Role of vaccinations as risk factors for ill health in veterans of the Gulf war: cross sectional study

We feel that the conclusion of an association between ill-health in Gulf veterans and immunisations given during the deployment reached by Hotopf and colleagues may be flawed by inadequate data. [1] [2]

Prior to deployment routine vaccinations are brought up to date and deployment specific vaccinations are administered. The Gulf conflict saw the requirement to implement a vaccination programme against biological warfare (BW) agents, hence the differences between immunisations given before and during deployment. The authors acknowledge that personnel received vaccines both before and during deployment, however, the results indicate that only 38% of their sample fall into that category. We find this proportion to be surprisingly low. The implication that around a third of the force received no vaccinations during the deployment or that a similar proportion had none before deployment is at odds with our review of the immunisation programme. [3]

The finding that only some 30% received cholera before deployment is unexpected. The policy was for all to receive the vaccine prior to deployment and one would expect records to reflect this. Indeed records for 205 General Hospital show an uptake of 93% for cholera vaccine. Other apparent anomalies in the presented results suggest data quality problems. We know that over 60% of the total force had deployed before the BW immunisation programme commenced. We also know that there was "a high uptake - over 75% generally and closer to 100% in some units - across all three Services of the first doses of anthrax and pertussis, but thereafter the uptake is reduced and the overall pattern changes". [3] We also know that codewords, such as "Cutter", "Victor 1", "Victor 2" and "Biological" were used for vaccines and appear on records that we have seen but do not receive a mention in the paper. How were these anomalies dealt with?

The Ministry of Defence (MOD) has acknowledged that there were deficiencies in record keeping. [4] The Field Medical Records system was
not designed for recording immunisations given during deployment and there were deficiencies in recording pre-deployment immunisations. The authors do not adequately discuss this aspect of the data quality. The reader may well assume that the vaccination records used accurately reflect immunisations administered in association with the Gulf deployment. They do not and we wonder if the only conclusion that can be drawn is that made by the team's first paper on Gulf Veterans' illnesses, that there is a weak association between multiple immunisations and illness in Gulf veterans.


**Competing interests:** No competing interests

05 January 2001

J P G Bolton
Medical Adviser
*Gulf Veterans’ Illnesses Unit*

**Re: Vaccinations and Ill Health in Veterans of the Gulf War: a response to correspondence**

Editor

In response to Chris Baker - sometimes 'anecdote and unsubstantiated claims' remain the only strong evidence on which to base conclusions; I see little difference overall when I analyse the MOD data and it's conclusions, despite the intensive analysis of collated data from the many and varied units deployed to the Gulf. The MOD is admitting that much important information - documentation and oral - is either already destroyed, was never completed or cannot be demonstrated to be an effective source of fact yet it bases its conclusions largely on that kind of evidence.

Chris's statement "our view (including the USA) is that there is no evidence that veterans were exposed to chemical or biological weapons", cannot be supported with
the facts displayed on the MOD web-site to which he directs us. Perhaps he ought to use words found on that site...."no confirmed evidence".

There is much evidence for probable chemical and biological attacks on coalition troops. Para. 134 and 135 of the MOD report entitled 'A review of the suggested exposure of UK Forces to chemical warfare agents in Al Jubayl during the Gulf war conflict' dated January 2000 states "....there is an element of doubt about the assessment that UK troops on Al Jubayl on 19th January 1991 were not exposed to Iraqi chemical agents...we cannot dismiss the two detector papers that had apparently responded to the presence of CW agent and that were analysed at CDC Porton Down....we cannot provide a positive explanation for the events that did occur in the small hours of that morning. What caused the one or two sets of explosions; the flashes; the mist of vapour at MRG11; the liquid drops reported by other individuals (a corporal, a CSM and a SO1); and the positive readings on CW agent detection and monitoring equipment".

French and Czechs report (validated by the USA but left as 'indeterminate' by the MOD) CWs (tabun, sarin and mustard identified) around the same period of the conflict (19th to 24th January 1991) suggesting perhaps an intensive deployment of CW weaponry during that period at various locations by the Iraqis.

