ORIGINAL RESEARCH

Increased Cardiometabolic and Mortality Risk Following Childhood Maltreatment in the United Kingdom

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BACKGROUND: Childhood maltreatment remains a significant public health issue associated with a number of poor health outcomes. This study explores the association between childhood maltreatment and the subsequent development of cardiometabolic disease and all-cause mortality.

METHODS AND RESULTS: Using a UK primary care database between January 1, 1995 and December 31, 2018, we conducted a population-based open retrospective cohort study. We matched 80,657 adult patients with a historic recording of childhood maltreatment or maltreatment-related concerns (exposed group) to 161,314 unexposed patients. Outcomes of interest were the development of cardiovascular disease, hypertension, type 2 diabetes mellitus, and risk of all-cause mortality. During the study period there were 243 new diagnoses of cardiovascular disease (incidence rate 8.3 per 10,000 person-years) in the exposed group compared with 254 in the unexposed group (incidence rate 4.6 per 10,000 person-years). Following adjustment for key covariates, this translated to an adjusted incidence rate ratio of 1.71 (95% CI 1.42–2.06). Additionally, the exposed group had an increased risk of hypertension (adjusted incidence rate ratio 1.42; 95% CI, 1.26–1.59), type 2 diabetes mellitus (adjusted incidence rate ratio 2.13; 95% CI, 1.86–2.45) and all-cause mortality (adjusted incidence rate ratio 1.75; 95% CI, 1.52–2.02) during the study period compared with the unexposed group.

CONCLUSIONS: Considering the high prevalence of exposure to childhood maltreatment, we have demonstrated the substantial associated burden of preventable cardiometabolic disease. There is a clear need to ensure that public health approaches are implemented to prevent the adverse consequences following exposure to childhood maltreatment.

Key Words: cardiovascular diseases ■ childhood maltreatment ■ hypertension ■ type 2 diabetes mellitus

Childhood maltreatment has been demonstrated to be associated with the subsequent development of cardiometabolic disease (cardiovascular disease [CVD], hypertension, and type 2 diabetes mellitus). The currently hypothesized and accepted mechanism for this relationship includes 3 pathways that occur following childhood maltreatment: the adoption of poor lifestyle behaviors (physical inactivity, poor diet, disrupted sleep, substance misuse, and smoking), development of mental and biological...
ill health because of alteration of the immune, metabolic, neuroendocrine, and autonomic nervous system. A recent statement from the American Heart Association scientific consensus drew upon available observational data and gave recommendations for imminent research required to further understand this important relationship. There were numerous key recommendations from the consensus meeting relating to global gaps in the literature on this topic. Some of the current evidence gaps that have yet to be addressed by preceding literature include the following: (1) heterogeneity of definitions concerning childhood adversity (with some studies including information on adverse childhood experiences, which are a broader class of adversity not usually included in the global or UK definition of childhood maltreatment); (2) much of the evidence is derived from case–control and cross-sectional studies, which were often small in size and susceptible to recall bias as information about exposure was noted during adulthood; (3) because of study design there was an inability to account for confounders; and (4) much of the available evidence is derived from populations outside of Europe, which may mean the results are not generalizable to the United Kingdom because of differences in child protection support and healthcare service infrastructure.

Following this noted limitation in the consensus report relating to geographical scarcity of information, there are still very few cohort studies derived from UK populations. One such cohort study is the British Birth Cohort, which followed up all births in 1 week from March 1958 in England, Scotland, and Wales until the present. Participants in this cohort appeared to experience higher levels of adiposity and biomarker inflammation following experiences of bullying and childhood adversity, which the authors stated put them at a high risk of type 2 diabetes mellitus. However, this study did not provide risk estimates for the development of cardiometabolic outcomes in later life. Additionally, aside from the recording of neglect at age 7 years, questions relating to childhood adversity were introduced at the 45-year point, which means that future cohort results are likely to be limited by recall bias. An alternative UK cohort study (Avon Longitudinal Study of Parents and Children) also explored the relationship between CVD risk factors and self-reported abuse at cohort entry in 3612 women. However, again recording of childhood maltreatment occurs during adulthood, and the cohort data do not provide outcomes on cardiometabolic end points.

Considering the potential public health burden posed by cardiometabolic disease occurring following exposure to childhood maltreatment, it is important to document the cardiometabolic risk in a UK cohort, taking into consideration important confounding factors. Therefore, we conducted the first UK retrospective cohort study using “The Health Improvement Network” (THIN) data set exploring the association between officially confirmed childhood maltreatment and maltreatment-related concerns (possible/suspected maltreatment) with the subsequent development of cardiometabolic outcomes and all-cause mortality.

**METHODS**

**Transparency and Openness Statement**

The anonymized data that support the findings of this study are available from the senior author (k.nirantharan@bham.ac.uk). However, this will be subject to approval from the data providers (Cegedim).
Study Design, Population, and Data Source

This study is a population-based, retrospective open cohort study using the THIN database, which consists of 787 general practices. The study period was set between January 1, 1995 and December 31, 2018. An open cohort study allows for patients to enter and exit the study at different time points, with each individual patient only contributing person-years of follow-up from the time of cohort entry (index date) to the time they leave the cohort (exit date).

The database is representative of the UK population in terms of demographic structure and prevalence of key comorbidities. Symptoms, examinations, and diagnoses in THIN are recorded using a hierarchical clinical coding system called Read codes. As entry into the database relies on the use of specific electronic records software (Vision), the number of contributing practices can vary over time. In order to reduce under-recording of events, general practices were included 12 months following their installment of electronic practice records or from the practice's acceptable mortality recording date.

Exposure and Outcome Definition

The purpose of this study was to compare exposed (those with a code identifying officially confirmed childhood maltreatment or a maltreatment-related concern code under the age of 18 years) adult (over the age of 18 years at index date) patients with unexposed patients (those without such codes) and then calculate their risk of developing cardiometabolic disease and all-cause mortality.

Exposure codes relating to officially confirmed child maltreatment were selected with the assistance of public health clinicians and general practitioners who have expertise in Read code selection. Exposure codes used to define maltreatment-related concern were adapted from previous research conducted using THIN and consist of codes designed to capture clinical concern relating to suspected or possible maltreatment. Patients were included in the exposed group if they had a maltreatment or maltreatment-related code inserted before the age of 18 years but only were able to enter the cohort once they were the age of 18 years or older.

Outcome codes relating to cardiometabolic disease (defined as CVD [ischemic heart disease, heart failure, peripheral vascular disease and Stroke/Transient ischemic attack, hypertension, and type 2 diabetes mellitus]) are well coded in THIN as they form part of the Quality Outcomes Framework (performance indicators linked to general practice payments in the United Kingdom). Hence, Read code lists relating to cardiometabolic disease were largely based on Quality and Outcomes Framework recommended codes and expert opinion from general practitioners with expertise in Cardiometabolic Read code selection.

Read code lists relating to exposure terms and outcomes are provided (Data S1).

Selection of Unexposed Group

Each exposed patient was matched with up to 2 unexposed control patients, who had no documented Read code relating to the exposure. Controls were taken from other general practices within the database and were matched by age at index date (±1 year) and sex. Matching was conducted in the selection of the unexposed group only and not as part of any analytical approaches.

Follow-Up Period

The index date for those in the exposed group was the date at which they reached 18 years of age, a year after registration with the general practice or the date the general practice was eligible to contribute to the database, whichever was the latest. To mitigate immortal time bias, the same index date was assigned to the corresponding unexposed patient. The follow-up period for each patient was from the index date until the exit date. Exit date is defined as the earliest of the following dates: study end date, last date of data collection from a given general practice, date patient transferred from general practice, date of death, or date the outcome of interest occurred.

Covariates

Covariates relating to the development of outcomes of interest such as body mass index, smoking status, the use of lipid-lowering drugs, Charlson comorbidity index, and Townsend deprivation score were extracted in the baseline data.

Statistical Analysis

STATA version 15.1 MP/4 software (Statacorp 2017) was used to conduct all analysis. Categorical baseline data were described using proportions, and continuous data were described using means or median with standard deviations or interquartile range. Missing data are highlighted in relevant baseline characteristic tables. Where there were missing data in our covariates, they were treated as a separate missing category and included in the final analysis.

In order to calculate an incidence rate (IR per 10 000 person-years) for each of the outcomes of interest, patients with the same pre-existing illness (defined as a Cardiometabolic Read code) were excluded to ensure the IR reflected outcomes that...
occurred following cohort entry. Poisson regression offsetting for log(person-years) of follow-up specified as an exposure was then used to calculate an incidence rate ratio (IRR) for each outcome of interest during the study period. Alternative models such as the negative binomial Poisson model were used to examine the possible effects of dispersion. However, the results were identical, suggesting absence of overdispersion. Therefore, a Poisson model was utilized. The mathematical model used for the Poisson model was the following:

$$\log(E(y)) = b_0 + b_1x + ... + \log(t)$$

where $y$ is dependent variable; $E(y)$, Expected count value; $x$, independent variable; $b_0$, $b_1$ etc., Regression coefficients; and $t$, exposure time.

Following adjustment for the covariates, we calculated and present an adjusted IRR (aIRR). All CVD outcomes were adjusted for body mass index, age, sex, smoking, diabetes mellitus status, lipid-lowering drug use, hypertension, and Townsend deprivation score at baseline. The hypertension outcome was adjusted for these factors excluding hypertension and likewise for type 2 diabetes mellitus outcome, we excluded diabetes mellitus status from the covariates. Mortality was adjusted for the same factors as CVD in addition to Charlson comorbidity index. 29 In all of the Poisson models, the year of registration was also included in the multivariable model to account for any changes in recording practice over time. 26 In all models relating to the main analyses, the adjusted model showed a better fit than the unadjusted model (higher pseudo R2 and likelihood ratios). Further details relating to the covariate significance and fit criterion can be seen in Table S1.

Decisions regarding covariate adjustment were influenced by previous research examining cardiometabolic outcomes. 14,33–35 Previous literature has stated the importance of taking into consideration the confounding role of age, sex, and deprivation when exploring the relationship between childhood maltreatment and cardiometabolic disease, hence their inclusion in our model. 14 Other covariates included in our model have been previously suggested as mediators in this relationship. 36 However, because of the young age of this cohort at cohort entry, it is clear that many of these covariates are likely to occur after index date. We, however, adjusted for the presence of such covariates at baseline because it was not possible to determine whether the exposure of interest or the covariates occurred first. IRRs are presented with 95% CIs where statistical significance was set at $P<0.05$.

A sensitivity analysis was conducted to explore whether findings differed when only looking at officially confirmed maltreatment codes.

### Ethical Approval

Anonymous data provided by the data provider to the University of Birmingham were used throughout the study. Studies using the THIN database have had initial ethical approval from the National Health Service South-East Multicentre Research Ethics Committee, subject to prior independent scientific review. The Scientific Review Committee (IQVIA) approved the study protocol (Reference Number: SRC18THIN034) before its undertaking.

### RESULTS

We identified 80 657 exposed patients who were matched to 161 314 unexposed patients during the study period, who on average were followed up for 2.3 years. The median follow-up was similar in the exposed group (2.3 years) compared with the unexposed group (2.2 years). Mean age (23 years) and sex proportions (42% males) were similar in the cohort because of matching. There were substantial missing data for body mass index (49%). There was a higher proportion of smokers in the exposed cohort (38%) compared with the unexposed cohort (20%). There was also a greater proportion of socio-economic deprivation, comorbidity, and pre-existing cardiometabolic disease at baseline in the exposed population compared with the unexposed. Baseline characteristics are described in Table 1.

