disease due to interaction between genetic and environmental factors.
2. MS is a disease of the central nervous system caused by inflammatory demyelination of nerve fibres in the brain, brain stem and spinal cord. Localised areas of inflammation and demyelination arise unpredictably in different parts of the nervous system over time. The usual age of onset is 20 - 40 years with a peak at age 30 years, although it may develop at any age including during childhood. Characteristic sites for lesions causing clinical episodes include optic nerves, brain stem, cerebellum and spinal cord. Three main temporal patterns of the disease are recognised: relapsing-remitting, in which there are punctate relapses, often with partial or complete symptom resolution, particularly in the early stages of the disease; primary progressive, in which there is gradual onset, no remission and gradual worsening of the neurological deficit and development of progressive symptoms attributable to lesions at new sites within the central nervous system; and secondary progressive MS, in which an initial relapsing-remitting pattern is followed by a progressive course. Intervals between relapses are very variable, from weeks to several years. Occasionally, MS runs a benign course, with few, widely spaced relapses, with good recovery from each relapse, occurring over many years, but in the majority, the disease leads to increasing disability.

3. Determination of the timing of onset of MS can be problematic. At the time of presentation with a first episode of neurological disturbance, accountable for clinically by a lesion at a single site in the central nervous system, a diagnosis of MS cannot be made on purely clinical grounds, without additional information from Magnetic Resonance Imaging (MRI). Prior to the introduction of MRI, the diagnosis was made on the basis of further episodes, typical of demyelinating lesions, disseminated in time and within the nervous system, supported by evidence of asymptomatic optic nerve lesions using visual evoked potentials, and the presence of oligoclonal bands in the Cerebrospinal Fluid (CSF) on protein electrophoresis. With the introduction of MRI, a combination of clinical, MRI and CSF criteria can now be employed (1) (2). The need for confident earlier diagnosis has been emphasised by the introduction of disease-modifying treatments in recent years.
4. MRI has also permitted detailed study of prognosis. In prospective investigation of patients presenting with a first demyelinating episode affecting optic nerve, brain stem or spinal cord, 50 - 70% had multiple lesions on T2-weighted MRI, and 82% of these patients went on to have further clinical attacks within the next 10 - 20 years, establishing the diagnosis of clinically definite MS (3) (4). Thus an individual might have had an episode of transient sensory disturbance or optic neuritis, often minor and not always leading to neurological assessment and investigation, years before a second episode that clinically, supported by investigation, clearly indicates that he/she has MS. In retrospect, it can be recognised that the illness began at (or before) the time of the initial clinical episode.
5. Recognition of a relapse, rather than the fluctuation of symptoms (and to some extent signs) that is so commonly experienced by those with MS can sometimes be difficult. It is straightforward when there are new symptoms related to a lesion in a previously unaffected part of the nervous system and more difficult when there is exacerbation of existing symptoms/deficits. For example, fatigue, so common in MS and exacerbated in many patients by exertion or overdoing things, can lead to presentation with considerable transient worsening of symptoms (e.g. of a paraparesis) that can mimic a relapse, though such exacerbations usually last for less than 24 hours and, by definition, a relapse lasts for at least 24 hours. In many cases it is difficult to tell acutely, and even if there is recovery to an objective level that is much the same as the pre-deterioration state, it can be hard in some patients, even in retrospect, to be completely certain as to whether or not a relapse has occurred.
6. The factors that can lead to temporary exacerbation, mimicking relapse, include hot weather, fever from intercurrent illness, and other environmental increase in temperature, e.g. hot baths or working in hot environments, as part of military duties. Likewise, lack of sleep, physical exertion or fatigue may be identified by patients as causing a relapse or exacerbating their illness.
7. Quite apart from these factors, many patients report wide fluctuation in the severity of their symptoms, without obvious external provocation. Investigation, for example with MRI, is often unhelpful in this situation. There is frequently a mismatch between neurological symptoms and signs and MRI findings. This is largely because the easily seen plaques of demyelination are present in the cerebral hemispheres (subcortical white matter and corpus callosum), where they are often asymptomatic, whereas the common neurological deficit-producing lesions in the brain stem, cerebellum (to some extent) and spinal cord are less easily demonstrable, though with high quality MRI, lesions at these sites can be seen. MRI is most useful as an investigation to support or establish the diagnosis of MS, and less useful in the later stages of the disease.
8. In conclusion, it can be hard to be definite about whether or not a relapse has occurred, particularly in the setting of pre-existing deficits. Many patients report relapses occurring at non-stressful times, noting that during a previous stressful period (of one type or another), they remained well, when they had expected that the stressful circumstances might have caused a relapse. There is, of course, a natural tendency to relate the development or exacerbation of all diseases to identifiable life events, and MS is no exception to this rule.