What of 'the veteran' who reported post-SCUD impact alarms on 20th January consistent with other reports? and the possible 'aflatoxin' attack via an unidentified transporting system at Al Jubayl on 19th/20th January, followed by 10 personnel showing signs of jaundice within a couple of days of contamination - Porton Down suspected it could be aflatoxin (a liver toxin). AWACs noted a propeller-driven aircraft coincident with the '2 bangs, flashes and white cloud drifting towards troops' which was never identified as an allied craft. These and many other incidents are noted by the MOD and can only be dealt with by supposition. The events followed closely on the heels of intelligence reports which said that CW were seen being loaded onto transport by Iraqis on 18th January and coalition troops were warned they were soon likely to be used.

This is obviously circumstantial evidence but when collated it suggests a strong probability that Iraq was ready and prepared to use chemicals and biologicals early in the conflict, and that these were used and detected in areas of the theatre by various units amongst the many false alarms expected under such circumstances.

To say 'there is no evidence' is untrue and may do a great injustice to the suffering, as well as deceased, service personnel who are still affected by such intransigence. For example, the 'Assessment' (in the above-quoted MOD report) is that UK troops were almost certainly not exposed to Iraqi CW agents at Al Jubayl on 19th January 1991 and is based on three facts:
1. "There is no evidence to suggest any delivery system Iraq was thought to have available were used (aircraft, super guns, mortars, artillery shells, rockets, bombs, SCUDS) yet a propeller-driven aircraft was identified by AWACS at the right time in the right place. Yet what about the more obvious Unmanned Aerial Vehicles (UAV), as used by coalition forces and recently known to be prepared for such delivery by Iraq, was this mode of delivery not considered?

2. No evidence of any casualties. Then what about the 10 jaundiced UK troops; and the 'Gulf War casualties' who had been stationed at Al Jubayl on 19th January - US Naval Mobile Construction Battalion 24 personnel who have reported health problems since being involved in those alerts and whose plight led to criticism of DoD (OSAGWI) investigations of Gulf War chemical and biological incidents by the USGAO which criticised the OSAGWIs case narrative for excluding those individuals' experiences.

3. Porton Down’s examination of equipment - "with one minor exception" did not indicate exposure to Iraqi CW agent. But there was an exception!

Decisions by MOD reporters of what will be 'fact' and what 'non-fact' does not alter the fact that Chris Baker’s statement that there is "no evidence" is untrue.

Regards

John H.

Competing interests: No competing interests

20 August 2000

John P Heptonstall
Director of the Morley Acupuncture Clinic and Complementary Therapy Centre
West Yorkshire

Addendum

It has been pointed out to us by Professors Graham Dunn and Brian Everitt that an alternative statistical method would have been more appropriate in our paper (1) on vaccines in Gulf War veterans. In our paper we assessed the effect of multiple vaccines received both before and during deployment to the Gulf as two separate exposures. We found that vaccines received before deployment were not associated with most of our outcomes, whereas vaccines received during deployment were. We performed the analysis in this way as we were testing a specific a priori hypothesis based on the theory put forward by Rook and Zumla (2). However, we did not make a direct comparison between these two exposures.

We have now performed a series of further analyses in which we entered two separate variables (vaccines received before deployment and vaccines received during deployment) in the same model and calculated the
difference in regression parameters for these exposures, with 95% confidence intervals, shown in the table. The table indicates that there are no statistically significant differences in these regression parameters. For four outcomes (Center for Disease Control Gulf War illness, fatigue, posttraumatic stress reaction and SF-36 health perception) the 95% confidence intervals are asymmetrical about zero, consistent with multiple vaccines received during deployment having a different effect than vaccines received prior to deployment.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Difference (95% CI)</th>
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<tbody>
<tr>
<td>CDC</td>
<td>0.18 (-0.02, 0.39)</td>
</tr>
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<td>Fatigue</td>
<td>0.17 (-0.03, 0.37)</td>
</tr>
<tr>
<td>GHQ</td>
<td>0.02 (-0.18, 0.22)</td>
</tr>
<tr>
<td>PTSR</td>
<td>0.29 (-0.01, 0.59)</td>
</tr>
<tr>
<td>SF-36 physical function</td>
<td>0.65 (-0.58, 1.88)</td>
</tr>
<tr>
<td>SF-36 health perception</td>
<td>1.56 (-0.70, 3.82)</td>
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(CDC - Center for Disease Control and Prevention Gulf war illness; GHQ - General Health Questionnaire; PTSR - post traumatic stress reaction; SF-36 - short form 36)