There were 243 new CVD events in the exposed group (0.3%, IR 8.3 per 10 000 person-years) compared with 254 (0.2%, IR 4.6 per 10 000 person-years) in the unexposed group. This translated to an increased aIRR of 1.71 (95% CI, 1.42–2.06). When broken down by type of CVD event, this risk persisted significantly for ischemic heart disease (aIRR 1.57; 95% CI, 1.16–2.13) and Stroke/transient ischemic attack (aIRR 2.15; 95% CI, 1.66–2.81). Though the risk was raised for heart failure and peripheral vascular disease, this did not reach statistical significance (heart failure: aIRR 1.51; 95% CI, 0.92–2.51; peripheral vascular disease: aIRR 1.54; 95% CI, 0.87–2.73).

There were 537 (0.7%, IR 18.6 per 10 000 person-years) and 504 (0.6%, IR 17.3 per 10 000 person-years) new diagnoses of hypertension and type 2 diabetes mellitus in the exposed group compared with 780 (0.5%, IR 14.3 per 10 000 person-years) and 414 (0.3%, 7.6 per 10 000 person-years), respectively, in the unexposed group. This translated into an increased risk of developing hypertension (aIRR 1.42; 95% CI, 1.26–1.59) and type 2 diabetes mellitus (aIRR 2.13; 95% CI, 1.86–2.45) in the exposed group when compared with the unexposed group. Further details can be seen in Table 2 and Figure.

When exploring the risk of all-cause mortality, during the study period 501 patients in the exposed group...
had died (0.6%, IR 17.4 per 10 000 person-years) compared with 452 in the unexposed cohort (0.3%, IR 8.3 per 10 000 person-years). This translated into 75% increased risk for mortality (aIRR 1.75; 95% CI, 1.52–2.02). Further details can be seen in Table 3.

We identified within the total cohort that 22 078 (27.3% of total exposed cohort) patients had confirmatory codes relating to childhood maltreatment. These patients were matched with 44 156 unexposed patients (27.3% of the total unexposed cohort). The cohort details are described in Table S2. The average age at index date was higher than the combined cohort (27 years old). When comparing confirmed exposed cases only with their unexposed controls, the risk of developing the outcomes of interest (Tables S3 and S4) persisted; CVD aIRR 1.77 (95% CI, 1.36–2.30), hypertension aIRR 1.60 (95% CI, 1.36–1.87), type 2 diabetes mellitus aIRR 2.07 (1.68–2.56) and all-cause mortality (aIRR 1.58; 95% CI, 1.27–1.96).

DISCUSSION

To our knowledge this was the first study using UK primary care data to explore the relationship between childhood maltreatment and the subsequent development of cardiometabolic disease and all-cause mortality. The main analysis found an increased risk of developing combined types of CVD and hypertension as well as a doubling of risk of developing type 2 diabetes mellitus. Additionally, we found an increased risk of all-cause mortality in this cohort. When isolating to only patients who had a confirmed code of maltreatment, this described risk persisted across all outcomes.

Our study adds to the global literature describing a positive relationship between the development of cardiometabolic disease following exposure to childhood maltreatment,14,15 particularly expanding on these findings with data taken from a large UK cohort. As our exposure and outcome definition is different from previously reported data,11–14 it is difficult to make direct comparisons of our demonstrated IR with other data sets. However, of particular note where there was a previous discrepancy in literature describing the effect size between exposure to childhood maltreatment and subsequent hypertension diagnosis, we have demonstrated a positive association.14,37–39

Interestingly, although there were missing data at baseline for covariates, we did notice some significant differences between the exposed and unexposed groups. When considering smoking rates at baseline, the unexposed group current smoking prevalence is considerably higher than the exposed group. This is in line with current literature, which suggests that individuals take on certain harmful coping mechanisms such as smoking in response to high levels of distress, and this may be a contributing but preventable factor mediating the relationship

| Table 1. Baseline Characteristics of Those Exposed and Unexposed to Childhood Maltreatment |
|---------------------------------------------------------------|
| Baseline Characteristics (SD, IQR, or Percentage)              |
|                                                               |
|                                                               |
| | Exposed Group | Unexposed Group |
|---------------------------------------------------------------|
| Number of patients    | 80 657    | 161 314    |
| Median follow-up period (person y) (IQR)            | 2.3 (IQR 0.9–5.1) | 2.2 (IQR 0.7–4.9) |
| Age at cohort entry (y)                                | 23.3 (SD 7.3) | 23.4 (SD 7.2) |
| Age when maltreatment occurred (y)                     | 9.6 (SD 6.2) | ... |
| Sex; Male (%)                                            | 33 614 (41.7%) | 67 228 (41.7%) |
| Body mass index                                          |                   |
| <25 kg/m²                                                    | 24 091 (29.9%) | 56 694 (35.2%) |
| 25–30 kg/m²                                                | 7642 (9.5%) | 18 659 (11.6%) |
| >30 kg/m²                                                   | 6222 (7.8%) | 11 132 (6.9%) |
| Not available                                               | 42 602 (52.9%) | 74 829 (46.4%) |
| Smoking status                                             |                   |
| Current smoker                                             | 30 462 (37.8%) | 31 517 (19.5%) |
| Noncurrent/not available                                    | 50 195 (62.2%) | 129 797 (80.5%) |
| Townsend index                                             |                   |
| (Least deprived) 1                                          | 6296 (7.8%) | 27 027 (16.8%) |
| 2                                                           | 7295 (9.8%) | 25 066 (15.6%) |
| 3                                                           | 13 469 (16.7%) | 29 771 (18.5%) |
| 4                                                           | 19 116 (23.7%) | 29 857 (18.5%) |
| 5                                                           | 19 860 (24.6%) | 22 849 (14.2%) |
| Not available                                               | 13 991 (17.4%) | 26 725 (16.6%) |
| Charlson comorbidity index                                  |                   |
| (Least comorbid) 0                                          | 59 352 (73.6%) | 130 956 (81.2%) |
| 1                                                           | 19 975 (24.8%) | 28 735 (17.8%) |
| 2                                                           | 888 (1.1%) | 1178 (0.7%) |
| 3                                                           | 276 (0.3%) | 289 (0.2%) |
| 4 and above                                                 | 166 (0.2%) | 156 (0.1%) |
| Lipid-lowering drug use                                     | 309 (0.4%) | 777 (0.5%) |
| Pre-existing cardiometabolic disease                       |                   |
| All cardiovascular disease                                 | 395 (0.5%) | 345 (0.2%) |
| Ischemic heart disease                                     | 115 (0.1%) | 115 (0.1%) |
| Heart failure                                               | 43 (0.1%) | 50 (0.0%) |
| Stroke/transient ischemic attack                            | 214 (0.3%) | 160 (0.1%) |
| Peripheral vascular disease                                | 56 (0.1%) | 51 (0.0%) |
| Hypertension                                                | 633 (0.8%) | 1111 (0.7%) |
| Diabetes mellitus                                          | 556 (0.7%) | 631 (0.4%) |

IQR indicates interquartile range.
Table 2. Risk of Developing Cardiometabolic Disease in Those Exposed and Unexposed to Childhood Maltreatment

|                                | All Cardiovascular Disease | Ischemic Heart Disease | Stroke/Transient Ischemic Attack | Heart Failure | Peripheral Vascular Disease | Hypertension | Type 2 Diabetes Mellitus |
|--------------------------------|---------------------------|------------------------|----------------------------------|--------------|-----------------------------|--------------|-------------------------|
| Number of patients             | Exposed 80,262 Unexposed 160,969 | Exposed 80,542 Unexposed 161,199 | Exposed 80,443 Unexposed 161,154 | Exposed 60,614 Unexposed 161,264 | Exposed 80,601 Unexposed 161,263 | Exposed 80,024 Unexposed 160,203 | Exposed 80,101 Unexposed 160,683 |
| Numbers of outcomes            | 263 254 | 94 100 | 139 117 | 30 40 | 30 27 | 537 780 | 504 414 |
| Person-y                       | 291,928 549,812 | 293,452 551,136 | 295,030 551,051 | 294,004 551,687 | 293,954 551,707 | 289,125 543,743 | 290,782 548,301 |
| Incidence rate (per 10,000 person-years) | 8.3 4.6 | 3.2 1.8 | 4.7 2.1 | 1.0 0.7 | 1.0 0.5 | 16.6 14.3 | 17.3 7.6 |
| Incidence rate ratio (95% CI)*  | 1.80 (1.51–2.15) | 1.77 (1.33–2.34) | 2.23 (1.75–2.86) | 1.41 (0.88–2.26) | 2.09 (1.24–3.51) | 1.29 (1.16–1.45) | 2.30 (2.02–2.61) |
| P-value                         | <0.001 | <0.001 | <0.001 | 0.157 | 0.006 | <0.001 | <0.001 |
| Adjusted incidence rate ratio (95% CIs)** | 1.71 (1.42–2.06) | 1.57 (1.16–2.13) | 2.15 (1.66–2.81) | 1.51 (0.92–2.51) | 1.54 (0.87–2.73) | 1.42 (1.26–1.59) | 2.13 (1.86–2.45) |
| P-value                         | <0.001 | 0.003 | <0.001 | 0.106 | 0.135 | <0.001 | <0.001 |

*Unadjusted incidence rate ratio.

**All cardiovascular disease, ischemic heart disease, stroke/transient ischemic attack, heart failure, and peripheral vascular disease outcomes were adjusted for body mass index, age, sex, smoking, diabetes mellitus status, lipid-lowering drug use, hypertension, and Townsend deprivation score at baseline as well as year of registration into the database. The hypertension outcome was adjusted for these factors excluding hypertension. The type 2 diabetes mellitus outcome was adjusted for these factors excluding hypertension and diabetes mellitus status.

The estimate associated with year of registration in the multivariable regression (adjusted incidence rate ratio; 95% CI, P-value): All cardiovascular disease (0.99; 0.99–1.00, 0.014), ischemic heart disease (0.99; 0.98–1.00, 0.156), stroke/transient ischemic attack (0.99; 0.86–1.00, 0.197), heart failure (0.99; 0.98–1.01, 0.320), peripheral vascular disease (1.00; 0.98–1.02, 0.996), hypertension (0.99; 0.99–0.99, <0.001), and type 2 diabetes mellitus (1.00; 1.00–1.01, 0.499).
between childhood maltreatment and cardiometabolic disease.40

These findings are of particular note in the United Kingdom, where there is an increasing burden of morbidity relating to cardiometabolic disease.41,42 Considering the estimated prevalence of childhood maltreatment within the United Kingdom (potentially 1 in 4 children being affected),2 this could suggest a significant proportion of the cardiometabolic disease burden may be attributable to maltreatment. Therefore, there is a clear public health message that requires a population-based approach to not only prevent childhood maltreatment but also the negative consequences as a result of it. There is a push by academic bodies and the UK Government to improve evidence in the area of early-years intervention to prevent these negative consequences.43,44 Specifically, focusing on cardiometabolic disease prevention using holistic and family-oriented-based programs has shown great promise in the reduction of risk factors that may mediate the pathway between maltreatment and disease.45,46 Additionally, considering the increased smoking risk in this group that may mediate the relationship, evidence-based school-based or family-based smoking cessation programs may need to be targeted at this high-risk group.47

Additionally, our results play an important role in the global context of the literature. Current global evidence has been limited by factors relating to the retrospective nature of case ascertainment, limited sample size, and inability to account for confounders, which we have taken into consideration in the design of our study.14,15 We hope these findings provide further evidence for the association and the need for public health approaches to tackle the burden of cardiometabolic disease associated with childhood maltreatment.

