Health status and clinical diagnoses of 3000 UK Gulf War veterans

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SUMMARY

Up to June 2001, 3000 British veterans of the Gulf War had sought advice from a special medical assessment programme established because of an alleged Gulf War syndrome. After assessment those attending were classified as completely well, well with symptoms, well with incidental diagnoses treated or controlled, or unwell (physically or mentally). Mental illness was confirmed by a psychiatrist. The first 2000 attenders have been reported previously. The present paper summarizes findings in all 3000.

2252 (75%) of those attending were judged 'well', of whom 303 were symptom-free. Medical diagnoses were those to be expected in such an age-group (mean age 34 years, range 21–63). No novel or unusual condition was found. In 604 of the 748 unwell veterans, a substantial element of the illness was psychiatric, the most common condition being post-traumatic stress disorder.

The healthcare requirements of the Gulf veterans seen in this programme can therefore be met by standard National Health Service provision.

INTRODUCTION

Some 53 462 British military personnel were deployed to the Gulf over the course of the 1990–1991 conflict. Whilst not all were engaged in combat duties, those providing support to the fighting formations, whether medical, logistic resupply or vehicle recovery, were thus similarly exposed to the dangers of the front line. All were subject to the stresses of deployment, separation from families and the threat of chemical and biological warfare (CBW).

After the Gulf conflict, some veterans complained of non-specific symptoms which have popularly been termed Gulf War syndrome. As a result, the Gulf Veterans' Medical Assessment Programme (GVMAP) was established in 1993 by the Ministry of Defence. Clinical findings of the first and second 1000 veterans have been published[1,2]. We review the diagnoses of the 3000 Gulf War veterans (5.6% of the deployed force) referred to this unit using the same functional approach to wellbeing[2].

Veterans were specifically asked about possible health exposures as a result of Gulf service and these are discussed.

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METHODS

Case series

This report is based on 3000 consecutive serving or former serving Armed Forces personnel who attended GVMAP between 11 October 1993 and 18 June 2001. Patients' military details were checked against the Ministry of Defence's database to verify Gulf service at any time between 1 September 1990 and 30 June 1991.

Diagnoses

The GVMAP is a service which is free of NHS contractual arrangements. Veterans are seen on referral from their medical attendants and there are no contractual or financial barriers to their attending. There is therefore considerable self-selection.

The same procedures were used as previously described[1,2]. Psychiatric diagnoses were confirmed by civilian or Service consultant psychiatrists. Individuals thought to have psychiatric disorder at their initial assessment but whose subsequent formal psychiatric diagnosis was not available were classified as 'no formal psychiatric diagnosis' (NFPD). For the purpose of this paper NFPD has been considered a psychiatric diagnosis.

Health status definitions

We used our previously described health status definitions[2]—namely, well completely, well with symptoms,

well with incidental diagnoses, and unwell. Some patients classified as having NFPD were considered well because they were functioning in a fully competent manner.

RESULTS

All 3000 case notes were available for inspection.

Table 1 shows the sociodemographic data for the 3000 Gulf veterans seen compared with all deployed Gulf veterans. The main differences in those assessed by GVMAP are the over-representation of Army, women and reservists and the under-representation of officers. Symptoms are shown in Table 2. Multiple symptoms were associated with psychiatric disorders.

Table 3 illustrates changes in health status. The proportion of symptom-free veterans shows over time a rising trend. 75% of the total assessed were well. For those whom we classified as well with incidental diagnoses, the proportions in the three groups were 62%, 31% and 40% (*see* Table 3). The proportion of unwell veterans, mainly those with psychiatric conditions, organic disease, or both, was at first 32% and then remained steady at around 21% up to the end of the series (*see* Table 3). Neither the symptomatology nor the diagnoses in the third 1000 differed from those in the second 1000; the trend is not changing with time.

The main diagnostic findings by International Statistical Classification of Diseases[3] in the overall 3000 are shown in Table 4 (see also Table 3). As noted in the second series[2], patients with ICD-10 chapter 18 main diagnoses remain less than 1%, and in the overall group 13%. There was no unusual pattern of disease.