Our paper (1) showed large differences in the effects of multiple vaccines before and during deployment. The results of this alternative method suggest that there may be no difference in the effects between vaccines received before, as opposed to during deployment. However, these findings do not necessarily contradict those reported in our paper: there may still be an effect which we are unable to detect because a much larger sample size is required in the revised analysis. We believe it is reasonable to conclude that multiple vaccines received during deployment have a greater effect than those received prior to deployment, but we have not demonstrated that multiple vaccines received prior to deployment are without risk. We emphasise, as we did in the paper, that these are preliminary findings which require replication, and also that they have no bearing on public health vaccination programmes. Our results still indicate, as in our earlier paper (3) that multiple vaccines may be an important exposure for illness in veterans of the Gulf war. Our earlier paper also showed that the effect of multiple vaccines was specific to deployment in the Gulf as opposed to Bosnia.


**Competing interests:**

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15 August 2000

Matthew Hotopf

**Vaccinations and Ill Health in Veterans of the Gulf War: a response to correspondence**

EDITOR -- Both John Heptonstall and Professor Malcolm Hooper in commenting on the article by Hotopf et al rely on anecdote and unsubstantiated claims. It is important that such debate remains grounded in fact. The Ministry of Defence has published a great deal of information about the Gulf War, and this is available on our website at [http://www.gulfwar.mod.uk](http://www.gulfwar.mod.uk). This information includes a number of papers dealing with incidents where it has been suggested that veterans were exposed to chemical or biological weapons. Our view (which is shared by the United States) remains that there is no evidence that such weapons were used by Iraq. The Ministry of Defence has also published papers explaining the policy underlying the use of medical countermeasures against biological warfare agents, and the implementation of the antibiological warfare vaccination programme in 1991.

Professor Hooper makes much of "another report" indicating that more than 100 sick UK personnel were returned almost immediately to the UK from the Kuwait theatre of operations. The Ministry of Defence has never heard of such a report. It is unaware of any incident of the sort that Professor Hooper purports to describe, whether related to adverse vaccination reactions or any other reason. In any case his argument is irrelevant, since if these people were ever in the Middle East they would have been included in the Ministry of Defence database, from which the subjects of the Hotopf research were randomly selected.

Professor Hooper is right to say that medical record keeping was poor and incomplete, but he is entirely wrong to say that there was a policy to destroy such records. We found no evidence of such a policy in our detailed investigation of the immunisation programme. Professor Hooper quotes the House of Commons Defence Committee Seventh report on Gulf veterans' illnesses as evidence that exposure to pyridostigmine bromide,
pesticides, particularly organophosphates, oil and smoke from the oil well fires, depleted uranium and low levels of chemical weapons as well as vaccines can all induce acute and chronic respiratory illnesses. The Committee's report makes no such reference. Even a careful reading of Professor Hooper's own Memorandum to the House of Commons Defence Committee provides extremely weak scientific collateral to substantiate these suggestions.

Professor Hooper then suggests that United States Veterans Administration figures reporting that 183,000 US veterans have been granted disability status "present the best estimates of GWS (Gulf War Syndrome)". It is worth pointing out that the internet reference he quotes makes it clear that these figures, which were subsequently corrected to 140,000, include all conditions arising from Gulf war service. The Veterans Affairs Department has testified to Congress that the most common conditions amongst these are injury-related: impairment of the knee, skeletal system disability, lumbar-sacral strain, arthritis due to trauma, scars, hearing loss, hypertension, inter-vertebral disc syndrome, tendinitis, and osteoarthritis. A small minority of disabilities relate to "undiagnosed illness".

The same pattern is apparent in the UK. Evidence to the Defence Committee from the War Pensions Agency indicated that as at the end of January 2000, only 923 claims had been submitted to them for "Gulf war illness". This is out of a total of over 3,000 claims for disability, arising from Service in the Gulf.