Table 3. Risk of Mortality in Those Exposed and Unexposed to Childhood Maltreatment

|                        | Exposed | Unexposed |
|------------------------|---------|-----------|
| Number of patients     | 80,657  | 161,314   |
| Numbers of outcomes    | 501     | 452       |
| Person-y               | 288,757 | 545,808   |
| Incidence rate (per 10,000 person-y) | 17.4 | 8.3 |
| Incidence rate ratio (95% CI)* | 2.10 (1.84–2.48) |    |
| P-value                | <0.001  |           |
| Adjusted incidence rate ratio (95% CI)** | 1.75 (1.52–2.02) |    |
| P-value                | <0.001  |           |

*Unadjusted incidence rate ratio.
**Adjusted for body mass index, age, sex, smoking status, diabetes mellitus status, lipid-lowering drug use, hypertension, Charlson comorbidity score, and Townsend deprivation score, as well as year of registration into the database.

†The estimate associated with year of registration in the multivariable regression (adjusted incidence rate ratio; 95% CI, P-value): (0.99; 0.99–1.00, 0.006).

Figure. The risk of developing cardiometabolic disease and all-cause mortality in those exposed and unexposed to childhood maltreatment.
However, the results of this study must be considered in light of its limitations. The use of electronic care records relies upon the accuracy of imputation of codes by the healthcare professionals contributing to the data set. Although we believe that recording of cardiometabolic outcomes may be largely accurate, there have yet to be any studies validating recording of childhood maltreatment that may introduce a misclassification bias into our exposure selection. This may mean that the unexposed group may include patients who have experienced childhood maltreatment, which may in fact underestimate the effect size seen in this study.

It has been shown from previous literature that the recording of childhood maltreatment in primary care records has improved over time. This may mean that the potential for misclassification bias is greater in the earlier years of the study. However, in our study we have tried to mitigate for the change in documentation rates over time by adjusting for year of registration. Interestingly, effect of year of registration played little role in the overall effect size (Tables 2 and 3 footnotes).

Another similar important consideration is that if maltreatment was recorded by the general practitioner, it could mean that the maltreatment was particularly severe. In order to mitigate this, we have utilized the maltreatment-related code lists to identify other factors relating to maltreatment that could identify children who may be at risk of childhood maltreatment. Also, in this study, because of nongranularity of the exposure Read codes, we were unable to examine outcomes in the subtypes of abuse or of differing levels of severity.

In conclusion, our study demonstrated an increased risk of developing cardiometabolic disease and all-cause mortality following childhood maltreatment. This highlights the need for public health approaches to both encourage the prevention of childhood maltreatment and for reduction of risk factors responsible for cardiometabolic disease, which may increase as a result of maltreatment.

**ARTICLE INFORMATION**

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**Disclosures**

None.

**Supplementary Materials**

Data S1

Tables S1–S4

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Supplemental Material
Data S1.

Read code lists

Maltreatment related codes

| Code  | Description                                           |
|-------|-------------------------------------------------------|
| 13IC.00 | Child on at risk register                           |
| 13IC200 | Child on at risk regist NOS                          |
| 13IM.00 | Child on protection register                         |
| 13Id.00 | On child protection register                         |
| 13IV.00 | Subject to child protection plan                     |
| 64C..00 | Child protection procedure                           |
| Z35..00 | Child protection procedure                           |
| 3874000 | Multidisciplinary case conference                    |
| 3875000 | Social services case conference                      |
| 3879000 | Review case conference                               |
| 8CM6.00 | Child protection plan                                |
| Z331.00 | Child protection plan                                |
| 9F2..00 | Child at risk-case conference                        |
| Z352.00 | Child protection investigation                       |
| 13VF.00 | At risk violence in the home                         |
| 13IB.00 | Child in care                                        |
| 13IB000 | Child in foster care                                 |
| 13IB100 | Looked after child                                   |
| 13IV.00 | Looked after child - Children (Scotland) Act 1995    |
| 13ZV.00 | At risk of neglect by others                         |
| 13ZT.00 | At risk of physical abuse                            |
| 13ZV.00 | At risk of sexual abuse                              |
| 13ZV.00 | At risk of emotional/psychological abuse             |
| 13VX.00 | At risk of sexual exploitation                       |
| 13Z100 | At risk of psychological abuse                       |
| 13Z100 | Violence between parents                             |
| 38C0.00 | Child in care health assessment                      |
| 6982000 | Fostering medical examination                        |
| 13IF.00 | Child is cause for concern                           |
| 13IP.00 | Family is cause for concern                          |
| 13IF.00 | Child at risk                                        |
| 13IF.11 | Vulnerable child                                     |
| 13IQ.00 | Vulnerable child in family                           |
| 13IS.00 | Child in need                                        |
14XD.00 History of domestic abuse
14X3.00 History of domestic violence
13W..11 Family problems
1BE1.00 Problem situation
625..00 A/N care: social risk
625Z.00 A/N care: social risk NOS
8CM5.00 Child in need plan
13G4.00 Social worker involved
8H75.00 Refer to social worker
ZL79.11 Refer to social worker
8HHB.00 Referral to Social Services
9NDA.00 Report received from social services
9N26.00 Seen by social worker
9Nl6.00 Seen by social services
9NNV.00 Under care of social services
9NNk.00 Under care of social worker
9b0k.00 Social services report
1J3..00 Suspected child abuse
1J30.00 Suspected sexual abuse of child
1J31.00 Suspected non-accidental injury to child
1J32.00 Suspected victim of child neglect

Officially confirmed maltreatment codes

| Code   | Description                                      |
|--------|--------------------------------------------------|
| 13WT.00 | Child protection observation                     |
| 13WT000 | Child protection category                        |
| 13WT100 | Child protection category emotional              |
| 13WT200 | Child protection category physical               |
| 13WT300 | Child protection category sexual                 |
| 13WT400 | Child protection category neglect                |
| 13W3.00 | Child abuse in family                            |
| 13W4.00 | Parent/child conflict                            |
| 13W4000 | Child/parent violence                            |
| 6254000 | A/N care: H/O child abuse                        |
| SN55z11 | Child abuse NEC                                  |
| ZV61200 | [V]Child abuse                                   |
| Z352.11 | Child abuse investigation                        |
| SN55.00 | Child maltreatment syndrome                      |
| SN55000 | Emotional maltreatment of child                  |
| SN55011 | Emotional deprivation of child                   |
| SN55012 | Emotional abuse of child                         |
| Code     | Description                                                      |
|----------|-----------------------------------------------------------------|
| SN55100  | Nutritional maltreatment of child                                |
| SN55111  | Nutritional deprivation of child                                 |
| SN55112  | Malnutrition in child maltreatment syndrome                     |
| SN55200  | Non-accidental injury to child                                   |
| SN55211  | NAI - non-accidental injury to child                            |
| SN55212  | Physical injury to child                                        |
| SN55300  | Battered baby or child syndrome NOS                             |
| SN55311  | Battered baby syndrome NOS                                      |
| SN55312  | Battered child syndrome NOS                                     |
| SN55400  | Multiple deprivation of child                                   |
| SN55500  | Physical abuse of child                                         |
| SN55600  | Non-accidental traumatic head injury to child                   |
| SN55z00  | Child maltreatment syndrome NOS                                  |
| SN55z12  | Child deprivation syndrome                                      |
| SN55z13  | Neglect affecting child NEC                                     |
| ZV61213  | [V]Parent - child conflict                                      |
| ZV61212  | [V]Child neglect                                                |
| ZV61211  | [V]Child battering                                              |
| 13II.00  | Child deserted by parents                                       |
| 13II.11  | Child deserted by mother                                        |
| 13II000  | Subject to care order under Children Act 1989                   |
| 13II001  | Subject to care order under section 20 of Children Act 1989     |
| 13II100  | Subject to care order under section 21 of Children Act 1989     |
| 13II200  | Subject to care order under section 25 of Children Act 1989     |
| 13II300  | Subject to care order under section 31 of Children Act 1989     |
| 13II000  | Subject to interim care order under Children Act 1989           |
| 13II001  | Sub to interim care order under section 38 Children Act 1989    |
| 13II100  | Emergency protective order section 44 Children Act 1989         |
| 13II300  | Subject to supervision order under Children Act 1989            |
| 13II000  | Subject to supervision order under Children Act 1989            |
| Z787.00  | Self-neglect                                                    |
| 222R.00  | Neglected appearance                                            |
| R037.00  | [D]Insufficient intake of food and water due to self neglect    |
| R2y311.0 | [D] Self neglect                                                |
| Ry18.00  | [D]Self neglect                                                 |
| SN57000  | Neglect or abandonment                                          |
| TE40.00  | Accidents due to abandonment or neglect of helpless person      |
| TLx4.00  | Assault by criminal neglect                                      |
| U3M000   | [X]Neglect and abandonment                                      |
| U3M001   | [X]Neglect and abandonment, by spouse or partner                |
| U3M100   | [X]Neglect and abandonment, by parent                           |
| U3M200   | [X]Neglect and abandonment, by acquaintance or friend          |
| U3M300   | [X]Neglect and abandonment, by other specified persons          |
| Code   | Description                                                                 |
|--------|-----------------------------------------------------------------------------|
| U3Mz.00 | [X]Neglect and abandonment, by unspecified person                           |
| Z787200 | Neglect of clothes                                                          |
| Z787400 | Neglect of personal hygiene                                                 |
| Z787500 | Neglect of physical health                                                  |
| Z787600 | Neglect of dental care                                                       |
| Z787700 | Neglect of physical illness                                                  |
| Z787800 | Neglect of common dangers                                                    |
| ZV1B400 | [V]Personal history of neglect                                              |
| ZV4H300 | [V]Emotional neglect of child                                                |
| ZV4H400 | [V]Other problems related to neglect in upbringing                          |
| 14X6.00 | Victim of sexual abuse                                                       |
| 14X..00 | History of abuse                                                             |
| 14X0.00 | History of physical abuse                                                    |
| 14X1.00 | History of sexual abuse                                                      |
| 14X2.00 | History of emotional abuse                                                   |
| 14X3.00 | History of domestic violence                                                 |
| 14X5.00 | Victim of physical abuse                                                     |
| 14X6000 | Victim of sexual harassment                                                  |
| 14X7.00 | Victim of emotional abuse                                                    |
| 14X8.00 | Victim of domestic violence                                                  |
| 14XD.00 | History of domestic abuse                                                    |
| 14XD000 | H/O domestic emotional abuse                                                 |
| 14XD100 | H/O domestic physical abuse                                                  |
| 14XD200 | H/O domestic sexual abuse                                                    |
| 14XE.00 | History of being victim of domestic violence                                |
| 14XF.00 | Victim of human trafficking                                                  |
| 14XG.00 | Victim of domestic abuse                                                     |
| 14XH.00 | Victim of child sexual exploitation                                           |
| 14XJ.00 | Victim of psychological abuse                                                |
| 14XK.00 | Victim of financial abuse                                                    |
| 14XP.00 | Victim of discriminatory abuse                                               |
| 14XR.00 | Victim neglect & acts omission                                               |
| SN57.00 | Maltreatment syndromes                                                       |
| SyuH500 | [X]Other maltreatment syndromes                                             |
| TL7..00 | Child battering and other maltreatment                                      |
| TL70.00 | Child battering or other maltreatment by parent                              |
| TL7y.00 | Child battering or other maltreatment by other spec person                   |
| TL7z.00 | Child battering or other maltreatment by person NOS                          |
| U3N..00 | [X]Other maltreatment syndromes                                             |
| U3N0.00 | [X]Other maltreatment syndromes, by spouse or partner                       |
| U3N1.00 | [X]Other maltreatment syndromes, by parent                                  |
| Code     | Description                                                      |
|----------|------------------------------------------------------------------|
| U3N2.00  | [X]Other maltreatment syndromes, by acquaintance or friend       |
| U3N3.00  | [X]Other maltreatment syndromes, by official authorities         |
| U3Ny.00  | [X]Other maltreatment syndromes, by other specified persons      |
| U3Nz.00  | [X]Other maltreatment syndromes, by unspecified person           |
| U3P..00  | [X]Maltreatment                                                  |
| U3P0.00  | [X]Maltreatment, by spouse or partner                             |
| U3P1.00  | [X]Maltreatment, by parent                                       |
| U3P2.00  | [X]Maltreatment, by acquaintance or friend                       |
| SN42000  | Deprivation of food, unspecified                                 |
| SN43000  | Deprivation of water                                             |
| SN57100  | Sexual abuse                                                     |
| SN56000  | Battered person unspecified, syndrome                            |
| SN57200  | Child affected by Munchausen’s by proxy                           |

