THE VALIDATED PREVALENCE OF SELECTED HEALTH CONDITIONS AND THE MORTALITY EXPERIENCE OF THE CHILDREN OF AUSTRALIAN VIETNAM VETERANS

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Introduction

Vietnam veterans comprise a group with possible exposure to 2,3,7,8-tetrachlorodibenzodioxin (TCDD) and phenoxy herbicides. Two recent reviews of the literature under taken by the National Academy of Sciences have reported limited or suggestive evidence of an increased rate of spina bifida maxima in the children of veterans exposed to herbicides in Vietnam[1,2].

We decided to attempt to validate the existence of some of the conditions in both the children, and the veterans themselves (described elsewhere). The aim of the study was to validate reports of illness in children of Vietnam veterans, namely all causes of death, leukaemia, Wilm's tumour, cancer of the nervous system, and all other cancer, and the congenital deformities of spina bifida, tracheo-oesophageal fistula, anecephaly, Down syndrome, cleft lip and palate and absent external body part.

Methods and Materials

As previously described, a postal survey was undertaken of all male Australian Vietnam veterans for whom a current postal address could be found[3]. Each veteran who indicated on the original survey that they had a child who suffered from any of the conditions mentioned above was again approached, and asked to provide contact details or other information relating to the affected child. This approach was made about eighteen months after the initial survey. For children below the age of 17, parental consent to obtain medical records that would validate the existence of the condition was sought. The consent of the affected child was sought for those children over 17 and alive.

Veterans were sent up to two reminder letters. The first was sent three weeks after the initial recontact, and the second about a further eight weeks later. In some areas of interest, insufficient replies were received, and so telephone reminders followed the postal questionnaires. For the children above the age of 17, there was also an initial mail out, followed by postal reminders, and then telephone reminders.

Once appropriate consent and demographic details had been obtained, we attempted to validate the condition in a number of ways. For birth defects, from 1981 onwards (and partly for 1980) there is a compulsory, national register of birth defects, known as the Congenital Malformations Register. If the affected child was born during this period, we attempted to match against this register, and when a match occurred, we considered this defect validated. If no match was

found, the case was recorded as not validated. However, many of the children were born prior to the introduction of the register. In these cases, we attempted to have the condition validated by obtaining the original medical records, either from the appropriate hospital, or from the individual's treating physician. Unfortunately, in Australia, hospitals now routinely destroy records after a set period of time (usually seven years), and in many cases the individual's treating doctor had retired, died, or otherwise lost the ability to confirm the records. In these cases, the condition was classified as "not able to be validated". In a small number of cases, we were able to validate the existence of the condition by a new clinical examination.

Similarly, for malignancies, a centralised, compulsory, nation-wide register holds all cases of cancer that have occurred in Australia since 1982. Prior to this time, some States had registries. If the cancer occurred after 1983 or in State that had a cancer register when the cancer was reported to have developed, an attempt was made to match that cancer. If it could not be matched, then it was classified as "not validated"; if matched, it was classified as validated. As for congenital defects, in many cases we had to attempt to validate the condition by finding original medical records. In many cases, these records were unavailable, so the condition was classified as "not able to be validated".

For many veterans who had initially indicated that they had fathered a child with a defect of interest, we were not able to ascertain the validation status for other reasons. These included the death of the veteran (thus effectively preventing us from finding the details of the child that would enable validation). It also included the veteran becoming too unwell or incapacitated to provide the details, and the loss of the veteran to follow-up (such as veteran moving, but not leaving a forwarding address, and not being otherwise traceable, or the veteran emigrating). In addition, there were some cases among the children over the age of 17 who were lost to follow-up, and some of the children declined to give consent for validation. All of these were classified as not able to be validated.

The proportion of children who could not be validated was substantial, and there were reasons to believe that many of those who were placed in the "not able to be validated" category did actually have the condition. Further, some of those (either veterans or children) who simply did not respond may have had the condition.

We therefore developed a number of models that allocated both the non-responders and the not able to be validated group to provide us with an estimate of the number of individuals with each disease. These five models descended in their level of strictness for validation.