**Competing interests:** No competing interests

15 August 2000

Chris Baker
Head of the Gulf Veterans' Illnesses Unit
Ministry of Defence

**Vaccines and Gulf War Syndrome**

The recent paper by Hotopf et al.1 and accompanying commentary by Shaheen2 make a useful contribution to the current debate which has resumed with increased intensity following the Report of the Select Defence Committee3.

1. The conclusion that vaccination after deployment, but not before, is associated with the approximate CDC multi-symptom syndrome (GWS/I) is surprising2.
   a) There are a number of reports of both UK and USA service personnel who had immediate and severe reactions to vaccines given before deployment that in some cases required hospitalisation. Some of these personnel were never deployed and some were deployed at a later date. Members from both these groups have reported with GWS/I.
   b) Another report indicates that >100 sick UK personnel were returned
almost immediately to the UK from the Kuwait Theatre of Operations, KTO. Were any of these personnel included in the analysis? Has any attempt been made to identify and assess such people?
c) Hotopf’s surprising conclusion may, therefore, be a result of ‘weeding out’ those personnel who had major vaccine-related reactions before deployment. The data for the before and during deployment, in Table 3, is consistent with this possibility.

2. The overall impression from the paper is that the primary data, on which all subsequent calculations depend, are sometimes contradictory, and, in some cases, involve very small numbers. For example, Table 1 reports twice as many anthrax vaccinations as pertussis- which record was used, the greater or the smaller number? Since pertussis was always given with anthrax the use of the raw data can only be misleading. There is a marked difference between these numbers and the recent statement from the Ministry of Defence, that “the uptake of anthrax vaccinations was around 75% and in some units up to 100%”4. Very small numbers are involved in the association of tetanus and cholera. Table 2 reports no relationship between the number of vaccines given before and during deployment. A reciprocal relationship might be expected, i.e. the more vaccines given before deployment the fewer would be necessary during deployment. Shaheen draws attention to the lack of evidence of ‘catch up’ vaccinations that would be expected in the primary source records. Record keeping appears to have been poor and incomplete and any policy haphazard in its implementation5,6. Taken together the evidence suggests that the 28% of records available (but not, I notice, seen by Hotopf et al) are badly skewed away from what other evidence suggests was the case. The policy of destroying records in the KTO6 has destroyed the vital primary sources of essential information and subverted any subsequent inquiry. Amongst the Gulf War Veterans, it has bred cynicism and suspicion.

3. Despite all the limitations of this and the earlier study7 vaccines are clearly associated with GWS/I. Tables 3 and 4 show that when 2 or more vaccines were given simultaneously during deployment, then there is a clear association with the CDC multi-syndrome, Odds Ratio 2.2-5.0, and fatigue (a very vague definition) OR 1.8 - 3.4. From the data in Table 3, 453/646 (70%) show an association with the CDC multi-syndrome. If the whole cohort is considered this reduces to 453/923 (49%). Even if only the 70 with the highest association are considered this gives 70/646 (10.8%)- a figure approximating to the 14% of USA troops now on Gulf Registries3. For the whole cohort this reduces to 8.0%. These figures demand more research and point to a much greater problem than has so far been recognised.

4. A further important conclusion, from Table 3, is that PTSR, Post-Traumatic Stress Reaction, is not a major factor associated with GWS/I. The association with PTSR is greatest before deployment into KTO and reduces during deployment. This discredits any suggestion that GWS/I is simply an example of a psychiatric War Syndrome 7-10 – a thesis that ignores
the large number of chemical and biological exposures unique to the Gulf War that made it the most toxic war in Western Military History [3].

5. Support for the importance of other toxins comes from Table 5 which identifies an association with asthma for 70% of those receiving two or more vaccines during deployment, OR, 2.2 - 3.4. Although this table lists asthma as an example of atopy, Shaheen rightly comments that, "wheezing in adults may not be atopic". Exposure to pyridostigmine bromide, pesticides (particularly organophosphates), oil and smoke from the oil well fires, depleted uranium, and low levels of chemical weapons, as well as vaccines, can all induce acute and chronic respiratory illnesses3.