Causation and attribution to occupation

9. There is no evidence that MS is uniquely occupational and in military personnel, it is clinically indistinguishable from the disorder as it occurs in the wider population. Literature scrutiny identifies no published papers on MS incidence in any occupational groups including the military, in comparison to the incidence in the general population. The evidence suggests that MS is an autoimmune disorder whose incidence is influenced by genetic and racial predisposition, family history and migration; e.g. the risk is generally low for black and white South Africans but increases for white English speakers who migrate to South Africa as adults rather than children (5). Work on birth order looking at the proposal that the disorder is more common amongst first-borns has produced conflicting results (6). Risk of developing MS is affected by gender and hormonal balance. It is more common in women, and in women with MS relapse rate is influenced by pregnancy. There is reduced risk of relapse as pregnancy proceeds while in the puerperium there is, conversely, a twofold higher risk of relapse (7).

Possible exposures/circumstances for investigation

10. The pattern of disease suggests that MS is triggered by an environmental factor in individuals who are genetically susceptible. Potential environmental agents have been the subject of much speculation and research of varied quality and study design. Infection, diet, toxic chemicals, soil constituents, head injury and physical and psychological trauma have all been investigated.
11. Infection. An infectious agent has long been suggested as a trigger for MS and relapses are reported following upper respiratory infection. (8). In support of the infective hypothesis is the varying disease frequency in Caucasian populations, dependent on latitude and migration and observed case clustering in small communities. Some studies have indicated an increase in the risk of relapse following systemic infection, together with evidence of increased lesion activity on MRI. These infections include bacterial urinary tract infection and viral respiratory or gastrointestinal infection (9) (10). However, despite a substantial body of research, some of high quality, investigating specific infections including measles, mumps, EB virus, herpes simplex, rubella, varicella, adenoviruses, Chlamydia and mycoplasma, no direct causal relationship has been established between infection with any of these microbes and onset or exacerbation of MS (11). There is some evidence that the total number of childhood infections before age 7 years is higher in MS sufferers than in controls (12).
12. Immunisation. Clinical onset and relapse of MS after immunisation for various diseases have been reported (13) especially in respect of Hepatitis B. Subsequent epidemiological studies did not confirm this and the US Institute of Medicine has concluded that current evidence does not support a causal link between commonly administered immunisations including those for tetanus, (alone or combined with polio and diphtheria), polio, influenza, hepatitis B, varicella, BCG and MS onset or relapse (14) (15). For some infections there is currently insufficient evidence on which to base recommendations for immunisation (e.g. human papilloma virus, rabies). A recent small study showed an increase in rate of relapse following immunisation for yellow fever (16), and this is probably best avoided. Most neurologists recommend avoidance of immunisation during periods of disease activity (i.e. during or shortly after relapse), and there are reasonable grounds for the avoidance of administration of live attenuated vaccines to patients receiving immunosuppressive or immune-modulating treatments (16).
13. Toxic chemicals and metals. The fact that MS is common and occurs sporadically in previously fit young adults has led to speculation, case reports etc looking at possible neurotoxicity of a range of substances including organic solvents, trichloroethylene, lead, mercury and zinc. However there is no reliable evidence of an association (17) (18).
14. Diet. Numerous studies have investigated the role of lifestyle including diet e.g. junk food, synthetic additives, absence or preponderance of dairy products, food contaminants and allergy. There are

several strands of evidence for a possible role for vitamin D deficiency as a causative factor for MS. MS frequency increases with increasing latitude, which is strongly correlated with exposure to Ultraviolet type B radiation (UVB) from sunlight and vitamin D concentration; the prevalence of MS at high latitudes is lower than expected in populations with high consumption of vitamin D-rich fatty fish; and MS risk decreases with migration from high to low latitudes (19). The possibility that vitamin D supplementation might decrease MS rates in vulnerable populations is currently under investigation. In patients with established MS, a single small controlled trial failed to demonstrate any benefit of vitamin D treatment (20). For other dietary constituents, there is no compelling evidence to support a dietary link with the cause or course of the disease.