**Type 2 Diabetes**

| Clinical Code | Description                                      |
|---------------|--------------------------------------------------|
| C10..00       | Diabetes mellitus                                |
| C100.00       | Diabetes mellitus with no mention of complication |
| C100100       | Diabetes mellitus, adult onset, no mention of complication |
| C100111       | Maturity onset diabetes                          |
| C100112       | Non-insulin dependent diabetes mellitus          |
| C100z00       | Diabetes mellitus NOS with no mention of complication |
| C101.00       | Diabetes mellitus with ketoacidosis              |
| C101100       | Diabetes mellitus, adult onset, with ketoacidosis |
| C101y00       | Other specified diabetes mellitus with ketoacidosis |
| C101z00       | Diabetes mellitus NOS with ketoacidosis          |
| C102.00       | Diabetes mellitus with hyperosmolar coma         |
| C102100       | Diabetes mellitus, adult onset, with hyperosmolar coma |
| C102z00       | Diabetes mellitus NOS with hyperosmolar coma     |
| C103.00       | Diabetes mellitus with ketoacidotic coma          |
| C103100       | Diabetes mellitus, adult onset, with ketoacidotic coma |
| C103y00       | Other specified diabetes mellitus with coma      |
| C103z00       | Diabetes mellitus NOS with ketoacidotic coma      |
| C104.00       | Diabetes mellitus with renal manifestation       |
| C104.11       | Diabetic nephropathy                              |
| C104100       | Diabetes mellitus, adult onset, with renal manifestion |
| C104y00       | Other specified diabetes mellitus with renal complications |
| C104z00       | Diabetes mellitus with nephropathy NOS            |
| C105.00       | Diabetes mellitus with ophthalmic manifestation   |
| Code      | Description                                           |
|-----------|-------------------------------------------------------|
| C105100  | Diabetes mellitus, adult onset, + ophthalmic manifestation |
| C105y00  | Other specified diabetes mellitus with ophthalmic complicatn |
| C105z00  | Diabetes mellitus NOS with ophthalmic manifestation |
| C106.00  | Diabetes mellitus with neurological manifestation |
| C106.11  | Diabetic amyotrophy                                   |
| C106.12  | Diabetes mellitus with neuropathy                     |
| C106.13  | Diabetes mellitus with polyneuropathy                 |
| C106100  | Diabetes mellitus, adult onset, + neurological manifestaion |
| C106100  | Diabetes mellitus, adult onset, + neurological manifestaion |
| C106200  | Diabetes mellitus with peripheral circulatory disorder |
| C107.00  | Diabetes mellitus with peripheral circulatory disorder |
| C107.11  | Diabetes mellitus with gangrene                       |
| C107.12  | Diabetes with gangrene                                |
| C107100  | Diabetes mellitus, adult, + peripheral circulatory disorder |
| C107200  | Diabetes mellitus, adult with gangrene                |
| C107400  | NIDDM with peripheral circulatory disorder            |
| C107y00  | Other specified diabetes mellitus with periph circ comps |
| C107z00  | Diabetes mellitus NOS with peripheral circulatory disorder |
| C108y00  | Other specified diabetes mellitus with multiple comps  |
| C108200  | Diabetes mellitus with multiple complications          |
| C108200  | Diabetes mellitus with multiple complications          |
| C109.00  | Non-insulin dependent diabetes mellitus               |
| C109.11  | NIDDM - Non-insulin dependent diabetes mellitus       |
| C109.12  | Type 2 diabetes mellitus                              |
| C109.13  | Type II diabetes mellitus                             |
| C109000  | Non-insulin-dependent diabetes mellitus with renal comp |
| C109011  | Type II diabetes mellitus with renal complications     |
| C109012  | Type 2 diabetes mellitus with renal complications      |
| C109100  | Non-insulin-dependent diabetes mellitus with ophthalm comp |
| C109111  | Type II diabetes mellitus with ophthalmic complications |
| C109112  | Type 2 diabetes mellitus with ophthalmic complications |
| C109200  | Non-insulin-dependent diabetes mellitus with neuro comp |
| C109211  | Type II diabetes mellitus with neurological complications |
| C109212  | Type 2 diabetes mellitus with neurological complications |
| C109300  | Non-insulin-dependent diabetes mellitus with multiple comp |
| C109311  | Type II diabetes mellitus with multiple complications  |
| C109312  | Type 2 diabetes mellitus with multiple complications   |
| C109400  | Non-insulin dependent diabetes mellitus with ulcer    |
| C109411  | Type II diabetes mellitus with ulcer                  |
| C109412  | Type 2 diabetes mellitus with ulcer                   |
| C109500  | Non-insulin dependent diabetes mellitus with gangrene |
| C109511  | Type II diabetes mellitus with gangrene               |
| Code   | Description                                      |
|--------|--------------------------------------------------|
| C109512 | Type 2 diabetes mellitus with gangrene           |
| C109600 | Non-insulin-dependent diabetes mellitus with retinopathy |
| C109611 | Type II diabetes mellitus with retinopathy       |
| C109612 | Type 2 diabetes mellitus with retinopathy        |
| C109700 | Non-insulin dependent diabetes mellitus - poor control |
| C109711 | Type II diabetes mellitus - poor control         |
| C109712 | Type 2 diabetes mellitus - poor control          |
| C109800 | Reaven’s syndrome                                |
| C109900 | Non-insulin-dependent diabetes mellitus without complication |
| C109911 | Type II diabetes mellitus without complication   |
| C109912 | Type 2 diabetes mellitus without complication    |
| C109A00 | Non-insulin dependent diabetes mellitus with mononeuropathy |
| C109A11 | Type II diabetes mellitus with mononeuropathy    |
| C109A12 | Type 2 diabetes mellitus with mononeuropathy     |
| C109B00 | Non-insulin dependent diabetes mellitus with nephropathy |
| C109B11 | Type II diabetes mellitus with nephropathy       |
| C109B12 | Type 2 diabetes mellitus with nephropathy        |
| C109C00 | Non-insulin dependent diabetes mellitus with diabetic cataract |
| C109C11 | Type II diabetes mellitus with diabetic cataract  |
| C109C12 | Type 2 diabetes mellitus with diabetic cataract   |
| C109D00 | Non-insulin dependent diabetes mellitus with hypoglyca coma |
| C109D11 | Type II diabetes mellitus with hypoglycaemic coma |
| C109D12 | Type 2 diabetes mellitus with hypoglycaemic coma  |
| C109E00 | Non-insulin dependent diabetes mellitus with diabetic cataract |
| C109E11 | Type II diabetes mellitus with diabetic cataract  |
| C109E12 | Type 2 diabetes mellitus with diabetic cataract   |
| C109F00 | Non-insulin-dependent diabetes mellitus with peripheral angiopathy |
| C109F11 | Type II diabetes mellitus with peripheral angiopathy |
| C109F12 | Type 2 diabetes mellitus with peripheral angiopathy |
| C109G00 | Non-insulin dependent diabetes mellitus with arthropathy |
| C109G11 | Type II diabetes mellitus with arthropathy        |
| C109G12 | Type 2 diabetes mellitus with arthropathy        |
| C109H00 | Non-insulin dependent diabetes mellitus with neuropathic arthropathy |
| C109H11 | Type II diabetes mellitus with neuropathic arthropathy |
| C109H12 | Type 2 diabetes mellitus with neuropathic arthropathy |
| C109J00 | Insulin treated Type 2 diabetes mellitus         |
| C109J11 | Insulin treated non-insulin dependent diabetes mellitus |
| C109J12 | Insulin treated Type II diabetes mellitus        |
| C109K00 | Hyperosmolar non-ketotic state in type 2 diabetes mellitus |
| Code   | Description                              |
|--------|------------------------------------------|
| C10A.00 | Malnutrition-related diabetes mellitus    |
| C10A.11 | Jamaica type diabetes                    |
| C10A000 | Malnutrition-related diabetes mellitus with coma |
| C10A100 | Malnutrition-related diabetes mellitus with ketoacidosis |
| C10A200 | Malnutrition-related diabetes mellitus with renal complicatn |
| C10A300 | Malnutrition-related diabetes mellitus with ophthalmic complicat |
| C10A400 | Malnutrition-related diabetes mellitus with neuro complicatns |
| C10A500 | Malnutrition-relat diabetes mellitus with periph circul complctn |
| C10A600 | Malnutrition-related diabetes mellitus with multiple comps |
| C10A700 | Malnutrition-related diabetes mellitus without complications |
| C10AW00 | Malnutrition-related diabetes mellitus with unspec complics |
| C10AX00 | Malnutrition-relat diabetes mellitus with other spec comps |
| C10B.00 | Diabetes mellitus induced by steroids |
| C10B000 | Steroid induced diabetes mellitus without complication |
| C10C.00 | Diabetes mellitus autosomal dominant |
| C10C.11 | Maturity onset diabetes in youth |
| C10D.00 | Diabetes mellitus autosomal dominant type 2 |
| C10D.11 | Maturity onset diabetes in youth type 2 |
| C10ER00 | Latent autoimmune diabetes mellitus in adult |
| C10F.00 | Type 2 diabetes mellitus |
| C10F.11 | Type II diabetes mellitus |
| C10F000 | Type 2 diabetes mellitus with renal complications |
| C10F011 | Type II diabetes mellitus with renal complications |
| C10F100 | Type 2 diabetes mellitus with ophthalmic complications |
| C10F111 | Type II diabetes mellitus with ophthalmic complications |
| C10F200 | Type 2 diabetes mellitus with neurological complications |
| C10F211 | Type II diabetes mellitus with neurological complications |
| C10F300 | Type 2 diabetes mellitus with multiple complications |
| C10F311 | Type II diabetes mellitus with multiple complications |
| C10F400 | Type 2 diabetes mellitus with ulcer |
| C10F411 | Type II diabetes mellitus with ulcer |
| C10F500 | Type 2 diabetes mellitus with gangrene |
| C10F511 | Type II diabetes mellitus with gangrene |
| C10F600 | Type 2 diabetes mellitus with retinopathy |
| C10F611 | Type II diabetes mellitus with retinopathy |
| C10F700 | Type 2 diabetes mellitus - poor control |
| C10F711 | Type II diabetes mellitus - poor control |
| C10F800 | Reaven's syndrome |
| C10F811 | Metabolic syndrome X |
| C10F900 | Type 2 diabetes mellitus without complication |
| C10F911 | Type II diabetes mellitus without complication |
| C10FA00 | Type 2 diabetes mellitus with mononeuropathy |
| Code   | Description                                           |
|--------|-------------------------------------------------------|
| C10FA11| Type II diabetes mellitus with mononeuropathy         |
| C10FB00| Type 2 diabetes mellitus with polyneuropathy          |
| C10FB11| Type II diabetes mellitus with polyneuropathy         |
| C10FC00| Type 2 diabetes mellitus with nephropathy             |
| C10FC11| Type II diabetes mellitus with nephropathy            |
| C10FD00| Type 2 diabetes mellitus with hypoglycaemic coma       |
| C10FD11| Type II diabetes mellitus with hypoglycaemic coma      |
| C10FE00| Type 2 diabetes mellitus with diabetic cataract        |
| C10FE11| Type II diabetes mellitus with diabetic cataract       |
| C10FF00| Type 2 diabetes mellitus with peripheral angiopathy    |
| C10FF11| Type II diabetes mellitus with peripheral angiopathy   |
| C10FG00| Type 2 diabetes mellitus with arthropathy             |
| C10FG11| Type II diabetes mellitus with arthropathy            |
| C10FH00| Type 2 diabetes mellitus with neuropathic arthropathy  |
| C10FH11| Type II diabetes mellitus with neuropathic arthropathy |
| C10FJ00| Insulin treated Type 2 diabetes mellitus               |
| C10FJ11| Insulin treated Type II diabetes mellitus              |
| C10FK00| Hyperosmolar non-ketotic state in type 2 diabetes mellitus |
| C10FK11| Hyperosmolar non-ketotic state in type II diabetes mellitus |
| C10FL00| Type 2 diabetes mellitus with persistent proteinuria  |
| C10FL11| Type II diabetes mellitus with persistent proteinuria |
| C10FM00| Type 2 diabetes mellitus with persistent microalbuminuria |
| C10FM11| Type II diabetes mellitus with persistent microalbuminuria |
| C10FN00| Type 2 diabetes mellitus with ketoacidosis             |
| C10FN11| Type II diabetes mellitus with ketoacidosis            |
| C10FP00| Type 2 diabetes mellitus with ketoacidotic coma        |
| C10FP11| Type II diabetes mellitus with ketoacidotic coma       |
| C10FQ00| Type 2 diabetes mellitus with exudative maculopathy    |
| C10FQ11| Type II diabetes mellitus with exudative maculopathy   |
| C10FR00| Type 2 diabetes mellitus with gastroparesis            |
| C10FR11| Type II diabetes mellitus with gastroparesis           |
| C10FS00| Maternally inherited diabetes mellitus                 |
| C10G.00| Secondary pancreatic diabetes mellitus                 |
| C10G000| Secondary pancreatic diabetes mellitus without complication |
| C10H.00| Diabetes mellitus induced by non-steroid drugs         |
| C10H000| DM induced by non-steroid drugs without complication   |
| C10J.00| Insulin autoimmune syndrome                            |
| C10J000| Insulin autoimmune syndrome without complication       |
| C10K.00| Type A insulin resistance                              |
| C10K000| Type A insulin resistance without complication          |
| C10L.00| Fibrocalculous pancreatopathy                          |
| C10L000| Fibrocalculous pancreatopathy without complication      |
| C10M.00 | Lipoatrophic diabetes mellitus |
| C10M00 | Lipoatrophic diabetes mellitus without complication |
| C10N.00 | Secondary diabetes mellitus |
| C10N00 | Secondary diabetes mellitus without complication |
| C10N100 | Cystic fibrosis related diabetes mellitus |
| C10P.00 | Diabetes mellitus in remission |
| C10P100 | Type II diabetes mellitus in remission |
| C10P111 | Type 2 diabetes mellitus in remission |
| C10y.00 | Diabetes mellitus with other specified manifestation |
| C10y100 | Diabetes mellitus, adult, + other specified manifestation |
| C10yy00 | Other specified diabetes mellitus with other spec comps |
| C10yz00 | Diabetes mellitus NOS with other specified manifestation |
| C10z.00 | Diabetes mellitus with unspecified complication |
| C10z100 | Diabetes mellitus, adult onset, + unspecified complication |
| C10zy00 | Other specified diabetes mellitus with unspecified comps |
| C10zz00 | Diabetes mellitus NOS with unspecified complication |