Psychiatric disorders are shown in Table 5. Post-traumatic stress disorder (PTSD) was the most common psychiatric diagnosis and was usually Gulf related. Of these, 49% were first diagnosed by general physicians as a result of attendance at GVMAP.

DISCUSSION

Our data do not represent disease prevalences because individuals attending the GVMAP are self-selected and probably unrepresentative of Gulf veterans[1,2]. Our analysis shows that 75% of those attending were essentially well. The remaining 25% were unwell with psychiatric disorders, organic disease or both. There were no unusual or unique

Table 1 **Sociodemographic data**

	Overall series Gulf veterans (n=3000)	*All Gulf veterans (n=53 462)*	*χ^2 test for heterogeneity*
Service			
Army	2292 (76)	37 434 (70)	
Royal Navy	270 (9)	5964 (11)	
Royal Air Force	438 (15)	10 064 (19)	$P<0.0005$
Sex			
Male	2887 (96)	52 227 (98)	
Female	113 (4)	1235 (2)	$P<0.0005$
Rank*			
Officers	230 (8)	5956 (11)	
Other ranks	2767 (92)	47 506 (89)	$P<0.0005$
Type of engagement*			
Regulars	2853 (95)	52 370 (98)	
Reservists	142 (5)	1092 (2)	$P<0.0005$
Age on 1 January 1991 (years)*			
<20	326 (11)	6376 (12)	
20–24	1000 (33)	18 988 (36)	
25–29	699 (23)	12 874 (24)	
30–34	529 (18)	7886 (15)	
35–39	264 (9)	4347 (8)	
⩾40	181 (6)	2991 (8)	$P<0.0005$

Values are numbers (percentages)
*Information was lacking on engagement type for 5, on rank for 3 and on age for 1

Table 2 **Symptoms in the first, second and third series of Gulf veterans**

Symptom groups	*1st series* Gulf veterans (n=1000)*	*2nd series Gulf veterans (n=1000)*	*3rd series Gulf veterans (n=1000)*
Affective	498 (50)	486 (49)	377 (38)
Joints and muscles, aches and pains	396 (40)	466 (47)	305 (31)
Fatigue	421 (42)	452 (45)	257 (26)
Cognitive	263 (26)	411 (41)	253 (25)
Headaches and migraine	258 (26)	309 (31)	172 (17)
Sleep difficulties	216 (22)	220 (22)	233 (23)
Respiratory	244 (24)	233 (23)	142 (14)
Skin lesions	196 (20)	217 (22)	166 (17)
GIT	221 (22)	204 (20)	153 (15)
Sensory	115 (12)	168 (17)	90 (9)
ENT	153 (15)	109 (11)	76 (8)
Sweats and fever	105 (11)	122 (12)	87 (9)
Weight changes	99 (10)	77 (8)	71 (7)
Dizziness, blackouts	80 (8)	107 (11)	49 (5)
GU	114 (11)	49 (5)	57 (6)
Eyes	73 (7)	70 (7)	52 (5)
Colds, flu etc.	49 (5)	104 (10)	37 (4)
Alcohol and substance abuse	61 (6)	59 (6)	63 (6)
Reproductive	26 (3)	41 (4)	47 (5)
Palpitations†	—	35 (4)	47 (5)
Dental‡	—	34 (3)	26 (3)
Not classified/other	193 (19)	—	—
No symptoms	43 (4)	115 (12)	219 (22)

Values are numbers (percentages)
*The symptom count in the 1st series differs from that of Coker *et al*.[1] because the counts have been reassessed
†Palpitations for the first series are included in the not classified/other category
‡Dental symptoms for the first series are included in the not classified/other category
§This includes those totally symptomless individuals and those symptomless with known disease
GIT=gastrointestinal; ENT=ear, nose and throat; GU=genitourinary

patterns of disease suggestive of a specific post-conflict organic condition.