- 15.** Climate. Although it is well recognised that a rise in body temperature may temporarily exacerbate symptoms attributable to demyelinating lesions in the nervous system (see paragraph 6 and 11) there is no evidence that living in hot climates, or heat stress illness, either causes MS or induces relapse of established disease.
- 16.** Physical trauma. Previous suggestions that physical trauma causes or exacerbates MS have not been borne out by careful epidemiological studies (21). The hypothesis that physical trauma contributes to the genesis of the disease is based on the observation that physical injury causes breakdown of the blood-brain barrier and auto-reactive lymphocytes then cause demyelination and neuronal loss or damage. The barrier breakdown lasts some 2 - 12 weeks, so exacerbation or onset is likely to relate to that time frame. Evidence supportive of an association between physical trauma to head and neck and MS onset or exacerbation is predominantly based on animal models supported by case reports and case control series. However, overall current evidence, including literature review (22) and prospective studies (23), does not support a causal role for physical injury in causation or exacerbation of MS. There is no consistent evidence concerning surgical trauma and disease activity. There is also MRI evidence demonstrating a lack of correlation of the site of MS plaques within the cervical spinal cord and levels of compression resulting from cervical spondylosis (24).
- 17.** Psychological stress. There are particular challenges in considering psychological stress. A substantial amount of research has been undertaken to attempt to clarify the role of mental stressors in the aetiology of a wide variety of diseases. Methodological difficulties and limitations include the following (25):
 - a)** Self-reporting. Mental stressors have different effects in different individuals, and assessment of the severity of the stress experienced inevitably requires some form of self-reporting, based on a simple description of feelings or on a questionnaire applied by an experienced interviewer. While the latter is more reliable, complete elimination of subjective bias is not possible. People who suspect that their medical condition is due to mental stress are more liable to have examined their past experiences for stress-related symptoms than individuals who remain healthy. Finally, remembering events can be difficult enough, remembering the way one felt at various times in the past can be much harder.
 - b)** Multiple 'confounding' factors. The very complexity of the factors that can affect the way an individual reacts to stress, including constitution and personality, coping strategies, social support and behaviour and lifestyle change, means that studies that examine associations between stress and disease are at risk of confounding by these other factors, which may be independently associated with the disease. Even where studies attempt to neutralise such confounding in the analysis of findings, this can be only partially achieved, since constitution, personality, coping strategies, behaviour and lifestyle are all unique to each individual and cannot readily be statistically separated out.

Use of the term 'confounding' suggests that various factors may be involved and operate independently of each other. In some cases factors influence disease aetiology through working

in combination and modifying individual influence. This makes assessment of the effect of one factor in isolation, such as mental stress, very difficult. One study showed that a group who experienced stress at work also showed features of anger, hostility, depression, anxiety and social isolation (26).

An individual's whole lifetime behaviour and lifestyle with regard to diet, exercise, smoking, and consumption of alcohol and other drugs can have an important influence on the development of disease. Such behaviour is unique to the individual and can vary from day to day and according to mood, making attempts to classify behaviour types over the whole period of a study only approximate at best. Changes in behaviour and lifestyle may occur due to mental stress and many other factors, and in any case will be self-reported.

- c) Association, cause, and effect. Where studies detect an association between a stressor and a medical condition, considerable care must be taken before concluding that cause and effect have been established. The association may operate through an underlying factor common to both elements of the association. Stress may be associated with a particular medical condition because the individual is constitutionally prone not only to the condition but also to a tendency to feel stressed. Also, even if a causal link were established, which element is the cause and which the effect would remain to be proven. Depression may be associated with cardiovascular disease (CVD) (27), but does depression cause CVD, does having CVD give rise to depression, or are depression and CVD both independently due to some other cause, perhaps of a constitutional nature? All are questions which challenge both clinician and researcher.
 - d) Defining mental stressors. Acute mental stressors are usually dramatic and easily recognised by others, so studies involving their effects can adopt firm definitions without difficulty. The effects of chronic mental stressors, on the other hand, vary substantially from individual to individual. An experience which may be stressful to one person can be constructively challenging to another. Therefore, defining any problem, activity, or event as a chronic mental stressor can never be absolute. Studies of potential chronic mental stressors suffer an inherent weakness of definition from the outset.
 - e) Study design. Many of the studies into the association of mental stress with physical disease attempt to address these difficulties, but few, if any, fully succeed. Most are cross-sectional and retrospective, at least in terms of recall of the stressor experience, whereas establishment of mental stress as a cause of development of pathological change requires prospective, longitudinal cohort studies of considerable duration, incorporating strictly matched controls throughout. Those studies that do perform follow-up assessments and do so at infrequent intervals will inevitably fail to account adequately for fluctuations in stress levels, behaviour and lifestyle over the whole study period. The many limitations already described render completely conclusive studies of this topic extremely difficult.
- 18.** MS was described in the mid 19th century and its possible association with emotional stress first suggested by Charcot in 1872 (28). This was followed in quick succession by a series of supportive case reports. In 1958 (29) and 1970 (30) case studies were published concluding that psychologically stressful situations immediately preceded the onset of MS in 35 out of 40 and 28 out of 32 patients respectively.
- 19.** Since that date many more studies have been published. These are of varied design, including some case control (31) and some prospective studies looking both at stress and onset of MS (32) and as a trigger for relapses (33). Although the longitudinal studies involved retrospective recall of stressor episodes, they suggested some association between stress and MS, particularly low grade chronic domestic or workplace stress.