**Ischaemic Heart Disease**

| Clinical Code | Description |
|---------------|-------------|
| G3...00       | Ischaemic heart disease |
| G3...11       | Arteriosclerotic heart disease |
| G3...12       | Atherosclerotic heart disease |
| G3...13       | IHD - Ischaemic heart disease |
| G30..00       | Acute myocardial infarction |
| G30..11       | Attack - heart |
| G30..12       | Coronary thrombosis |
| G30..13       | Cardiac rupture following myocardial infarction (MI) |
| G30..14       | Heart attack |
| G30..15       | MI - acute myocardial infarction |
| G30..16       | Thrombosis - coronary |
| G30..17       | Silent myocardial infarction |
| G300.00       | Acute anterolateral infarction |
| G301.00       | Other specified anterior myocardial infarction |
| G301000       | Acute anteroapical infarction |
| G301100       | Acute anterosseptal infarction |
| G301z00       | Anterior myocardial infarction NOS |
| G302.00       | Acute inferolateral infarction |
| G303.00       | Acute inferoposterior infarction |
| G304.00       | Posterior myocardial infarction NOS |
| G305.00       | Lateral myocardial infarction NOS |
| Code     | Description                                                                 |
|----------|-----------------------------------------------------------------------------|
| G306.00  | True posterior myocardial infarction                                        |
| G307.00  | Acute subendocardial infarction                                             |
| G307000  | Acute non-Q wave infarction                                                 |
| G307100  | Acute non-ST segment elevation myocardial infarction                        |
| G308.00  | Inferior myocardial infarction NOS                                          |
| G309.00  | Acute Q-wave infarct                                                        |
| G30A.00  | Mural thrombosis                                                            |
| G30B.00  | Acute posterolateral myocardial infarction                                  |
| G30X.00  | Acute transmural myocardial infarction of unspecified site                  |
| G30X000  | Acute ST segment elevation myocardial infarction                            |
| G30Y.00  | Other acute myocardial infarction                                           |
| G30Y000  | Acute atrial infarction                                                     |
| G30Y100  | Acute papillary muscle infarction                                           |
| G30Y200  | Acute septal infarction                                                     |
| G30YZ00  | Acute transmural myocardial infarction of unspecified site                  |
| G30y.00  | Other acute and subacute ischaemic heart disease                            |
| G30Y000  | Acute coronary insufficiency                                                |
| G31.00   | Old myocardial infarction                                                    |
| G311.00  | Postmyocardial infarction syndrome                                           |
| G311.11  | Dressler's syndrome                                                         |
| G311.00  | Preinfarction syndrome                                                      |
| G311.12  | Impending infarction                                                        |
| G311.13  | Unstable angina                                                             |
| G311.14  | Angina at rest                                                              |
| G311000  | Myocardial infarction aborted                                               |
| G311011  | MI - myocardial infarction aborted                                          |
| G311100  | Unstable angina                                                             |
| G311200  | Angina at rest                                                              |
| G311300  | Refractory angina                                                           |
| G311400  | Worsening angina                                                            |
| G311500  | Acute coronary syndrome                                                     |
| G311Z00  | Preinfarction syndrome NOS                                                  |
| G312.00  | Coronary thrombosis not resulting in myocardial infarction                  |
| G31Y.00  | Other acute and subacute ischaemic heart disease                            |
| G31Y000  | Acute coronary insufficiency                                                |
| G31Y100  | Microinfarction of heart                                                    |
| G31Y200  | Subendocardial ischaemia                                                    |
| G31Y300  | Transient myocardial ischaemia                                              |
| G31Y200  | Other acute and subacute ischaemic heart disease NOS                        |
| G32.00   | Old myocardial infarction                                                   |
| G32.11   | Healed myocardial infarction                                                |
| G32.12   | Personal history of myocardial infarction                                   |
| Code     | Description                                      |
|----------|--------------------------------------------------|
| G33..00  | Angina pectoris                                  |
| G330.00  | Angina decubitus                                 |
| G330000  | Nocturnal angina                                 |
| G330z00  | Angina decubitus NOS                             |
| G331.00  | Prinzmetal's angina                              |
| G331.11  | Variant angina pectoris                          |
| G332.00  | Coronary artery spasm                            |
| G33z.00  | Angina pectoris NOS                              |
| G33z000  | Status anginosus                                 |
| G33z100  | Stenocardia                                      |
| G33z200  | Syncope anginosa                                 |
| G33z300  | Angina on effort                                 |
| G33z400  | Ischaemic chest pain                             |
| G33z500  | Post infarct angina                              |
| G33z600  | New onset angina                                 |
| G33z700  | Stable angina                                    |
| G33z800  | Angina pectoris NOS                              |
| G34..00  | Other chronic ischaemic heart disease            |
| G340.00  | Coronary atherosclerosis                         |
| G340.11  | Triple vessel disease of the heart               |
| G340.12  | Coronary artery disease                          |
| G340000  | Single coronary vessel disease                   |
| G340100  | Double coronary vessel disease                   |
| G341.00  | Aneurysm of heart                                |
| G341.11  | Cardiac aneurysm                                 |
| G341000  | Ventricular cardiac aneurysm                     |
| G341100  | Other cardiac wall aneurysm                      |
| G341111  | Mural cardiac aneurysm                           |
| G341200  | Aneurysm of coronary vessels                     |
| G341300  | Acquired atrioventricular fistula of heart       |
| G341z00  | Aneurysm of heart NOS                            |
| G342.00  | Atherosclerotic cardiovascular disease            |
| G343.00  | Ischaemic cardiomyopathy                         |
| G344.00  | Silent myocardial ischaemia                      |
| G34y.00  | Other specified chronic ischaemic heart disease  |
| G34y000  | Chronic coronary insufficiency                   |
| G34y100  | Chronic myocardial ischaemia                     |
| G34yz00  | Other specified chronic ischaemic heart disease NOS| |
| G34z.00  | Other chronic ischaemic heart disease NOS        |
| G34z000  | Asymptomatic coronary heart disease              |
| G35..00  | Subsequent myocardial infarction                 |
| G350.00  | Subsequent myocardial infarction of anterior wall| |
| Clinical Code | Description |
|---------------|-------------|
| 101..00       | Heart failure confirmed |
| 210..00       | On optimal heart failure therapy |
| 662f.00       | New York Heart Association classification - class I |
| 662g.00       | New York Heart Association classification - class II |
| 662h.00       | New York Heart Association classification - class III |
| 662i.00       | New York Heart Association classification - class IV |
| 8B29.00       | Cardiac failure therapy |
| Code       | Description                                             |
|------------|---------------------------------------------------------|
| G58..00    | Heart failure                                           |
| G58..11    | Cardiac failure                                         |
| G580.00    | Congestive heart failure                                |
| G580.11    | Congestive cardiac failure                              |
| G580.12    | Right heart failure                                     |
| G580.13    | Right ventricular failure                               |
| G580.14    | Biventricular failure                                   |
| G580000    | Acute congestive heart failure                          |
| G580100    | Chronic congestive heart failure                        |
| G580200    | Decompensated cardiac failure                           |
| G580300    | Compensated cardiac failure                             |
| G580400    | Congestive heart failure due to valvular disease        |
| G581.00    | Left ventricular failure                                |
| G581.11    | Asthma - cardiac                                        |
| G581.13    | Impaired left ventricular function                      |
| G581000    | Acute left ventricular failure                          |
| G582.00    | Acute heart failure                                     |
| G583.00    | Heart failure with normal ejection fraction             |
| G583.11    | HFNEF - heart failure with normal ejection fraction     |
| G583.12    | Heart failure with preserved ejection fraction          |
| G584.00    | Right ventricular failure                               |
| G58z.00    | Heart failure NOS                                       |
| G58z.12    | Weak heart                                              |
| G5y4z00    | Post cardiac operation heart failure NOS                |
| 661M500    | Heart failure self-management plan agreed               |
| 661N500    | Heart failure self-management plan review               |
| 662p.00    | Heart failure 6 month review                            |
| 662T.00    | Congestive heart failure monitoring                     |
| 662W.00    | Heart failure annual review                             |
| 679W100    | Education about deteriorating heart failure             |
| 8H25.00    | Admit heart failure emergency                           |
| 8HBE.00    | Heart failure follow-up                                 |
| 8HTL000    | Referral to rapid access heart failure clinic           |
| G232.00    | Hypertensive heart&renal dis wth (congestive) heart failure |
| G234.00    | Hyperten heart&renal dis+both(congestv)heart and renal fail |
| G581.12    | Pulmonary oedema - acute                                |
| G58z.11    | Weak heart                                              |
| SP11111    | Heart failure as a complication of care                 |
| SP11200    | Cardiorespiratory failure as a complication of care     |
| G554000    | Congestive cardiomyopathy                               |
### Stroke/Trans-ischaemic attack

