

**Incidence of variant Creutzfeldt-Jakob disease diagnoses and deaths in
the UK**

January 1994 – December 2008

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Summary

In 2008 there was one new diagnosis of vCJD in a case who also died in 2008. This brings the total number of cases reported in the UK to 167 of whom 164 have died.

Results from modelling the underlying incidence of diagnoses and deaths indicate that the epidemic reached a peak in the year 2000 when there were 27 diagnoses and 28 deaths and has since declined to a current incidence of about 2 diagnoses/deaths per year. Extrapolating the best fitting model (the quadratic model) gives an estimate of less than one death in the next 12 months (95% prediction interval 0 to 2).

An analysis that looked at deaths by birth cohort (pre 1970, 1970s, 1980s) showed that the shape of the epidemic differs between cohorts, mainly due to the fact that deaths of individuals born in the 1980s were only seen from 1999 onwards.

It is important to note that although a peak has been passed, it is possible that there will be future peaks, possibly in other genetic groups. There is also the possibility of ongoing person to person spread as seen with four cases of transfusion associated vCJD infection to date, who received blood in 1999 or earlier from donors who were later diagnosed with clinical vCJD. Three of these individuals developed vCJD (one diagnosed in 2003 and two in 2006), whilst the fourth died from causes unrelated to vCJD, but was found on post mortem examination to have abnormal prion protein present in the spleen and a lymph node.

1. Introduction

Each year data on diagnosed cases of variant Creutzfeldt-Jakob disease (vCJD) in the UK are reviewed in order to investigate trends in the underlying rate at which deaths and diagnoses are occurring. The present report reviews the data for all individuals who had been classified as definite or probable cases by the end of December 2008.

2. Background information

Definite cases are those confirmed neuropathologically. To date all probable cases for which neuropathological data have become available have subsequently been confirmed as definite. The date of diagnosis is taken as the date when diagnosed as probable or, when this is not available, the date of confirmation of a definite case.

For these analyses we have included all cases notified to the National CJD Surveillance Unit and classified as definite or probable by the end of December 2008 (Table 1).

Table 1. Cases of vCJD classified as definite or probable by end of December 2008.

	Died*	Alive	Total
Male	92	2	94
Female	72	1	73
Total	164	3	167

* Deaths including 115 definite and 49 probable (without neuropathological confirmation).

There is no significance difference in deaths between males and females (56% male, $p=0.14$).

Numbers of cases by onset, notification, diagnosis and death are given below by year along with the median age at death by year of death (Table 2). The median number of days from onset to diagnosis is 328 days and from onset to death is 413 days. The overall median age at death is 28 with a range from 14 to 74.

Table 2. Annual cases by onset, notification, diagnosis and death (including median age at death by year of death).

Year	Onset	Notification	Diagnosis	Death	Median age at death
1994	8	0	0	0	-
1995	10	8	7	3	-
1996	11	9	8	10	30
1997	14	13	12	10	26
1998	17	20	17	18	25.5
1999	29	16	17	15	29
2000	24	29	27	28	25.5
2001	17 [^]	21	25	20	28
2002	14 [^]	15	16	17	29
2003	5 [^]	16	16	18*	28
2004	9	6	8	9	26
2005	5	7	6	5	34
2006	3	5	6	5*	30
2007	1	1	1	5*	24
2008	0	1	1	1	-
Total	167	167	167	164	28

*Three cases have arisen to date who had a blood transfusion from earlier cases. These cases, who were all male, died (were diagnosed) in 2003 (2003), 2006 (2006) and 2007 (2006). These cases are included in the analyses although are likely to part of secondary spread.

[^]This indicates the year of onset for the three living cases.