20. An Israeli study in 1993 (34) came to a different conclusion. It considered disease exacerbations using SCUD missile attacks during the 1990/91 Gulf War as the stressor. The study was small with only 32 patients. The number of relapses during the war and in the following two months was reported as significantly lower than expected based on the frequency during the preceding two years. In other words, these severe life-threatening stressor events seemed to protect the patients from exacerbations, for at least a period. In addition to the small sample size, other factors which we need to bear in mind in relation to the study are: the short follow-up period; the effect of different stressors; and variable impact of trauma on different samples because of different expectations of, and preparation for, trauma, such as missile attacks. Military and civilian samples are particularly likely to differ with regard to these factors.
21. Other studies have attempted to consider possible mechanisms of disease where psychological stressors are potential factors. This includes the role of increased permeability of the blood brain barrier, as well as changes in brain MRI and their relation to clinical signs (35). Another study (36) considered the possible moderating effects of psychological, social and biological factors. The study was clear that previous investigations all had methodological limitations. While it supported a possible correlation between psychological stress and MS, it did not provide clear evidence on balance of probabilities that stressful life events cause or contribute to it.
22. The 33-day Israeli-Lebanese conflict of 2006 led to two further studies of MS exacerbation (37) (38) both providing evidence that exposure to war-related events increased disease activity. A further study indicated a possible association between coping strategies and a reduced relapse rate (39). However, a recent systematic review concluded that stress as a risk factor for MS onset or exacerbation is not yet proven, and again drew attention to methodological issues. These included the heterogeneity of measurement of stress in different studies, and the need to incorporate a multidisciplinary approach to stress measurement and clinical and radiological criteria for MS (40). It is also worth emphasising that all the published research studies on this topic have been conducted in civilian rather than military populations. Furthermore, it should be recalled that UK military personnel known to have MS are judged to be non-deployable on medical grounds and removed from combat situations.
23. Multifactorial causation and prognosis of MS. It is widely acknowledged that MS is due to a combination of genetic and environmental factors (see paragraph 9 above). A question raised in relation to the military is whether the combination of putative stressors, outlined in the preceding paragraphs, might act in an additive or synergistic way to either cause MS or produce relapses/ progression of existing disease. If this was the case, and given that physical and psychological stressors are frequently experienced in military life, it might be expected both that the incidence and prevalence of MS would be higher in the military, and that the rate of progression of the disease and degree of disability related to duration of disease might also be greater. Furthermore, one might expect the life expectancy of those affected by MS in the military to be reduced. However, there is no published evidence to support any of these outcomes.

Multiple sclerosis as a recognised disease in the AFCS

24. As outlined above, and despite a large body of research into aetiology, the cause or causes of MS remain unknown. Reported studies are of varying design quality, are rarely prospective, are often small and heavily reliant on patient or family recollection, there may be issues about diagnosis and study findings are inconsistent. As a result, current understanding of the causation of MS does not allow it to be a recognised disease, as defined, in terms of attribution on the balance of probabilities. In terms of service worsening, Article 9 AFCS Order 2011 must be met and service worsening must be the predominant cause of the downgrading and medical discharge. As with other conditions which may be associated with a wide spectrum of disability and where safety of the person or colleagues may be an issue, retention of a person in their principal service occupation or in some other in-service

role after diagnosis, depends on individual circumstances. In line with many other chronic illnesses, best clinical advice and occupational health practice seek to keep the person engaged productively, socially connected, and part of a team for as long as possible. Overall evidence is that almost all but the heaviest jobs are good for people's health. The armed forces are committed to high standards of human resource management and occupational medicine and aim to retain people in service as long as appropriate for both them and the organisation. Care is taken to ensure that working environments, including any modifications are provided, tasks allocated, suitable working hours and patterns arranged and the individual monitored so as to avoid harm to him/her or any possible worsening of his/her disorder. In respect of claims, each case must be looked at on its merits but where medical employability downgrading and medical discharge is an issue for personnel with MS, it is much more likely to be related to the natural progress of the disorder itself than to service worsening.

