Appendix 1

Ecological Data

Each individual patient record had a variable indicating residence at an output area level, which can then be mapped to Census Area Statistics (CAS) wards or standard table wards using the Neighbourhood Statistics Look-up tables or the All Fields Postcode Directory 2005. (http://www.statistics.gov.uk/geography/afpd.asp). There are 7969 CAS wards and 7932 Standard table wards in England. These are almost identical but some very small wards have been merged to preserve confidentiality. CAS wards were used to classify rurality whilst the standard table wards were used for area deprivation.

The Index of Multiple Deprivation (IMD) 2004 was created by the Office for the Deputy Prime Minister (ODPM) and is a weighted measure across seven deprivation domains: income, employment, health and disability, education, skills and training, barriers to Housing and Services, living environment and crime. Each standard table ward is given a score and then ranked (where one is most deprived). The wards were then grouped into six equal groups (sextiles).

We used the Office of National Statistics (ONS) Rural and Urban Classification 2004 (www.statistics.gov.uk/geography/nrudp.asp). This classifies CAS wards as urban, town and fringe or village/isolated dependent on the type of predominant settlement.

Ethnicity is generally poorly recorded on the HES database although this varies according to provider unit. (http://www.hesonline.nhs.uk/Ease/servlet/DynamicPageBuild?siteID=1802&categoryID=171&catName=Ethnic%20category%20coding). Instead an ecological ethnicity variable was produced which categorised each output area by the proportion of each ethnic group found there according to the 2001 Census.
**Charlson Comorbidity Index**

The Charlson Comorbidity Index (14) is a weighted index that takes into account the number and seriousness of comorbid conditions that, either together or singly, might alter the risk of short term mortality. A variety of diseases contribute to the index, including those in the following disease categories: myocardial, vascular, pulmonary, neurologic, endocrine, renal, liver, gastrointestinal, cancer/immune and miscellaneous. An ordinal variable is created by grouping the index as none- 0, mild- 1, moderate- 2 and severe- 3+. 