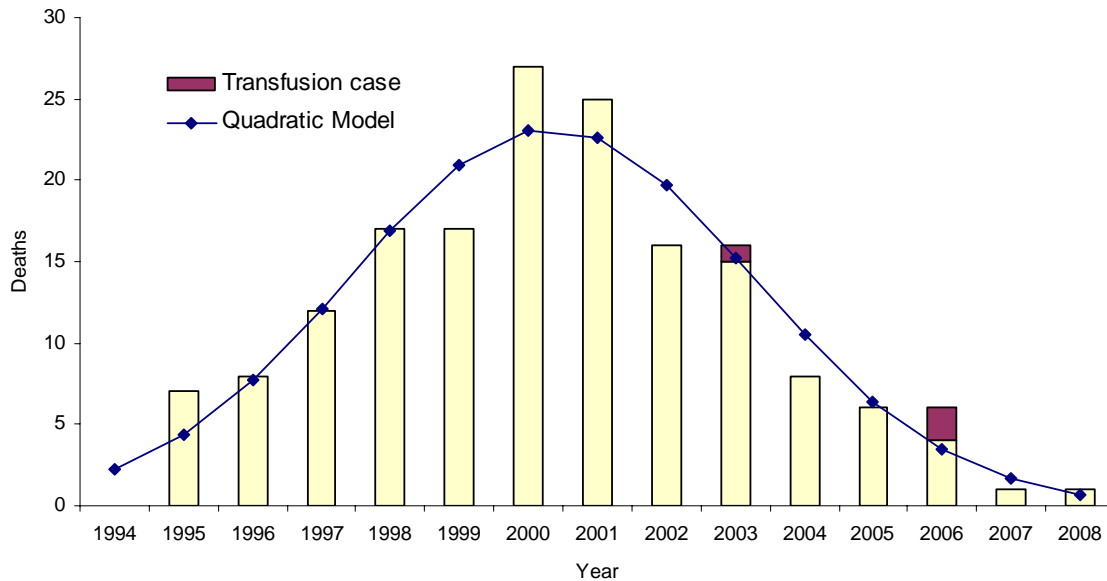
3. Methods

The incidence of deaths and diagnoses was modelled by Poisson regression using polynomials. Most deaths and diagnoses are reported quickly so an adjustment for reporting delay is not necessary. The age at death has not increased as may have been expected, assuming that most exposure to BSE ceased in the early 1990's. In order to examine this further the cases were stratified by year of death and birth cohort (pre1970, 1970s and 1980s). Trends in deaths over time were compared between these cohorts.

4. Results for Diagnoses

The quadratic trend model provided the best fit to the data. A model with a cubic term was also fitted but did not provide an improved fit ($p=0.50$). The fitted trend is shown in figure 1 and estimates that the current annual incidence of diagnoses is 0.7. The peak is estimated to have occurred in mid 2000.

Figure 1: Quadratic-exponential model for vCJD diagnoses incidence trend



Prediction for diagnoses in the next 12 months

Extrapolation of the model with the quadratic term predicts a total of less than 1 diagnosis in the next 12 months with a 95% prediction interval of 0 to 2. The cubic model gives an estimate of less than 1 diagnoses with 95% CI 0 to 2.

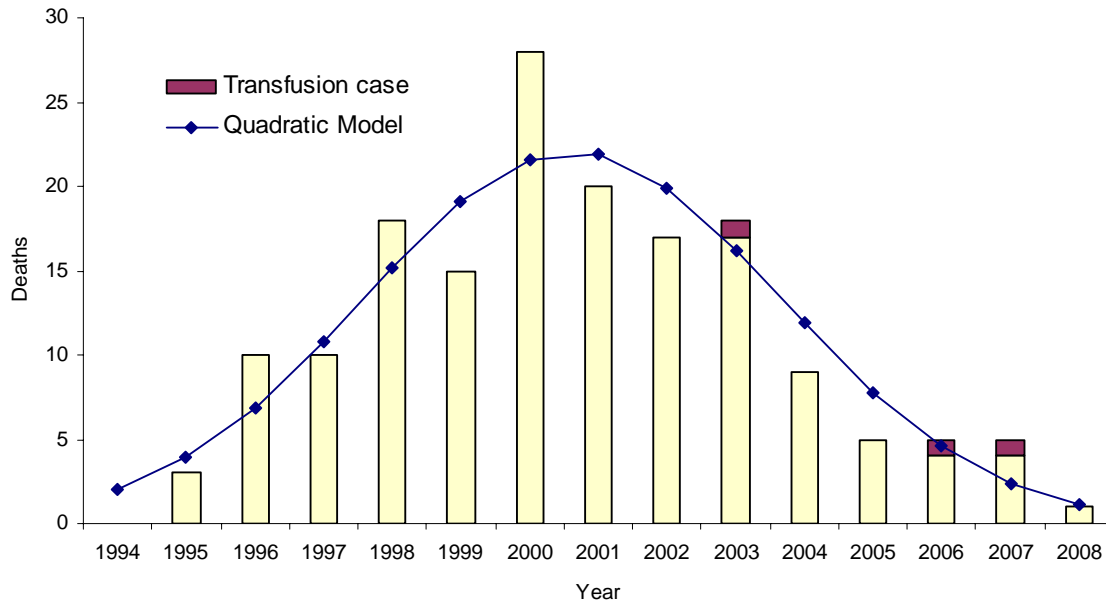
Assessment of Predictions made 12 months ago

The quadratic and cubic models gave a prediction of 1 diagnosis (95% prediction interval 0 to 3). The observed number of 1 agrees with both models.

