THE VALIDATED PREVALENCE OF MULTIPLE SCLEROSIS AND MOTOR NEURONE DISEASE IN AUSTRALIAN VIETNAM VETERANS

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Introduction

Veterans of the war in Vietnam represent a group with possible exposure to phenoxy herbicides such as 2,4-D and 2,4,5-T and to 2,3,7,8-tetrachlorodibenzo-*p*-dioxin. During that conflict, large amounts of herbicides were sprayed. We have previously reported that Australian Vietnam veterans self report very high levels of multiple sclerosis (MS) and motor neurone disease (MND).[1] Recently, a study of a group who handled 2,4-D reported elevation in mortality from MND.[2]

MS has a relapsing–remitting course in that clearly defined relapses occur with full recovery. Typically the symptoms of a MS attack evolve over days or weeks, remain stable for days or weeks, and then gradually resolve over days or weeks, although often incompletely. The symptoms and signs of the first attack usually recover within 1–3 months, and after a variable interval there may be a recurrence, in many cases within 2 years.

MND occurs when motor neurones, the nerves that control muscles, fail to work normally. The motor neurones progressively deteriorate and, with no nerves to activate them, the muscles gradually weaken and waste. Early symptoms of MND are mild and may include stumbling, twitching, cramps and spasticity. As a result diagnosis is often clinically difficult in the early stages as MND can be confused with other conditions. Confirmation of a diagnosis must be made by a neurologist. The epidemiology of MND is not as well known as that of MS. Motor neurone disease is an adult disease, being extremely uncommon in people aged less than 30.

Methods and Material

The Australian community comparison for MS was derived from Australian prevalence rates as published by McLeod *et al*,[3] Here all patients for whom the diagnosis of MS was considered to be correct were classified according to the diagnostic criteria of Rose *et al* (1976) into clinically definite, probable and possible.[4] Prevalence rates were then determined from those deemed clinically definite and clinically probable.

Estimated prevalence rates of MND in Australia for the period 1986 to 1994[5] show that the prevalence of MND in Australia has remained relatively stable over the 1986 to 1994 period at around four per 100,000 population.

These prevalence rates were derived from mortality rates, based on the relationship between incidence (the number of new cases in a year), and the average duration between diagnosis and death. Mortality rates were used as a proxy for incidence rates, and these were multiplied by the average duration between diagnosis and death, estimated to be 27 months, to estimate the prevalence of MND in Australia. To validate MND, the El Esorial criteria were used.[6]

In the validation process, responses from veterans and their children were classified as validated, not validated, not able to be validated, or non-responding[7]. Five models have been used to illustrate the effect of including some of the not able to be validated and non-responding responses into the validated category. The five models decrease in their level of strictness for the validation of responses. Model 3 (see below) was adopted for the Validation Study, and therefore has been adopted for the MS and MND Study.

The components included to determine the estimated number of validated responses for each model are:

Model 1
(a) counting only positively validated responses; but
(b) excluding non-respondents.

Model 2
(a) counting positively validated responses; and
(b) including a prorated component of those responses not able to be validated due to a non-response from the clinician, or a clinician indicating there was insuffient information to confirm the condition—prorated according to the ratio of validated to not validated responses; but
(c) excluding non-respondents.

Model 3
(a) counting positively validated responses; and
(b) including a prorated component of those responses not able to be validated regardless of reason — prorated according to the ratio of validated to not validated responses; but
(d) excluding non-respondents.

Model 4
(a) counting positively validated responses; and
(b) including a prorated component of those responses not able to be validated due to a non-response from the clinician, or a clinician indicating there was insufficient information to confirm the condition — prorated according to the ratio of validated to not validated responses; and
(c) redistributing cases from non-responding veterans between validated, not validated and not able to be validated responses.

Model 5
(a) counting positively validated responses; and

(e) including a prorated component of those responses not able to be validated regardless of reason — prorated according to the ratio of validated to not validated responses; and
(f) including a prorated component of non responses — prorated according to the ratio of validated to not validated responses.

Results and Discussion

Validation results using selected reallocation models and their significance level

Condition	Model 1	Model 2	Model 3	Model 4	Model 5	Expected no. of conditions
MS	14	16	18	21	23	17 (9–26)
MS including deaths	15	18	20	22	24	17 (9–26)
MND	2	2	2	3	4	1.2 (0–3.3)
MND including deaths	3	3	3	5	5	1.2 (0–3.3)
MS	—	—	—	—	—	
MS including deaths	—	—	—	—	—	
MND	—	—	—	—	High	
MND including deaths	—	—	—	High	High	

Notes:
1. High – The estimated validated conditions are statistically significantly higher than the Australian community standard at the 95% confidence level.
2. Dashes indicate no statistically significant differences from the Australian community standard.

When the number of validated cases of MS and MND among veterans was compared with the expected number of conditions, based on the Australian community standard, no statistically significant difference was found between the prevalence of MS and MND in veterans and that of the general Australian community.

However, if reported cases of MND among deceased veterans are included as 'validated' where clinical notes were not available but MND is included as a cause of death on the death certificate, the estimated number of cases among veterans is at the upper limit of the 95% confidence interval for the Australian community standard.

It is recommended that caution be used in the interpretation of the MND results. The estimated Australian community standard for MND used in this study is considered to be the most accurate estimate possible, but it should be understood that a number of assumptions were made in calculating this standard. These assumptions introduce a level of uncertainty that cannot be measured statistically, but they were necessary because of the lack of prevalence data for MND in Australia. Any margin of error in these assumptions will affect the Australian community standard, and may have the potential to change the conclusion that there is no difference between the prevalence of MND in veterans compared with the Australian community standard.

In the case of MS, the number of validated conditions among veterans is well within the 95% confidence interval for the community standard. Therefore, variations in the assumptions are unlikely to affect the conclusion of no statistical significance between the prevalence of MS for veterans and the Australian community standard.

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