20% of those attending GVMAP were psychiatrically unwell, and psychiatric diagnoses accounted for 81% of overall ill-health. PTSD is the principal psychiatric diagnosis (*see* Table 5) and is a major consideration when assessing Gulf veterans with vague, multiple or unexplained symptoms[4]. The 12% prevalence of PTSD in this series compares with a prevalence of 13.2% for a questionnaire-derived proxy for PTSD in a random sample of Gulf veterans, 4.7% in Bosnia veterans and 4.1% in a matched military population who deployed to neither theatre[5]. It also compares with a reported 8% lifetime prevalence of PTSD in the American population and 30% among US Vietnam veterans[6]. In assessing occupational risk factors for ill-health among Gulf veterans, Ismail found that generally combat duties did not predispose to post-traumatic stress reaction any more than combat support or logistic duties[7]. Eleven years after the conflict, we continue to recognize cases of Gulf-related PTSD not previously diagnosed[8]. There are many reasons for late diagnosis of the condition. These include late presentation, which may reflect late recognition by the patient, stigma and concerns about the effects of a psychiatric diagnosis on careers, especially during a period when redundancy programmes were in force (this was true of the UK Armed Forces in the 1990s). They may also include a perception by the Service population that psychological illness associated with military service is likely to be misunderstood by the civilian medical community. This is an important consideration for civilian doctors. The *de-novo* diagnosis of 49% of all cases of PTSD seen at

Table 3 **Diagnosis-based findings in Gulf veterans for first, second, third and overall series**

	1st series (n=1000)	*2nd series* (n=1000)*	*3rd series (n=1000)*	*Overall series (n=3000)*
Well	682 (68)	794 (79)	776 (78)	2252 (75)
Well completely (symptom-free)	33 (3)	101 (10)	169 (17)	303 (10)
Well with symptoms but no disease	28 (3)	384 (38)	207 (21)	619 (21)
Well with incidental diagnoses	621 (62)	309 (31)	400 (40)	1330 (44)
Only psychiatric conditions	48 (5)	61 (6)	57 (6)	166 (6)
Only organic conditions	477 (48)	232 (23)	311 (31)	1020 (34)
Both	96 (10)	16 (2)	32 (3)	144 (5)
Unwell	318 (32)	206 (21)	224 (22)	748 (25)
Only psychiatric conditions	73 (7)	145 (15)	123 (12)	341 (11)
Only organic conditions	74 (7)	31 (3)	39 (4)	144 (5)
Both	171 (17)	30 (3)	62 (6)	263 (9)

Values are numbers (percentages); NFPD (no formal psychiatric diagnosis) is considered as a psychiatric condition
*Figures for the second series have been updated since published by Lee *et al*. (Ref. 2)

GVMAP emphasizes the need for adequate National Health Service resourcing for psychiatric care of veterans who are now in the community.

One in five new consultations in general practice involves such multiple, vague symptoms, for which no organic causes are found[9]: common symptoms are unexplained chest, back or abdominal pain, tiredness, dizziness, headaches, ankle oedema, dyspnoea, insomnia and numbness. Gulf veterans' symptoms are very similar. Such symptoms are the reason for almost half of all primary care consultations, yet only 10–15% followed for up to one year were shown to have an organic basis[10]. Reid *et al*.[11]

Table 4 **Most frequent conditions diagnosed in the first, second and third series of Gulf War veterans, by International Statistical Classification of Diseases Chapter 10 (ICD-10 chapter)**

Chapter title (codes)	*1st series (n=1000)*	*2nd series* (n=1000)*	*3rd series (n=1000)*	*Overall series (n=3000)*
2 Neoplasms (C00-D48)	40 (4)	16 (2)	25 (3)	81 (3)
of which malignant (00-97)	*20* (*2*)	*15* (*2*)	*17* (*2*)	*52* (*2*)
4 Endocrine, nutritional, and metabolic diseases (E00-90)*	43 (4)	15 (2)	25 (3)	83 (3)
5 Mental and behavioural disorders (F00-99)	390 (39)	217 (22)	204 (20)	811 (27)
of which psychiatric disorders (F10-F43)†	*298* (*30*)	*207* (*21*)	*182* (*18*)	*687* (*23*)
6 Diseases of the nervous system (G00-99)	103 (10)	36 (4)	45 (5)	184 (6)
9 Diseases of the circulatory system (100-99)	43 (4)	32 (3)	50 (5)	125 (4)
10 Diseases of the respiratory system (J00-99)	155 (16)	62 (6)	68 (7)	285 (10)
11 Diseases of the digestive system (K00-93)	137 (14)	34 (3)	68 (7)	239 (8)
12 Diseases of the skin and subcutaneous tissue (L00-99)	86 (9)	48 (5)	77 (8)	211 (7)
13 Diseases of the musculoskeletal system and connective tissue (M00-99)	182 (18)	58 (6)	113 (11)	353 (12)
14 Diseases of the genitourinary system (N00-99)	55 (6)	19 (2)	28 (3)	102 (3)
18 Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (R00-99)	387 (39)	2 (0)	6 (1)	395 (13)
of which, no other diagnosis	*53* (*5*)	*1* (*0*)	*4* (*0*)	*58* (*2*)
21 Factors influencing health status and contact with health services (Z00-99)	163 (16)	506 (51)	388 (39)	1057 (35)
of which no other diagnosis	*61* (*6*)	*485* (*49*)	*376* (*38*)	*922* (*31*)
Diagnosis in other chapters	87 (9)	23 (2)	32 (3)	142 (5)
Patients with a classification of NFPD	99 (10)	50 (5)	100 (10)	249 (8)