5. Results for Deaths

The quadratic trend model provided the best fit to the data. A model with a cubic term was also fitted but did not provide an improved fit ($p=0.14$). The fitted trend is shown in figure 2 and estimates that the current annual incidence of deaths is 1.1. The peak is estimated to have occurred in mid 2000.

Figure 2: Quadratic-exponential model for vCJD deaths incidence trend



Prediction for deaths in the next 12 months

Extrapolation of the model with the quadratic term predicts a total of less than one death in the next 12 months with a 95% prediction interval of 0 to 2. The cubic model gives an estimate of 1.4 deaths with 95% CI 0 to 4.

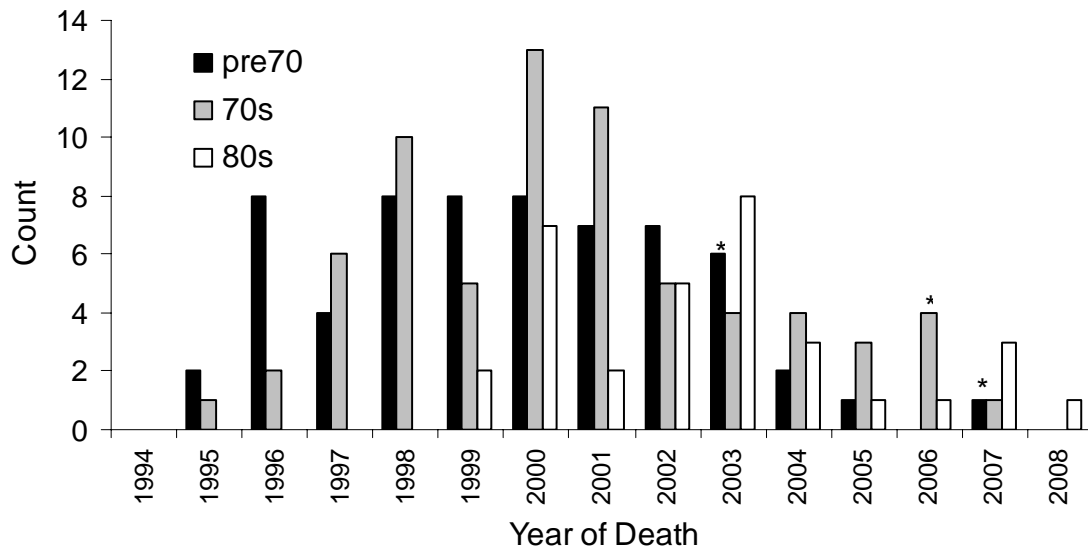
Assessment of Predictions made 12 months ago

The quadratic model gave a prediction of one death with a 95% prediction interval of 0 to 4. The cubic model gave a prediction of 2.5 deaths with a 95% prediction interval of 0 to 6. The actual observed number was one, which is consistent with both models, but closest to the simpler quadratic model.

Deaths by cohort

The age at death has so far remained stable, contrary to what might be expected given that most exposure to BSE is presumed to have ceased in the early 1990s. To examine this in more detail the epidemic curves (quadratic model) are compared in those born before 1970 with those born in the 1970s and the 1980s. This analysis showed significant differences by cohort in the shape of the fitted curves ($p < 0.001$). The main difference is due to the fact that in the 1980s cohort no deaths were seen prior to 1999 (Figure 3). This finding is consistent with those born in the 1980s being infected towards the end of the BSE epidemic when they were older rather than at the beginning. This requires a lower exposure/susceptibility in the very young, which is reasonable because no cases have been seen to date in individuals born in the 1990s. An alternative explanation of the stable age distribution could be shorter incubation periods in those exposed as teenagers/young adults than those exposed as young children. Note that both these explanations would only be expected to yield a temporary stable age distribution.

Figure3: Deaths by year and birth cohort



* Count includes a transfusion case