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D. Asthma

Clinical issues

1. Asthma is an inflammatory condition of the bronchial (conducting) airways of the lung characterised clinically by reversible airways obstruction and hyper-responsiveness of the air passages. Symptoms are episodic and improve between attacks although in chronic or inadequately treated asthma a variable degree of airways obstruction may persist (1). The disorder commonly starts in childhood. It is estimated to affect 7 - 10% of adults in UK with some having asthma persisting from childhood and others developing it as adults without a previous history. Childhood asthma may improve in adolescence but relapse in later life (2).
2. Asthma is considered to be due to a combination of genetic and environmental factors. It probably occurs when a person with genetic pre-disposition encounters an environmental factor that induces airways inflammation and hyper-responsiveness. Children of parents with asthma, who are atopic or have allergies, are more likely to develop asthma.
3. Although the boundaries between them can overlap it is helpful to distinguish:

Initiators: Agents which initiate asthma, i.e. an identifiable primary cause, in those previously without it, by causing airway inflammation and increased airway responsiveness to non-specific stimuli e.g. exercise, cold air. The best characterised initiators of asthma are the causes of occupational asthma, where a specific agent encountered in the workplace causes asthma in an individual previously without it.

Inducers: Agents which on re-exposure in a patient with asthma increase airway inflammation and airway responsiveness. This includes both agents which can initiate asthma (e.g. inhaled flour in a baker) and others which include viral respiratory infections such as caused by rhinovirus, the common cold virus which is the commonest cause of exacerbations of asthma as well as allergens such as grass pollen, house dust mite and cat.

Provokers of asthma cause transient acute airway narrowing in patients with asthma. These include physical factors such as inhaled cold, dry air, the cause of so called exercise-induced (more properly provoked) asthma and inhaled chemicals such as sulphur dioxide which provoke acute airway narrowing in individuals with hyper-responsive airways. Exercise can provoke an attack even in elite athletes (3). This is a provocation of existing asthma, which can occur in an individual who, in the absence of a sufficient exercise stimulus, may not previously have experienced symptoms or have been symptom free since childhood. Exercise does not initiate, but can provoke, asthma. Certain common therapeutic drugs which also can provoke asthma include, aspirin, non-steroidal anti inflammatory drugs and β -blockers, used in the treatment of high blood pressure and chronic heart failure. Anxiety and stress do not induce asthma but can be associated with a worsening of symptoms.

4. Several of these agents occur in the workplace and asthma can be both initiated/induced and provoked by the work environment. The term occupational asthma usually refers to asthma initiated by an agent encountered at work, while work -related asthma covers both this and asthma where attacks are provoked by an agent in the work environment.
5. Asthma caused by an agent inhaled at work can occur due to toxic damage to the airways, (irritant induced asthma) or as the outcome of an acquired specific hypersensitivity or allergic response (hypersensitivity - induced or allergic asthma). Irritant - induced asthma results from inhalation of irritant chemicals in high concentration while allergic asthma can be caused by a variety of substances inhaled over a period of time in usual day to day (non-toxic) concentrations. These include, inhaled proteins such as grain, flours, latex and animal proteins, inhaled chemicals such as isocyanates and platinum salts which bind to body proteins; (so-called haptens) and complex biological molecules such as pine wood resin (colophony) and hard wood dust. Occupational asthma (hypersensitivity-induced) is a prescribed disease under the Industrial Injuries Disablement Benefit Scheme. As well as recognising over 20 specific allergens, the terms of prescription include a further category, "any other sensitizing agent inhaled at work". Provided other factors have been excluded, a causal link is accepted if symptoms develop and subsequently recur, following exposure to a known sensitizer at work (4). Claims for irritant-induced asthma can be made under the accident provisions of the Scheme.
6. Hypersensitivity-induced asthma differs clinically from irritant induced asthma in the time course of symptoms. Irritant induced asthma develops within 24 hours of exposure to an irritant chemical in toxic concentrations and subsequently persists for at least three months. Hypersensitivity-induced asthma is the manifestation of an allergic reaction and occurs in a minority of those exposed to its cause. There is an initial asymptomatic period (the period of sensitisation), usually of months, after initial exposure to the causal agent. After the development of hypersensitivity-induced asthma, exposure to the causal agent in low doses, to which others are exposed without symptoms, and to which the individual was previously tolerant, can cause exacerbations of asthma with increased airway inflammation and responsiveness.
7. IMEG has identified no published papers on asthma incidence in the armed forces or any of the single services. Service personnel in the three services undertake a variety of principal service occupations and professions as in the civilian world. Some occupations seen in military context e.g. bakers, lab technicians, human and animal health professionals, animal handlers, environmental health

technicians, painters, especially spray painters, are at similar risk for occupational asthma as their civilian counterparts.