At present the best estimates of GWS/I come from the USA where, Jim Benson, a spokesman for the Veterans' Administration, reported that 183,000 (26%) of USA veterans have been granted disability status - this is two and a half times the number from the Vietnam War. A further 36,782 cases are pending. The overall costs at present are $1 billion [11].

References


Canada's Gulf War Vaccine Experience at Odds with British Findings

I was fascinated with the article that appeared in the most recent edition by Hotopf et al. Canada's Gulf War vaccine experience may contribute to a better understanding of the issues surrounding multiple vaccinations on deployments. Canada, like its Gulf War coalition partners does not maintain a Central Registry of vaccination status for its members. We do know, however, the vaccine schedules that were followed by the various units during the Gulf War.

Ships of the naval blockade were the first to be notified of a tasking for the Gulf conflict and were the first to leave. On the 7 August 1990 the Deputy Chief of the Defence Staff issued a Warning Order alerting the Canadian Force's senior commanders of a possible intervention in the Gulf, under the codename Operation FRICITION. A three-ship naval force was given a "Notice to Sail - Seven days." This naval task force departed Halifax harbour on a bright and sunny day on Friday, 24 August 1990. This was 17 days after their "Notice to Sail." Vaccinations were given to the crew as part of their Departure Assistance Group (DAG) processing in Canada, however, additional vaccines were given to them while they were "under sail" (i.e., deployed). Plague vaccine, for example, was given in January of 1991 to members of the HMCS Terra Nova and HMCS Athabaskan. The first crew of the HMCS Protecteur returned home to Canada before his vaccine was given.

Interestingly, and of critical importance in terms of this British study, the second crew of the HMCS Protecteur received all their vaccines in Canada (including plague) prior to deploying. In other words, according to the British study, this would have been a "pure" cohort in
terms of "multiple vaccines" given before deploying. They received no vaccines after their departure. If the preliminary observations of these British investigators are correct, the illness rate in this second crew of the HMCS Protecteur should be less than the rate in the crews of the other ships, or in Canadians of other non-naval units, including the Field Hospital, air squadrons based at Canada Dry in Qatar and at our Headquarters in Bahrain. In fact, we know that the illness rate in members of all Canadian units is identical, no matter when or where they served. This Canadian data is significant evidence that the observations of the British investigators may not be correct.

For other Canadian units, multiple vaccinations were given to Canadians prior to departing for the Gulf War. For members of Canada Dry and the Headquarters, plague vaccine was given in-theatre. This did not constitute a "multiple vaccinations while deployed" cohort, however. The experience of personnel attached to 1 Canadian Field Hospital is, however, relevant. 1 Canadian Field Hospital personnel received multiple vaccines in Petawawa as part of their DAG procedure before deploying. When they arrived in theatre, however, they also received multiple vaccines (plague, anthrax and pertussis). According to this British study, 1 Canadian Field Hospital would constitute a "multiple vaccination while deployed" group.

If the observations of the British investigators are correct, a comparison of the second crew of HMCS Protecteur (all vaccines received in Canada prior to departing) and the members of 1 Canadian Field Hospital (multiple vaccinations received after deploying) should reveal a difference in their rates of illness. We know for a fact, however, that the illness rate in these two groups is identical.

Canada's Gulf War data does not support the preliminary observations of these British investigators. Nevertheless, their conclusion that more needs to be done to investigate the stress factors while on deployment that may contribute to an adverse health outcome is a valid one and deserves consideration.

Col KC Scott

Col Scott is Director of Medical Policy

Competing interests: No competing interests

01 July 2000

Ken Scott
Director Medical Policy
National Defence Headquarters, Ottawa, CANADA

Further study needed

Dear Editor,
Hotopf et al. [1] recently reported a valuable cross-sectional study investigating the role of vaccinations as risk factors for ill health in Gulf war veterans. They concluded that there is a specific relationship between multiple vaccines given during deployment (in combination with deployment "stress") and subsequent ill health.