| Clinical code | Description |
|---------------|-------------|
| G60..00       | Subarachnoid haemorrhage |
| G600.00       | Ruptured berry aneurysm  |
| G601.00       | Subarachnoid haemorrhage from carotid siphon and bifurcation |
| G602.00       | Subarachnoid haemorrhage from middle cerebral artery |
| G603.00       | Subarachnoid haemorrhage from anterior communicating artery |
| G604.00       | Subarachnoid haemorrhage from posterior communicating artery |
| G605.00       | Subarachnoid haemorrhage from basilar artery |
| G606.00       | Subarachnoid haemorrhage from vertebral artery |
| G60X.00       | Subarachnoid haemorrhage from intracranial artery, unspecified |
| G60Z.00       | Subarachnoid haemorrhage NOS |
| G61..00       | Intracerebral haemorrhage |
| G611.11       | CVA - cerebrovascular accident due to intracerebral haemorrhage |
| G611.12       | Stroke due to intracerebral haemorrhage |
| G610.00       | Cortical haemorrhage |
| G611.00       | Internal capsule haemorrhage |
| G612.00       | Basal nucleus haemorrhage |
| G613.00       | Cerebellar haemorrhage |
| G614.00       | Pontine haemorrhage |
| G615.00       | Bulbar haemorrhage |
| G616.00       | External capsule haemorrhage |
| G617.00       | Intracerebral haemorrhage, intraventricular |
| G618.00       | Intracerebral haemorrhage, multiple localized |
| G619.00       | Lobar cerebral haemorrhage |
| G61X.00       | Intracerebral haemorrhage in hemisphere, unspecified |
| G61X000       | Left sided intracerebral haemorrhage, unspecified |
| G61X100       | Right sided intracerebral haemorrhage, unspecified |
| G61Z.00       | Intracerebral haemorrhage NOS |
| G62..00       | Other and unspecified intracranial haemorrhage |
| G620.00       | Extradural haemorrhage - nontraumatic |
| G621.00       | Subdural haemorrhage - nontraumatic |
| G622.00       | Subdural haematoma - nontraumatic |
| G623.00       | Subdural haemorrhage NOS |
| G62Z.00       | Intracranial haemorrhage NOS |
| G63..00       | Precerebral arterial occlusion |
| G63..11       | Infarction - precerebral |
| Code   | Description                                           |
|--------|-------------------------------------------------------|
| G63.12 | Stenosis of precerebral arteries                     |
| G630.00| Basilar artery occlusion                              |
| G631.00| Carotid artery occlusion                              |
| G631.11| Stenosis, carotid artery                              |
| G631.12| Thrombosis, carotid artery                            |
| G632.00| Vertebral artery occlusion                            |
| G633.00| Multiple and bilateral precerebral arterial occlusion  |
| G634.00| Carotid artery stenosis                               |
| G63y.00| Other precerebral artery occlusion                    |
| G63y000| Cerebral infarct due to thrombosis of precerebral arteries |
| G63y100| Cerebral infarction due to embolism of precerebral arteries |
| G63z.00| Precerebral artery occlusion NOS                      |
| G64..00| Cerebral arterial occlusion                           |
| G64..11| CVA - cerebral artery occlusion                       |
| G64..12| Infarction - cerebral                                |
| G64..13| Stroke due to cerebral arterial occlusion             |
| G640.00| Cerebral thrombosis                                  |
| G640000| Cerebral infarction due to thrombosis of cerebral arteries |
| G641.00| Cerebral embolism                                    |
| G641.11| Cerebral embolus                                     |
| G641000| Cerebral infarction due to embolism of cerebral arteries |
| G64z.00| Cerebral infarction NOS                               |
| G64z.11| Brainstem infarction NOS                              |
| G64z.12| Cerebellar infarction                                |
| G64z000| Brainstem infarction                                 |
| G64z100| Wallenberg syndrome                                  |
| G64z111| Lateral medullary syndrome                            |
| G64z200| Left sided cerebral infarction                        |
| G64z300| Right sided cerebral infarction                       |
| G64z400| Infarction of basal ganglia                           |
| G65..00| Transient cerebral ischaemia                          |
| G65..11| Drop attack                                           |
| G65..12| Transient ischaemic attack                            |
| G65..13| Vertebro-basilar insufficiency                        |
| G650.00| Basilar artery syndrome                              |
| G650.11| Insufficiency - basilar artery                        |
| G651.00| Vertebral artery syndrome                             |
| G651000| Vertebro-basilar artery syndrome                      |
| G652.00| Subclavian steal syndrome                             |
| G653.00| Carotid artery syndrome hemispheric                   |
| G654.00| Multiple and bilateral precerebral artery syndromes   |
| G655.00| Transient global amnesia                             |
| Code     | Description                                                        |
|----------|-------------------------------------------------------------------|
| G656.00  | Vertebrobasilar insufficiency                                     |
| G657.00  | Carotid territory transient ischaemic attack                     |
| G65y.00  | Other transient cerebral ischaemia                               |
| G65z.00  | Transient cerebral ischaemia NOS                                 |
| G65z000  | Impending cerebral ischaemia                                     |
| G65z100  | Intermittent cerebral ischaemia                                  |
| G65zz00  | Transient cerebral ischaemia NOS                                 |
| G66..00  | Stroke and cerebrovascular accident unspecified                  |
| G66..11  | CVA unspecified                                                  |
| G66..12  | Stroke unspecified                                                |
| G66..13  | CVA - Cerebrovascular accident unspecified                       |
| G660.00  | Middle cerebral artery syndrome                                  |
| G661.00  | Anterior cerebral artery syndrome                                |
| G662.00  | Posterior cerebral artery syndrome                               |
| G663.00  | Brain stem stroke syndrome                                       |
| G664.00  | Cerebellar stroke syndrome                                       |
| G665.00  | Pure motor lacunar syndrome                                      |
| G666.00  | Pure sensory lacunar syndrome                                    |
| G667.00  | Left sided CVA                                                   |
| G668.00  | Right sided CVA                                                  |
| G669.00  | Cerebral palsy, not congenital or infantile, acute               |
| G67..00  | Other cerebrovascular disease                                    |
| G670.00  | Cerebral atherosclerosis                                          |
| G670.11  | Precerebral atherosclerosis                                      |
| G671.00  | Generalised ischaemic cerebrovascular disease NOS                |
| G671000  | Acute cerebrovascular insufficiency NOS                          |
| G671100  | Chronic cerebral ischaemia                                       |
| G671200  | Generalised ischaemic cerebrovascular disease NOS                |
| G672.00  | Hypertensive encephalopathy                                      |
| G672.11  | Hypertensive crisis                                              |
| G673.00  | Cerebral aneurysm, nonruptured                                   |
| G673000  | Dissection of cerebral arteries, nonruptured                     |
| G673100  | Carotico-cavernous sinus fistula                                 |
| G673200  | Carotid artery dissection                                        |
| G673300  | Vertebral artery dissection                                      |
| G674.00  | Cerebral arteritis                                                |
| G674000  | Cerebral amyloid angiopathy                                      |
| G675.00  | Moyamoya disease                                                 |
| G676.00  | Nonpyogenic venous sinus thrombosis                              |
| G676000  | Cereb infarc due cerebral venous thrombosis, nonpyogenic         |
| G677.00  | Occlusion/stenosis cerebral arts not result cerebral infarct     |
| G677000  | Occlusion and stenosis of middle cerebral artery                 |
| G677100 | Occlusion and stenosis of anterior cerebral artery |
| G677200 | Occlusion and stenosis of posterior cerebral artery |
| G677300 | Occlusion and stenosis of cerebellar arteries |
| G677400 | Occlusion+stenosis of multiple and bilat cerebral arteries |
| G678.00 | Cereb autosom dominant arteriop subcort infarcts leukoenceph |
| G679.00 | Small vessel cerebrovascular disease |
| G67A.00 | Cerebral vein thrombosis |
| G67B.00 | Reversible cerebral vasoconstriction syndrome |
| G67y.00 | Other cerebrovascular disease OS |
| G67z.00 | Other cerebrovascular disease NOS |
| G68..00 | Late effects of cerebrovascular disease |
| G680.00 | Sequelae of subarachnoid haemorrhage |
| G681.00 | Sequelae of intracerebral haemorrhage |
| G682.00 | Sequelae of other nontraumatic intracranial haemorrhage |
| G683.00 | Sequelae of cerebral infarction |
| G68W.00 | Sequelae/other + unspecified cerebrovascular diseases |
| G6X..00 | Other cerebrovascular disease |
| G6z..00 | Cerebrovascular disease NOS |
| Gy6.00  | [X]Cerebrovascular diseases |
| Gy6000  | [X]Subarachnoid haemorrhage from other intracranial arteries |
| Gy6100  | [X]Other subarachnoid haemorrhage |
| Gy6200  | [X]Other intracerebral haemorrhage |
| Gy6300  | [X]Cerebral infarct due/unsp occlus or sten/cerebrl artrs |
| Gy6400  | [X]Other cerebral infarction |
| Gy6500  | [X]Oclusion and stenosis of other precerebral arteries |
| Gy6600  | [X]Oclusion and stenosis of other cerebral arteries |
| Gy6700  | [X]Other specified cerebrovascular diseases |
| Gy6C00  | [X]Sequelae of stroke;not specfd as h'morrhage or infarction |
| Gy6D00  | [X]Sequelae/other unspecified cerebrovascular diseases |
| Gy6E00  | [X]Subarachnoid haemorrh from intracranial artery, unspecif |
| Gy6F00  | [X]Intracerebral haemorrhage in hemisphere, unspecified |
| Gy6G00  | [X]Cereb infarct due unsp occlus/stenos precerebr arteries |
| G6W..00 | Cereb infarct due unsp occlus/stenos precerebr arteries |
| G6X..00 | Cerebrl infarctn due/unspcf occlusn or sten/cerebrl artrs |