8. For irritant-induced asthma, symptoms should begin within 24 hours of exposure and persist for at least three months. Possible service exposures for irritant asthma include inhalation of chlorine, sulphur dioxide in high dose, ammonia smoke, and sealant (5) (6).
9. Provokers do not initiate asthma nor worsen the underlying asthma, airways inflammation and airway responsiveness. They provoke attacks in patients with pre-existing asthma so avoidance can reduce the frequency but not the existence, or severity of, asthma. Where asthma is initiated by an occupational agent, subsequent exposure should be avoided as rapidly and completely as possible to minimise the risk of increasingly severe and chronic asthma (7). However despite avoidance of exposure initiated by an agent inhaled at work, asthma may persist for many years, in some cases indefinitely.

Asthma and military service

10. Respiratory problems are a common cause of rejection for military service. Candidates with a history of wheezing including on exercise are normally refused entry. An exception is where a person with a history of wheeze or chest tightness has been free from symptoms and off all treatment for at least the previous four years and where
 - the history of wheeze was before the age of four with no episodes since that age
 - there is a proven history of a single episode of wheeze associated with respiratory infection since the age of four, but more than four years ago.
11. If a person has asthma in childhood there is significant risk of recurrence as an adult and this includes while serving (8). Fitness, employability and retention decisions for serving personnel are based on the individual case facts including the person's service and principal service occupation e.g. aircrew diver or chef. Issues for consideration include: confirmation of diagnosis; assessing clinical severity; optimum treatment; the presence of workplace allergens and irritants; and the scope for their reduction or elimination as well as alternative service employment (9).

Asthma as a recognised disease in the AFCS

12. To accept asthma as a recognised disease due to AFCS service we need:
 - i) onset and of symptoms after initial exposure at work to an agent recognised as able to induce irritant or hypersensitivity induced asthma and subsequent clinical pattern consistent with the specific occupational link
 - ii) pattern of symptoms consistent with irritant or hypersensitivity induced asthma
 - iii) symptoms and pulmonary function test results are consistent with asthma, i.e. reversible airway narrowing, and other types of respiratory disease are excluded.

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Topic 4 – Facial Disfigurement

1. The adequacy of AFCS awards for injuries leading to facial disfigurement was first raised by staff and patients at Headley Court and the topic was discussed at the IMEG visit to Headley Court in March 2012. Facial disfigurement is a feature of combat related injuries particularly Improvised Explosive Device (IED) explosions; such injuries also arise quite commonly in relation to road traffic accidents. In many cases the injuries sustained are complex, encompassed by several descriptors with an award for facial disfigurement paid in addition.
2. In relation to surgical scarring, Article 5 of the AFCS Order provides that a descriptor is to be construed as encompassing the expected effects of the primary injury and its appropriate clinical management, short of a discrete diagnosable disorder and including pain and suffering; the effects of operative treatment including pain, discomfort and scarring; the effects of therapeutic drug treatment; the use of aids and appliances, and associated psychological effects short of a discrete diagnosable disorder. Where surgical scarring is especially prominent or keloid formation is marked, it is likely that an additional award will be made.

AFCS current approach

3. The current AFCS tariff descriptors and award levels relevant to facial scarring are set out below.

TABLE 1 - BURNS

Item	Level	Description
4	6	Burns, with deep second degree, third degree or full thickness burns to the face or face and neck including one or more of the following: loss of or very severe damage to chin, ear, lip or nose, resulting in or expected to result in residual scarring and poor cosmetic result despite treatment and camouflage.
5	7	Burns, with deep second degree, third degree, or full thickness burns to the face or face and neck resulting in, or expected to result in, residual scarring and poor cosmetic result despite treatment and camouflage.
7	9	Burns, with deep second degree, third degree, or full thickness burns to the face or face and neck resulting in, or expected to result in, residual scarring and satisfactory cosmetic result with camouflage.

TABLE 2 – INJURY, WOUNDS and SCARRING

Item	Level	Description
11	7	Severe facial lacerations including one or more of the following: loss of or very severe damage to chin, ear, lip or nose, which have required, or are expected to require, operative treatment, but with poor cosmetic result despite camouflage.