Table 3 in the article shows the number of vaccines received by military personnel both before and during deployment. We noted that the authors did not specify the number of veterans receiving vaccinations both before and during deployment. Therefore, it appears that the two groups were not clearly defined and cannot be compared for effects of vaccines given at different times.

A further point we wish to make is that the study design did not allow the effects of the vaccine to be separated from the undefined deployment "stress" of fighting in the gulf. We assumed that no military personnel were deployed without receiving vaccinations. If it had existed, a group of non-vaccinated veterans could have provided good evidence of effect of stress only on health outcomes.

Table 3 shows a large non-linear increase in the odds ratio for five out of the six health outcomes between four vaccines and five or more vaccines. The authors did not comment on this finding. Would this suggest a threshold effect? Could this be explained by vaccine interactions? Alternatively was there a very large increase in number of vaccines given above five? The authors did not show which vaccines were given; culprit vaccines could exist.

We recognise the importance of the authors' study which provided new information about the possible effects of these vaccinations on health. However, we also see the need for further studies. A case control study of veterans who were sent the original questionnaire could compare vaccination patterns of veterans with or without health symptoms specified in the study. This could provide stronger evidence of the relationship between the vaccines and ill health.

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3rd year medical student

Alvyn Henry Wongso
3rd year medical student

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Competing interests: No competing interests
08 June 2000

Kerry McNally
3rd year medical students
Alvyn Henry Wongso
Department of Epidemiology and Public Health, University of Newcastle Medical School

Gulf War Syndrome: Depleted Uranium or Enriched Vaccination

Dear Sir,

I read with interest the paper on role of vaccinations as risk factor for ill health in veterans of the Gulf war in BMI Volume 320 on 20/05/00.

I would like to add the followings:

First: Multiple vaccinations have been used for decades by millions of holiday makers and visitors of the third world particularly the countries with high incidence of infectious diseases, yet multi-symptoms syndromes similar to Gulf war illness was not noted. Many of them had used personal pesticides as well.

Second: In the first Gulf war nearly one million Iraqi veterans were involved and despite vaccinations against common communicable diseases and a wide range of use of pesticides and the stress of eight years of war such syndromes had not been reported.

Third: In the Second Gulf war, which lasted only for several months there was a high incidence of symptom and signs which couldn't be explained on basis of a single disease. The same programme of vaccination in the first gulf war was used in the second and again pesticides were used by soldiers.

Fourth: There was a high incidence of Gulf war syndrome like symptoms and signs among civilians who never received any vaccinations neither before nor during the second Gulf war particularly from cities which were targeted by allied forces. In addition, there is marked increase in the incidence of cancers especially leukaemia in children and notably in the southern districts of IRAQ which had been subjected to high intensity bombardments.

From all above the only common factor to all who suffered was exposure to depleted Uranium in the missiles used by allied forces against Iraqi targets.

Yours sincerely

Dr H Al-Sardar

Specialist Registrar
REFERENCES:


Competing interests: No competing interests
08 June 2000

H Al-Sardar
Specialist Registrar
DME Addenbrookes Hospital, Cambridge

Can statistical analysis ever achieve consensus in GWS when politics runs wild?

Editor

The authors confirm that vaccinations endured by Gulf War troops are probably responsible for some of the ‘Gulf War Syndrome’ (GWS) suffering now established in British and American veterans of that conflict. Anecdotal evidence revealed in the media thro’ the ’90s suggested that many troops were not informed what they were receiving via their shots, in some cases their consent was not sought, and they were probably injected with substances which - even now - have been kept secret from investigators and public. In short, our troops were used as unwitting guinea pigs and many suffer consequences where there is no political will for an honest solution.

In the USA it has been estimated that over 10,000 veterans have since died of, and more than 100,000 remain afflicted by, GWS. Physical misery has been transferred to their dependants, children now exhibiting unusual conditions which veterans believe are linked to GWS.
A sober and objective approach to researching the GWS enigma is reasonable, but one can obscure the reality each sufferer faces when projects publish results that may appear unsympathetic or ill-conceived. I believe the authors have managed to cloud the issue further with their methodology, findings and conclusions and have achieved consensus amongst themselves that the average serviceman and informed individual) would find difficulty accepting, for several reasons:

1. The paper concentrates on data obtained from relatively few and specific service personnel (those who had vaccine records to hand); various statistical manipulations were performed on this cohort requiring further reduction in 'group' size for analysis, e.g. by rank, service type, length of duty, age, whether previous ADRs had been experienced etc, which were often applied as 'confounders'. I admit to myself being 'confounded' as to why some of these characteristics were used in certain instances.