**Hypertension**

| Clinical Code | Description |
|---------------|-------------|
| G2...00       | Hypertensive disease |
| Code      | Description                                      |
|-----------|--------------------------------------------------|
| G20.00    | BP - hypertensive disease                       |
| G20.11    | Essential hypertension                          |
| G20.12    | High blood pressure                             |
| G20.13    | Primary hypertension                            |
| G200.00   | Malignant essential hypertension                |
| G201.00   | Benign essential hypertension                    |
| G202.00   | Systolic hypertension                           |
| G203.00   | Diastolic hypertension                          |
| G20z.00   | Essential hypertension NOS                      |
| G20z.11   | Hypertension NOS                                |
| G21.00    | Hypertensive heart disease                      |
| G210.00   | Malignant hypertensive heart disease            |
| G210000   | Malignant hypertensive heart disease without CCF|
| G210100   | Malignant hypertensive heart disease with CCF   |
| G210z00   | Benign hypertensive heart disease NOS           |
| G211.00   | Benign hypertensive heart disease               |
| G211000   | Benign hypertensive heart disease without CCF   |
| G211100   | Benign hypertensive heart disease with CCF      |
| G211z00   | Benign hypertensive heart disease NOS           |
| G21z.00   | Hypertensive heart disease NOS                  |
| G21z000   | Hypertensive heart disease NOS without CCF     |
| G21z100   | Hypertensive heart disease NOS with CCF         |
| G21z200   | Hypertensive heart disease NOS                  |
| G22.00    | Hypertensive renal disease                      |
| G22.11    | Nephrosclerosis                                 |
| G220.00   | Malignant hypertensive renal disease            |
| G221.00   | Benign hypertensive renal disease               |
| G222.00   | Hypertensive renal disease with renal failure   |
| G22z.00   | Hypertensive renal disease NOS                  |
| G22z.11   | Renal hypertension                              |
| G23.00    | Hypertensive heart and renal disease            |
| G230.00   | Malignant hypertensive heart and renal disease  |
| G231.00   | Benign hypertensive heart and renal disease     |
| G232.00   | Hypertensive heart and renal disease with congestive heart failure |
| G233.00   | Hypertensive heart and renal disease with renal failure |
| G234.00   | Hypertensive heart and renal disease NOS        |
| G24.00    | Secondary hypertension                         |
| G240.00   | Secondary malignant hypertension                |
| G240000   | Secondary malignant renovascular hypertension  |
| G240z00   | Secondary malignant hypertension NOS            |
|        | Description                                                                 |
|--------|-----------------------------------------------------------------------------|
| G241.00 | Secondary benign hypertension                                               |
| G241000| Secondary benign renovascular hypertension                                  |
| G241z00| Secondary benign hypertension NOS                                           |
| G244.00 | Hypertension secondary to endocrine disorders                              |
| G24z.00 | Secondary hypertension NOS                                                 |
| G24z000 | Secondary renovascular hypertension NOS                                    |
| G24z100 | Hypertension secondary to drug                                              |
| G24zz00 | Secondary hypertension NOS                                                 |
| G25..00 | Stage 1 hypertension (NICE - Nat Ins for Hth Clin Excl 2011)               |
| G25..11 | Stage 1 hypertension                                                       |
| G250.00 | Stage 1 hyperten (NICE 2011) without evidnce end organ damge               |
| G251.00 | Stage 1 hyperten (NICE 2011) with evidence end organ damage                |
| G26..00 | Severe hypertension (Nat Inst for Health Clinical Ex 2011)                 |
| G26..11 | Severe hypertension                                                        |
| G27..00 | Hypertension resistant to drug therapy                                     |
| G28..00 | Stage 2 hypertension (NICE - Nat Ins for Hth Clin Excl 2011)               |
| G2y..00 | Other specified hypertensive disease                                       |
| G2z..00 | Hypertensive disease NOS                                                   |
| Gyu2.00 | [X]Hypertensive diseases                                                   |
| Gyu2000 | [X]Other secondary hypertension                                            |
| Gyu2100 | [X]Hypertension secondary to other renal disorders                         |

**Lipid Lowering Drugs**

| Clinical code | Description                                                                 |
|---------------|-----------------------------------------------------------------------------|
| 81048998      | Atorvastatin 20mg chewable tablets sugar free                              |
| 81051998      | Atorvastatin 10mg chewable tablets sugar free                              |
| 83099998      | Simvastatin 40mg/5ml oral suspension sugar free                           |
| 82655998      | Nicotinic acid & laropiprant 1g+20mg tablets                               |
| 83030998      | Simvastatin 80mg tablets                                                   |
| 81050998      | Atorvastatin 10mg chewable tablets sugar free                              |
| 84268998      | Colesevelam 625mg tablets                                                  |
| 84267998      | Colesevelam 625mg tablets                                                  |
| 83594998      | Nicotinic acid 1g / laropiprant 20mg modified-release tablets              |
| 79254979      | Simvastatin 20mg/5ml oral suspension sugar free                           |
| 83188998      | Bezafibrate 200mg tablets                                                  |
| 83187998      | Bezafibrate 400mg modified-release tablets                                |
| 81049998      | Atorvastatin 20mg chewable tablets sugar free                              |
| 82141978      | Eicosapentaenoic acid 460mg / Docosahexaenoic acid 380mg capsules          |
| 87853998      | Nicotinic acid 1g modified-release tablets                                |
| Code       | Description                                           |
|------------|-------------------------------------------------------|
| 87852998   | Nicotinic acid 500mg modified release tablets         |
| 89154996   | Cerivastatin 300microgram tablets                    |
| 86791998   | Simvastatin 80mg / Ezetimibe 10mg tablets             |
| 87854998   | Nicotinic acid 750mg modified-release tablets         |
| 89153996   | Cerivastatin sodium 300mcg tablets                   |
| 88298997   | Fenofibrate micronised 267mg capsules                |
| 88534998   | Rosuvastatin 10mg tablets                             |
| 86794998   | Simvastatin 80mg / Ezetimibe 10mg tablets             |
| 86510979   | Ispaghula husk 3.5g sugar free granules               |
| 87025998   | Bezafibrate 400mg modified-release tablets           |
| 87418998   | Simvastatin 10mg tablets                              |
| 87918998   | Simvastatin 10mg tablets                              |
| 89401998   | Bezafibrate 400mg modified-release tablets           |
| 87917998   | Simvastatin 20mg tablets                              |
| 89089998   | Bezafibrate 400mg modified release tablets           |
| 87373998   | Simvastatin 10mg tablets                              |
| 87760998   | Colestipol 5g granules sachets sugar free            |
| 86798998   | Simvastatin 20mg / Ezetimibe 10mg tablets             |
| 88297996   | Fenofibrate micronised 267mg capsules                |
| 87848998   | Nicotinic acid pack                                  |
| 86796998   | Simvastatin 40mg / Ezetimibe 10mg tablets             |
| 87849998   | Nicotinic acid 375mg + 500mg + 750mg modified-release tablet |
| 87850998   | Nicotinic acid 1g modified release tablets           |
| 87851998   | Nicotinic acid 750mg modified release tablets        |
| 86797998   | Simvastatin 20mg / Ezetimibe 10mg tablets             |
| 87916998   | Simvastatin 40mg tablets                              |
| 89306996   | Atorvastatin 40mg tablets                             |
| 89311998   | Atorvastatin 10mg tablets                             |
| 89617998   | Ispaghula husk 3.5g sugar free granules               |
| 89154997   | Cerivastatin 200microgram tablets                    |
| 86795998   | Simvastatin 40mg / Ezetimibe 10mg tablets             |
| 89311997   | Atorvastatin 20mg tablets                             |
| 89306998   | Atorvastatin 10mg tablets                             |
| 89311996   | Atorvastatin 40mg tablets                             |
| 88298996   | Fenofibrate micronised 200mg capsules                |
| 86788998   | Simvastatin 40mg / Ezetimibe 10mg tablets             |
| 86789998   | Simvastatin 20mg / Ezetimibe 10mg tablets             |
| 89153998   | Cerivastatin sodium 100mcg tablets                   |
| 86787998   | Simvastatin 80mg / Ezetimibe 10mg tablets             |
| 89154998   | Cerivastatin 100microgram tablets                    |
| 88297998   | Fenofibrate micronised 67mg capsules                 |
| 86467998   | Rosuvastatin 5mg tablets                              |
| Code          | Description                                      |
|--------------|--------------------------------------------------|
| 89285979     | Nicotinic acid 500mg modified release tablets    |
| 89800988     | Eicosapentaenoic acid 460mg / Docosahexaenoic acid 380mg capsules |
| 89284979     | Nicotinic acid 750mg modified release tablets    |
| 88298998     | Fenofibrate micronised 67mg capsules             |
| 88297997     | Fenofibrate micronised 200mg capsules            |
| 89306997     | Atorvastatin 20mg tablets                        |
| 87855998     | Nicotinic acid 500mg modified-release tablets    |
| 89283979     | Nicotinic acid 1g modified release tablets       |
| 89153997     | Cerivastatin sodium 200mcg tablets               |
| 86468998     | Rosuvastatin 5mg tablets                         |
| 92447998     | Cerivastatin sodium 400mcg tablets               |
| 90973998     | Rosuvastatin 20mg tablets                        |
| 93619998     | Simvastatin 10mg tablets                         |
| 92408998     | Rosuvastatin 20mg tablets                        |
| 93620996     | Simvastatin 40mg tablets                         |
| 92448997     | Cerivastatin 800microgram tablets                |
| 92410998     | Rosuvastatin 40mg tablets                        |
| 93620997     | Simvastatin 20mg tablets                         |
| 93620998     | Simvastatin 10mg tablets                         |
| 93871990     | Simvastatin 40mg tablets                         |
| 92409998     | Rosuvastatin 10mg tablets                        |
| 93243996     | Pravastatin 40mg tablets                         |
| 91194998     | Fluvastatin 80mg modified-release tablets        |
| 93010990     | Colestyramine 4g oral powder sachets sugar free  |
| 92549990     | Fenofibrate micronised 200mg capsules            |
| 93244998     | Pravastatin 10mg tablets                         |
| 93244997     | Pravastatin 20mg tablets                         |
| 93244996     | Pravastatin 40mg tablets                         |
| 92539998     | Rosuvastatin 40mg tablets                        |
| 90310998     | Atorvastatin 80mg tablets                        |
| 93243997     | Pravastatin 20mg tablets                         |
| 92448998     | Cerivastatin 400microgram tablets                |
| 94407990     | Simvastatin 20mg tablets                         |
| 93838990     | Bezafibrate 200mg tablets                        |
| 92471998     | Simvastatin 80mg tablets                         |
| 93851992     | Colestipol 5g granules sachets sugar free       |
| 90309998     | Atorvastatin 80mg tablets                        |
| 92460998     | Fenofibrate micronised 160mg tablets             |
| 91316998     | Colestyramine sugar free powder                 |
| 93243998     | Pravastatin 10mg tablets                         |
| 92292998     | Ezetimibe 10mg tablets                           |
| Code     | Description                                      |
|----------|--------------------------------------------------|
| 92154990 | Simvastatin 20mg/5ml oral suspension sugar free |
| 93541998 | Colestyramine 4g oral powder sachets             |
| 93542998 | Colestyramine 4g oral powder sachets sugar free |
| 92804997 | Fluvastatin 40mg capsules                         |
| 94189997 | Fenofibrate micronised 200mg capsules             |
| 92293998 | Ezetimibe 10mg tablets                            |
| 90649998 | Fenofibrate 200mg capsules                        |
| 92805998 | Fluvastatin 20mg capsules                         |
| 92804998 | Fluvastatin 20mg capsules                         |
| 92805997 | Fluvastatin 40mg capsules                         |
| 93619996 | Simvastatin 40mg tablets                          |
| 92220998 | Simvastatin 80mg tablets                          |
| 90653998 | Colestyramine 4g oral powder sachets sugar free   |
| 94188997 | Fenofibrate micronised 200mg capsules             |
| 94112992 | Cholestryramine 325 mg cap                         |
| 94189998 | Fenofibrate 100mg capsule                         |
| 94189998 | Fenofibrate 100mg capsules                        |
| 92804996 | Fluvastatin 80mg modified-release tablets         |
| 93619997 | Simvastatin 20mg tablets                          |
| 95480990 | Simvastatin 10mg tablets                          |
| 95479990 | Simvastatin 20mg tablets                          |
| 95952997 | Bezafibrate 400mg modified-release tablets        |
| 95550990 | Simvastatin 20mg tablets                          |
| 95551990 | Simvastatin 10mg tablets                          |
| 94925998 | Eicosapentaenoic acid 170mg / Docosahexaenoic acid 115mg capsules |
| 95478990 | Simvastatin 40mg tablets                          |
| 95471990 | Simvastatin 40mg tablets                          |
| 95475990 | Simvastatin 20mg tablets                          |
| 94799998 | Fenofibrate micronised 160mg tablets              |
| 96295997 | Gemfibrozil 600mg tablets                         |
| 95474990 | Simvastatin 40mg tablets                          |
| 95472990 | Simvastatin 20mg tablets                          |
| 95451990 | Simvastatin 10mg tablets                          |
| 95549990 | Simvastatin 40mg tablets                          |
| 96295998 | Gemfibrozil 300mg capsules                        |
| 94927990 | Simvastatin 80mg tablets                          |
| 94827992 | Colestyramine 4g oral powder sachets              |
| 95501990 | Simvastatin 40mg tablets                          |
| 94782990 | Pravastatin 20mg tablets                          |
| 95185990 | Simvastatin 80mg tablets                          |
| 95494990 | Simvastatin 20mg tablets                          |
| Code         | Description                                           |
|--------------|-------------------------------------------------------|
| 94605998     | Colestipol 5g granules sachets sugar free            |
| 95495990     | Simvastatin 10mg tablets                              |
| 94851990     | Pravastatin 10mg tablets                              |
| 95500990     | Simvastatin 80mg tablets                              |
| 94830990     | Pravastatin 20mg tablets                              |
| 95502990     | Simvastatin 20mg tablets                              |
| 97078998     | Fish oil concentrate 1g capsules                      |
| 96685990     | Bezafibrate 400mg modified-release tablets            |
| 96685989     | Bezafibrate 200mg tablets                             |
| 97377979     | Cerivastatin sodium 300mcg tablets                    |
| 94831990     | Pravastatin 10mg tablets                              |
| 97078997     | Fish oil concentrate oral liquid                      |
| 94661998     | Colestipol 5g granules sachets sugar free            |
| 95482990     | Simvastatin 20mg tablets                              |
| 95483990     | Simvastatin 10mg tablets                              |
| 95486990     | Simvastatin 40mg tablets                              |
| 95508990     | Simvastatin 10mg tablets                              |
| 95487990     | Simvastatin 20mg tablets                              |
| 95952998     | Bezafibrate 200mg tablets                             |
| 97078996     | Fish oil concentrate oral emulsion                    |
| 94850990     | Pravastatin 20mg tablets                              |
| 94849990     | Pravastatin 40mg tablets                              |
| 94662998     | Colestipol 5g granules sachets sugar free            |
| 95493990     | Simvastatin 40mg tablets                              |
| 95847990     | Colestyramine 4g oral powder sachets sugar free      |
| 95098992     | Hexopal 200 mg tab                                    |
| 97455979     | Pravastatin 10mg tablets                              |
| 95481990     | Simvastatin 40mg tablets                              |
| 94661997     | Colestipol 5g granules sachets sugar free            |
| 97430979     | Fluvastatin 20mg capsules                             |
| 95805998     | Bezafibrate 400mg modified release tablets            |
| 95405990     | Simvastatin 40mg tablets                              |
| 94789990     | Pravastatin 10mg tablets                              |
| 95401998     | Probucol 250mg tablet                                 |
| 97247997     | Gemfibrozil 600mg tablets                             |
| 97247998     | Gemfibrozil 300mg capsules                            |
| 96134990     | Colestyramine 4g oral powder sachets                 |
| 95278990     | Simvastatin 20mg tablets                              |
| 95277990     | Simvastatin 40mg tablets                              |
| 95372990     | Simvastatin 40mg tablets                              |
Table S1. (Main cohort) The full Poisson models demonstrated in Table 2 and 3 in the manuscript.