Item	Level	Description
12	7	High velocity gun shot wound, deep shrapnel fragmentation or other penetrating injury (or all or any combination of these) with clinically significant damage to bone, soft tissue, structures and vascular or neurological structures of the head and neck, torso or limb, with complications, which have required, or are expected to require, operative treatment with residual permanent significant functional limitation or restriction.
15	8	Severe facial lacerations which have required, or are expected to require, operative treatment, but with poor cosmetic result despite camouflage.
22	9	High velocity gun shot wound, deep shrapnel fragmentation or other penetrating injury (or all or any combination of these) with clinically significant damage to soft tissue structures and vascular or neurological structures of the head and neck, torso or limb, which have required, or are expected to require, operative treatment with residual permanent significant functional limitation or restriction.
30	11	Severe facial scarring which produces a poor cosmetic result despite camouflage.
38	12	Severe scarring of face, or face and neck, or neck, scalp, torso or limb, where camouflage produces a good cosmetic result.
41	12	High velocity gun shot wound, deep shrapnel fragmentation or one or more puncture wounds (or all or any combination of these injuries) to the head and neck, torso or limb which have required, or are expected to require, operative treatment with substantial functional recovery.
49	13	Moderate facial scarring where camouflage produces a good cosmetic result.
52	13	Superficial shrapnel fragmentation or one or more puncture wounds (or both such injuries) to head and neck, torso or limb which have required, or are expected to require, operative treatment.
57	14	Moderate scarring of scalp, neck, torso or limbs, where camouflage produces a good cosmetic result.
58	14	Minor facial scarring.

TABLE 6 – NEUROLOGICAL DISORDERS

Item	Level	Description
24	9	Permanent isolated damage to one cranial nerve.
32	13	Permanent facial numbness including lip.
35	14	Permanent facial numbness which does not include the lip.

TABLE 8 – FRACTURES and DISLOCATIONS

Item	Level	Description
5	10	Multiple face fractures causing permanent significant cosmetic effect and functional limitation or restriction despite treatment.

Item	Level	Description
15	11	Multiple fractures to face, or face and neck where treatment has led, or is expected to lead, to a good cosmetic and functional outcome.
19	12	Fracture of mandible or maxilla, which has required, or is expected to require, operative treatment and which has caused, or is expected to cause, significant functional limitation or restriction beyond 26 weeks.
40	13	Fracture of zygoma which has caused, or is expected to cause, significant functional limitation or restriction beyond 26 weeks.

Argument

- Consideration of the topic by IMEG included discussion at Headley Court with patients and staff. This was informative and IMEG was privileged to have patients share their experiences and perspectives, including in relation to employment. While functionally able to work they reported difficulties both experienced and anticipated, particularly in getting into work. A core aim of the AFCS is to support an empowering ethos of disability and disfigurement e.g. as does Changing Faces. IMEG also supports the right of people with all degrees of facial disfigurement due to congenital malformation, acquired disease or accidental injury to be accepted within family and community including in paid work. IMEG at the same time recognises the challenges of facial disfigurement and **recommends** some revalorisation of the current tariff to reflect these concerns. The changes are emboldened in the Tables below.

Recommended changes

- In Table 1, Item 4 Level 6 should be increased to Level 5 with GIP maintained at Band B (75%). In Table 2, Item 11 should increase from Level 7 to Level 6 with GIP rising from Band C (50%) to Band B (75%). Similarly Table 2 items 15 and 30 should attract lump sum awards one level higher; Item 15 moving from Level 8 to Level 7 and Item 30 from Level 11 to Level 10. In both cases, GIP band remains the same. IMEG **recommends** an increase in GIP band for Table 2 Item 11, to bring the deemed impact on civilian employability of this injury into line with the injury described at Table 1 Item 4. Discussion at Headley Court confirmed the enormity of these cosmetically similar injuries and their probable adverse impact on employability, especially getting into employment.

TABLE 1 – BURNS

Item	Level	Description
4	5	Burns, with partial, deep or full thickness burns to the face or face and neck including one or more of the following: loss of or very severe damage to chin, ear, lip or nose, resulting in or expected to result in residual scarring and poor cosmetic result despite treatment and camouflage.
5	7	Burns, with partial, deep or full thickness burns to the face or face and neck resulting in, or expected to result in, residual scarring and poor cosmetic result despite treatment and camouflage.
7	9	Burns, with partial, deep or full thickness burns to the face or face and neck resulting in, or expected to result in, residual scarring and satisfactory cosmetic result with camouflage.