2. The paper acknowledges that those with vaccine records would most probably be 'older', 'still serving' and ' reservists'(e.g. TA). If this cohort, of under 1,000 personnel, was by design selected as likely to produce biased and unrepresentative results of the experiences of tens of thousands of regular troops sent to the Gulf, they could probably not have chosen better! I doubt many dead or severely disabled servicemen, victims of GWS, form part of the cohort whose members are ' still serving'.

3. The paper compares pre-deployment (preD) vaccination states with post-deployment (postD) yet recognises that the preD vaccine types were different from postD vaccines - the latter comprising more anti-bio/chemical warfare vaccines than the former which were 'routine' vaccines. How then does one analyse like with like?

The authors state that 'multiple vaccines preD do not seem to be harmful', despite there being no evidence of them having collated and analysed ADR data from the military establishment to support this statement. Did they just throw this remark in or is it based on another detailed investigation of military vaccines?

4. There appears to have been a general assumption that 'longer service' in the Gulf is a stressor as compared to the soldiers' normal routine. I suspect this depends on individual circumstances. Many soldiers are 'relieved' of boredom or family stressors when called up, as are some reservists when relieved of 'civvy street' stressors, so that assumption may be false. The role of the individual would also dictate whether 'stress' was greater or less than normal. Many reservists would be less likely to have been exposed to chemicals, biologicals, pesticides, oil fumes, desert environments etc. than regular troops; naval and air force reservists ditto.

5. When comparing statistics of vaccine type against multiple-symptom disorders why introduce 'confounders' such as rank, or age, or type of
service, or duration of service - do vaccines affect people according to rank?
I believe such 'confounders' do little to clarify the situation and could be used to alter results in favour of any author's bias. They certainly reduce the impact of 'unconfounded' results.

6. GWS probably has many causes; biologicals, chemicals, vaccines, depleted uranium, lead, toxins from oil fires and other environmental etc. It is a phenomenon that is unique in its intensity and symptomatology to the Gulf War despite other conflicts having seen variously diseased/distressed troops return home. It does not affect French troops who suffered similar 'stressors' other than the vaccines! Why was this not mentioned as extremely important?

Vaccination must therefore be a major factor, not the 'possibly slight' factor implied by this paper.

7. The authors do not explore WHY such cocktails were given our troops when the French, well-experienced in desert warfare, chose not to expose their troops to such, often unnecessary, dangers. The USA CDC "does not recommend and you are not advised to have a yellow fever vaccination for the Middle East, East or Southeast Asia". The CDC also states that "cholera vaccine is available but is not recommended. Only 50% of those who take the vaccine develop immunity to choler, and this lasts only a few months. Simultaneous administration of cholera with yellow fever vaccines produces less-than-normal antibody responses to both vaccines". Then why did the US Department of Defense and the British MoD insist on such vaccines for troops when France saw them as unnecessary and its own medical advice are of the same opinion?

8. The authors admit to not having 'as yet performed immunological investigation that would test what pathways could link multiple-vaccines to subsequent ill heath'. Their "measure of vaccine side effects was crude (single question)... from which to reduce the probability of multiple-vaccines causing GWS symptoms" yet they suggest in future "a measured intervention with every effort made to ensure either soldiers maintain routine vaccination (including biowarfare vaccines)" and in the event of conflict the troops are vaccinated at the earliest opportunity".

This sounds more like vaccine sales talk, not scientific reporting about work that confirms a link between military vaccine use and the devastating results of GWS. If GWS was the result of drug ADRs that had killed tens of thousands and destroyed the health of hundreds of thousands of people, the drug would be immediately withdrawn.

With sponsors like the US Department of Defense perhaps the authors are a little biased!?