In Model One, we estimated the validated response by counting only those we had positively validated. In Model Two, we estimated the validated response by counting those we had positively validated, and those who could not be validated because the clinician did not respond or indicated that records were insufficient to provide validation. We prorated these between the validated and not validated categories, assuming that those who could not be validated would have had the same validation rate as those where the clinician responded with a decision. In Model Three, we estimated the validated response by counting the positively validated, and by prorating the not able to be validated between the validated and not validated group. In Model Four, we estimated the validated response by counting the positively validated, and those who

could not be validated because the clinician did not respond or indicated that records were insufficient to provide validation. The non-responders were distributed between the validated, not validated and not able to be validated. In Model Five, we estimated the validated response by counting the positively validated responses. Those that could not be validated were distributed on a pro-rata basis between the validated and not validated. The non-responders were distributed on a pro-rata basis between validated and not validated.

Results and Discussion

Of the 40 030 males who responded to the original questionnaire, 6 842 letters were sent to veterans seeking validation of conditions in the veteran, their child, or both.

Table 1 shows the summed response rate (either the parent responding and consenting, or both the parent and child responding and consenting). The response rate averaged about 63 per cent. There are many reasons why there was no response. It also may include some cases in which the child did not actually have the condition. We were unable to ascertain which of these reasons were relevant in any individual case. However, as the non-response rate was not insignificant, in some of our models we distributed the non-responders to provide an estimate of the number of conditions present within our populations.

Table 1. The Response Rate by Disease and Rate Not able to be Validated

Condition	Total Number	Number Responding	**Response Rate %**	Number not able to be validated	**Rate %**
Leukaemia	85	56	**65.9**	13	**15.3**
Wilm's Tumour	52	30	**57.7**	8	**15.4**
Cancer of the Nervous System	135	83	**61.5**	13	**9.6**
Other Cancer	663	294	**44.3**	84	**12.7**
Spina Bifida Maxima	470	321	**68.3**	102	**21.7**
Down Syndrome	147	104	**72.2**	28	**19.0**
Tracheo-oesophageal Fistula	131	93	**71.0**	26	**19.8**
Anencephaly	58	47	**81.0**	10	**17.2**
Cleft Lip or Palate	304	197	**64.8**	77	**25.3**
Absent External Body Part	395	285	**72.2**	105	**26.6**
Extra Body Part	383	264	**68.9**	129	**33.7**

The rate that the conditions could not be validated was also calculated, and is detailed in Table 1. Given that both the non-response rate and the rate of conditions being unable to be validated, we developed a number of models for estimating the likely prevalence of the conditions in children of Vietnam veterans (see above).

We found that the Vietnam veterans self report that their children suffer from a much higher rate of selected illnesses than that which we could validate. For most forms of cancer (with the possible exception of Wilm's tumour), we found evidence that the rate was not elevated, and may be below the community norm. For congenital deformities, the rate of most defects was either low or around expectation. However, for spina bifida maxima and cleft lip and palate, we found evidence of an elevated rate in the children of male Vietnam veterans.

Table 2. Number of Estimated Conditions According to Different Models

Condition	Model 1	Model 2	Model 3	Model 4	Model 5	Expected Number
Leukaemia	30	30	39	46	59	64(48-80)
Wilm's Tumour	7	7	10	***13***	***17***	7(2-12)
Cancer of the Nervous System	26	27	31	44	50	48(34-62)
Other Cancer	101	103	122	163	187	333(297-369)
Spina Bifida – Maxima	34	38	***50***	***68***	***73***	33(22-44)
Down Syndrome	49	51	67	72	95	92(73-111)
Tracheo-oesophageal Fistula	7	8	10	13	14	23(14-32)
Anencephaly	10	11	13	13	16	16(8-24)
Cleft Lip/Palate	57	71	***94***	***119***	***144***	64(48-80)
Absent External Body Part	14	17	22	37	31	34(23-45)

Note: In Table 2, the 95 % Confidence Levels follow the expected number in the right hand column. If the estimated number is above the upper 95 % Confidence Level, it is written in *italics* and in **bold**.

Table 3. Rates of Death in Children of Vietnam Veterans.

Condition	Validated	Not Validated	Not Able to Be Validated	Estimated Validated	Expected Validated
Suicide	111	4	123	230	75 (58-92)
Death from Illness	504	33	469	944	805 (749-861)
Death from Accident or Other Cause	219	43	528	660	365 (328-402)

The overall evidence suggests that there is a pattern of elevated mortality in the children of Vietnam veterans. There is strong evidence of an excess level of suicide among the children of Vietnam veterans.

This study has important drawbacks. The response rate was low, and a proportion of those who responded could not be validated. This required a variety of models to produce an estimated validated rate. Against this, the study has the advantage of size. For some conditions, such as suicide, the study provided strong evidence of a significant elevation.

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References

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