TABLE 2 – INJURY, WOUNDS and SCARRING

Item	°	Description
11	6	Severe facial lacerations including one or more of the following: loss of or very severe damage to chin, ear, lip or nose, which have required, or are expected to require, operative treatment, but with poor cosmetic result despite camouflage.
12	7	High energy transfer gun shot wound, deeply penetrating missile fragmentation or other penetrating injury (or all or any combination of these) with clinically significant damage to bone, soft tissue, structures and vascular or neurological structures of the head and neck, torso or limb, with complications, which have required, or are expected to require, operative treatment with residual permanent significant functional limitation or restriction.
15	7	Severe facial lacerations which have required, or are expected to require, operative treatment, but with poor cosmetic result despite camouflage.
22	9	High energy transfer gun shot wound, deeply penetrating missile fragmentation or other penetrating injury (or all or any combination of these) with clinically significant damage to soft tissue structures and vascular or neurological structures of the head and neck, torso or limb, which have required or are expected to require, operative treatment with residual permanent significant functional limitation or restriction.
30	10	Severe facial scarring which produces a poor cosmetic result despite camouflage.
38	12	Severe scarring of face, or face and neck, or neck, scalp, torso or limb, where camouflage produces a good cosmetic result.
41	12	High energy transfer gun shot wound, deeply penetrating missile fragmentation or other penetrating injury (or all or any combination of these) to the head and neck, torso or limb which have required, or are expected to require, operative treatment with substantial functional recovery.
49	13	Moderate facial scarring where camouflage produces a good cosmetic result.
52	13	Superficial missile fragmentation or one or more puncture wounds (or both such injuries) to head and neck, torso or limb which have required, or are expected to require, operative treatment.
57	14	Moderate scarring of scalp, neck, torso or limbs, where camouflage produces a good cosmetic result.
58	°	Minor facial scarring.

TABLE 6 – NEUROLOGICAL DISORDERS

Item	Level	Description
24	9	Permanent isolated damage to one cranial nerve.
32	13	Permanent facial numbness including lip.
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TABLE 8 – FRACTURES and DISLOCATIONS

Item	Level	Description
5	10	Multiple face fractures causing permanent significant cosmetic effect and functional limitation or restriction despite treatment.
15	11	Multiple fractures to face, or face and neck where treatment has led, or is expected to lead, to a good cosmetic and functional outcome.
19	12	Fracture of mandible or maxilla, which has required, or is expected to require, operative treatment and which has caused, or is expected to cause, significant functional limitation or restriction beyond 26 weeks.
40	13	Fracture of zygoma which has caused, or is expected to cause, significant functional limitation or restriction beyond 26 weeks.

6. For accuracy and to reflect current UK practice, some revision of the wording of descriptors in the Burns (Table 1) and Injury, wounds and scarring (Table 2) tables is **also recommended**. Table 1 descriptors should be recast using the terms “superficial” “partial thickness” and “deep/full thickness”. Similarly Table 2 descriptors currently using the form “High velocity gun shot wound, deep shrapnel fragmentation or other penetrating injury etc” which should read “High energy transfer gunshot wound, deeply penetrating missile fragmentation or other penetrating injury (or all or any combination of these) etc” in the appropriate descriptors.
7. All AFCS awards include an element for psychological symptoms short of a discrete diagnosable disorder. Where facial disfigurement due to AFCS service leads to associated development of a diagnosable mental health problem, an additional award may be made.
8. A modern approach to facial scarring and self-image must however go beyond appropriate compensation. If stigma and perceived or actual discrimination are to be reduced and eventually eliminated, education is key. This includes education of health professionals both in service and in the civilian community. People with visible difference or scarring of any kind and site are usually not ill but they may need help with camouflage or psychosocial support. IMEG is aware of and supports current work across the UK to raise awareness of military life and challenges amongst civilian health professionals, especially in primary care. Given the contribution of the UK armed forces and Prof Sir Archibald McIndoe to the development of reconstruction surgery and camouflage techniques in the second world war, it seems appropriate that the topic of living with facial disfigurement is covered at some of the many local and national events currently being undertaken at the NHS Armed Forces Networks in England and equivalents in the devolved administrations.

Conclusion and Recommendations

9. IMEG are grateful for the opportunity to discuss and consider this important topic and would **recommend** some revalorisation of awards for more serious injuries as set out above and some revision of burn (Table 1) and injury (Table 2) descriptors. We also support education action to tackle stigma and discrimination and to improve the skills and understanding of health professionals in interacting and supporting people with visible difference.