9. The US DoD, their sponsors, may be responsible for GWS. Is it likely to encourage the identification of cause and culprits amongst its practices?
Truth appears to have been the first casualty in the Gulf war. Soldiers reported nerve agent detectors sounding long and hard after incoming scuds; sarin was detected by an NBC expert Turnbull on 20/1/92 from a scud landing 400 yards away. 'Made in the USA' chemical weapons were supplied to Iraq via Jordan; coalition troops recovered USA 155mm ammo in Kuwait; Terry Walker suffered a double scud attack at Al Jubayl and received chemical exposure that he believes resulted in his GWS, his wife and little girl are also affected - and his RAF medical notes have 'gone missing'. Pat Eddington (a former CIA analyst and author of 'Gassed in the Gulf') tells how coalition troops were vaccinated against biologicals supplied by British and US Governments to Saddam Hussain. Senator Donald J Riegle was able to identify no less than 61 biological cultures supplied to Iraq between 1985-89, some of which included human gene clones! Boscombe Down and Porton Down had biological samples collected from the battlefield by men like Angus Parker which their prepared sample test kits 'could not analyse'. Two US marine 'whistle blowers' stated that they observed hundreds of records from the Gulf conflict being destroyed illegally.

The Surgeon General Vice Admiral Revell told a Parliamentary Defence Committee hearing, when asked how many vaccines do we not admit to, "I think perhaps 5 or 6".

Michael Hanlon wrote in The Express 8th April 199 "allied troops are claimed to have been unwitting victims of a gigantic medical experiment in the Gulf war" breaking the Nuremberg Convention.

When I observe what I consider to be an example of ill-conceived, methodologically unsound research that achieves results that must largely suit the sponsors, whilst avoiding major issues and actions involving those sponsors, I wonder why the BMJ sought fit to include it.

I hope my conclusions are wrong.

Regards

John H.

Competing interests: No competing interests

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Other hypotheses

Dear Sir - The study reported by Hotopf et al (1) confirms an earlier hypothesis that multiple vaccinations of Gulf War veterans is associated with adverse long-term health outcomes. Hotopf et al emphasise that multiple vaccinations in themselves do not seem to be harmful but combined
with the "stress" of deployment, a weak association is noted. Thus, they add that the critical constituents of stress require urgent study.

We wish to comment to expand on this studies implications further, and provide direction for further investigation. Future studies of the effects of multiple vaccines in veteran will require a more rigorous documentation system. Hotopf et al had access to a mere 28% of the larger sample at risk, as only that many kept their vaccination records. The weak association between multiple vaccinations and adverse long-term health outcomes is even more fragile when one considers that, in a worst case scenario analysis, if there were no association in the majority of the 72% of veterans not studied, this weak association would have disappeared.

Yet, assuming that the results of the minority of veterans is reflective of the larger sample, one can consider many hypotheses. Hotopf et al explore some of these in their article. We suggest, however, that it is still possible to investigate other hypotheses with the current study group. Thus, in asking how the group of veterans with records of vaccinations differed from the larger group without this information, Hotopf et al have not considered the most obvious difference - one group kept their vaccine information, and the other group did not. Why? The reasons why may explain the outcomes. Those keeping vaccination records may have been more sensitised to the concerns raised about vaccinations, especially during the period of deployment, when the risks of biological and chemical warfare and adverse effects of the vaccines could be perceived as the greatest. A number of veterans may have experienced acute adverse vaccine reactions, but those expecting or concerned with potential vaccine problems, may have attached a greater significance to these acute complications, and had a reminder of their vaccinations for months or years to come whenever questions with regard to health arose again.

Thus, the association between multiple vaccines and adverse health outcomes may be that multiple vaccines are more likely to generate acute, transient adverse outcomes. Indeed, when Hotopf et al controlled for the acute reactions, the association between multiple vaccinations and long-term adverse health outcomes became even weaker. In the individual with symptom expectation for future ill health as a result, these acute reactions are not so likely to have been dismissed as self-limited events. This is especially true if some kept vaccination records out of fear that such records may one day be an important part of their health care assessment.

The best course of investigation of this group of veterans may now be to ask them "Why did you keep your vaccination record?"


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