Values are numbers (percentages); some patients had several diagnoses within the same ICD-10 chapter
*Diagnosis of obesity has been excluded from the Endocrine, Nutritional, and Metabolic Diseases Chapter
†Although alcohol and substance abuse (F10-19) were excluded from the psychiatric disorders in the first 1000 paper they have been included here for comparative purposes

Table 5 **Psychiatric diagnoses for 3000 Gulf veterans**

Disorders	*No.*	*(% of series)*
Post-traumatic stress disorder	369	(12)
Without co-morbidity	233	(8)
With co-morbidity	136	(5)
Depression	85	(3)
Alcohol abuse	59	(2)
Substance abuse	23	(1)
Depression	170	(6)
Alcohol abuse	66	(2)
Substance abuse	30	(1)
Adjustment disorders	55	(2)
Anxiety disorders	38	(1)
Reaction to severe stress	4	(0)
Other psychiatric disorders	23	(1)
No formal psychiatric diagnosis*	249	(8)
Total	914	(30)

Some patients may have more than one diagnosis: includes both well and unwell
*249 patients are thought to have had a psychiatric disorder but no confirmed diagnosis was available from a consultant psychiatrist

estimated the prevalence of medically unexplained symptoms in patients who most frequently attended outpatient facilities. They found that, in a sample of 361 medical records examined from 400 frequent attenders, 27% had one or more consultations in which the condition was medically unexplained. No reasons for abdominal pain or chest pains, headache or backache were found.

The problem of somatization has lately been re-examined[12,13]. Bass *et al.*[12] wrote: 'The tendency to conceptualise medical problems in biological terms is powerful and medical practitioners are often reluctant to explore the non-biological aspects of a patient's case'. Over-investigation of such patients risks strengthening belief of an organic condition. These patients are likely to have underlying depressive or anxiety disorders[13]. If, as we have found, symptomatic Gulf War veterans are no different from many civilians with medically unexplained symptoms, then suggestions that veterans have 'Gulf War syndrome' or a unique Gulf-related illness may be detrimental to their best interests.

Results of veterans' assessment programmes in the UK and the USA indicate neither an abnormal pattern of disease which might be expected to result in worsening health with time nor the presence of any unique Gulf-related condition[1,2,14–16]. Veterans do not have an excess of hospital admissions[17,18] or have children with excess birth defects[19,20]. While there was a small statistically significant increase in deaths among American Gulf veterans[21–23], this was due to accidents not disease; moreover, a recent study by Kang's group[24] does not show any significant difference in mortality rates. A UK study showed fewer deaths from disease but more accidental deaths among Gulf veterans than in controls; these results did not reach statistical significance[25]. There were no excess deaths from cancers. Our clinically derived series from 3000 veterans supports the view of Unwin *et al.*[5] that veterans' physical and social disability was generally not severe.

The percentage of well individuals (75%) is high. It must be emphasized that around one-third (*see* Table 4) attend not because they have symptoms but because they have worries about future health, malignancies or birth defects. Some veterans want reassurance because of widespread publicity given to Gulf health issues, others seek a comprehensive medical assessment before leaving the Services, whilst yet others need reassurance about their health prospects.

Gulf exposures

Many claims have been made about exposures that could adversely affect the health of veterans. It has been almost impossible to obtain detailed, validated and individual exposure histories because of the difficulties in collecting such data in a force deployed for battle. Here we briefly describe the exposures associated with military deployment to the Gulf.

Apart from participation in combat operations, short-notice deployment to the Gulf to face an enemy with not only a CBW capability but also a record of having employed such weapons ranks high as a life-event stressor. The CBW threat was ever-present and affected troops in the whole South Arabian peninsula as evidenced by the requirement to take personal defensive measures such as donning protective clothing against CBW attack and taking to air-raid shelters from as early as 3 December 1990 (some 6 weeks before the air campaign started in response to detection of Scud missile launches)[26]. Personnel based in large static units such as airfields, ports and major logistic installations may have been at greater risk of such attacks than those serving in mobile combat formations in the desert.

Personnel deployed to the Gulf were brought up to date with routine immunizations (TABT, polio, yellow fever and cholera). Medical staff were also immunized against hepatitis B and a small number of personnel were immunized against meningococcal groups A and C. In theatre, immunization against biological warfare agents was undertaken, with all forces being immunized against anthrax (with pertussis as an adjuvant) and plague. A Ministry of Defence report found no evidence that additional, or still classified, vaccines had been used[27].

Those deployed early to the Gulf (September 1990 to early December 1991) took proguanil and chloroquine as malarial prophylaxis. Less than 20% fell into this category. Doxycycline (BATS) was supposed to be taken only after attack with biological weapons; this never occurred. Pyridostigmine (NAPS) 30 mg three times daily was ordered to be taken as a pre-treatment to protect the cholinesterase system in the event of nerve agent attack. The maximum duration of this prophylaxis was about 6 weeks.

Some personnel were exposed to the smoke and fumes from burning oil wells. The possible effects on health of the smoke have been examined and reports have concluded that ill-effects are unlikely to occur[28,29]. Depleted uranium was used in munitions designed to attack hardened armour. Its toxicological profile has been characterized[30] and three major reviews[31–33] have concluded that it is unlikely to be implicated in Gulf veterans' illnesses.

Possible exposure to organophosphate compounds (OP) has received considerable attention. Pesticide spraying was undertaken by trained environmental health personnel. Pesticide smokes (swing fog) were used but these did not contain OP[34]. Some personnel may well have used their own supplies of insecticide. The other potential sources of OP were nerve agents. Chemical attack on coalition forces has never been verified. It is now known that chemical alarms were misleading because their sensors were highly sensitive and specificity was low, leading to many false alarms. Chemical agent release from demolition of Iraqi chemical weapons occurred after the conflict. The spread of the resultant toxic plumes has been modelled[35], and the conclusion is that UK forces, if exposed, would not have received toxic doses. Reports on sheep-dippers have acknowledged the possibility of long-term damage from exposure to OP compounds, but that is largely confined to people who have been acutely poisoned[36,37]. There were no cases of acute OP poisoning during the Gulf conflict.

We have found no clinical evidence to suggest that the known effects of the exposures affected the health of the veterans. We have not seen any condition that could be attributable to depleted uranium or pyridostigmine bromide.

Conclusions

Many of those who consulted us had multiple and non-specific symptoms very similar to those experienced by patients seen in general practice and National Health Service hospitals[2]. Unexplained physical symptoms are common in primary care[9], as they are amongst Gulf War veterans[2]. Such veterans have many of these 'normal' symptoms, and they may even have had them before the war[38]. Many factors affect perceptions of health and illness and, while such factors have little to do with the origin of symptoms, they contribute to illness concerns[39].

Although 75% of patients attending are well, many still need reassurance. Amongst the unwell, the commonest Gulf-related illness is PTSD. There has been no altered pattern of health concerns amongst veterans presenting to our unit over time, indicating there is no late development of unusual or novel post-Gulf-conflict health problems. Hyams *et al*.[39] showed after four separate conflicts that veterans' health concerns had many symptoms in common. Most of these are evident in the Gulf veterans we have seen. Many experience the expected array of symptoms[17,40] whilst functionally competent, but others have psychiatric or organic disorders or combinations thereof.

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