| Unadjusted Incidence Rate Ratio | All Cardiovascular Disease | Ischaemic Heart Disease | Stroke/Trans-Ishchaemic Attack | Heart Failure | Peripheral Vascular Disease | Hypertension | Type 2 Diabetes Mellitus | All-cause mortality |
|---------------------------------|-----------------------------|-------------------------|--------------------------------|---------------|----------------------------|--------------|--------------------------|-------------------|
|                                 | 1.80 (1.51-2.15)            | 1.77 (1.33-2.34)        | 2.23 (1.75-2.86)               | 1.41 (0.88-2.26) | 2.09 (1.24-3.51)           | 1.29 (1.16-1.45) | 2.30 (2.02-2.61)         | 2.10 (1.84-2.48)   |
| Log likelihood                  | -3626.9                     | -1572.2                 | -2041.3                        | -643.7        | -551.4                     | -8541.9      | -6255.0                  | -6679.6           |
| Likelihood ratio test (degrees of freedom) | (df 1) 42.27 | (df 1) 15.36 | (df 1) 40.90 | (df 1) 1.96 | (df 1) 7.60 | (df 1) 20.84 | (df 1) 156.74 | (df 1) 128.71 |
| Pseudo R2                       | 0.0058                      | 0.0049                  | 0.0099                          | 0.0015        | 0.0068                     | 0.0012       | 0.0124                   | 0.0095            |
| Adjusted Incidence Rate Ratio   | 1.71 (1.42-2.06)            | 1.57 (1.16-2.13)        | 2.15 (1.66-2.81)               | 1.51 (0.92-2.51) | 1.54 (0.87-2.73)           | 1.42 (1.26-1.59) | 2.13 (1.86-2.45)         | 1.75 (1.52-2.02)   |
| Log likelihood                  | -3053.5                     | -1233.0                 | -1824.2                         | -533.1        | -435.8                     | -7253.4      | -5540.4                  | -5975.6           |
| Likelihood ratio test (degrees of freedom) | (df 16) 1189.0 | (df 16) 693.76 | (df 16) 475.18 | (df 16) 223.19 | (df 16) 238.79 | (df 15) 2597.74 | (df 14) 1586.04 | (df 20) 1536.73 |
| Pseudo R2                       | 0.1630                      | 0.2196                  | 0.1152                          | 0.1731        | 0.2151                     | 0.1519       | 0.1252                   | 0.1139            |
| Covariates                      |                             |                         |                                 |               |                           |              |                          |                   |
| Age at index date               | 1.11 (1.10-1.12)            | 1.13 (1.16-2.13)        | 1.09 (1.08-1.10)               | 1.10 (0.92-2.51) | 1.12 (1.10-1.14)           | 1.10 (1.10-1.10) | 1.07 (1.06-1.07)         | 1.08 (1.07-1.08)   |
| Sex                             | 1.51 (1.26-1.80)            | 2.08 (1.56-2.79)        | 1.03 (0.80-1.34)               | 2.09 (1.29-3.40) | 1.46 (0.86-1.14)           | 1.06 (0.95-1.19) | 1.21 (1.06-1.39)         | 1.75 (1.53-1.99)   |
| Body mass index group           |                             |                         |                                 |               |                           |              |                          |                   |
| <25Kg/m2                        | 1 (Ref)                     | 1 (Ref)                 | 1 (Ref)                         | 1 (Ref)       | 1 (Ref)                    | 1 (Ref)      | 1 (Ref)                  | 1 (Ref)           |

Covariates

Age at index date 1.11 (1.10-1.12) 
1.13 (1.16-2.13) 
1.09 (1.08-1.10) 
1.10 (0.92-2.51) 
1.12 (1.10-1.14) 
1.10 (1.10-1.10) 
1.07 (1.06-1.07) 
1.08 (1.07-1.08) 

Sex 1.51 (1.26-1.80) 
2.08 (1.56-2.79) 
1.03 (0.80-1.34) 
2.09 (1.29-3.40) 
1.46 (0.86-1.14) 
1.06 (0.95-1.19) 
1.21 (1.06-1.39) 
1.75 (1.53-1.99) 

Body mass index group

<25Kg/m2 1 (Ref) 
1 (Ref) 
1 (Ref) 
1 (Ref) 
1 (Ref) 
1 (Ref) 
1 (Ref) 
1 (Ref)
| Townsend deprivation | Townsend deprivation | Townsend deprivation | Townsend deprivation | Townsend deprivation | Townsend deprivation | Townsend deprivation |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 1 (Least deprived)   | 1 (Least deprived)   | 1 (Least deprived)   | 1 (Least deprived)   | 1 (Least deprived)   | 1 (Least deprived)   | 1 (Least deprived)   |
| 2                    | 1.13 (0.79-1.62)     | 1.11 (0.61-2.03)     | 1.27 (0.777-2.08)    | 0.90 (0.50-2.06)     | 1.78 (0.54-5.80)     | 0.89 (0.73-1.09)     | 1.12 (0.84-1.50)     | 0.95 (0.72-1.25)     |
| 3                    | 1.33 (0.95-1.87)     | 1.67 (0.96-2.89)     | 1.23 (0.76-2.00)     | 1.04 (0.47-2.31)     | 1.59 (0.48-5.20)     | 1.05 (0.87-1.26)     | 1.46 (1.12-1.90)     | 1.03 (0.80-1.33)     |
| 4                    | 1.36 (0.97-1.91)     | 1.69 (0.97-2.94)     | 1.24 (0.77-1.99)     | 0.99 (0.44-2.22)     | 1.11 (0.32-3.84)     | 1.06 (0.88-1.27)     | 1.45 (1.12-1.88)     | 1.31 (1.03-1.66)     |
| 5                    | 1.82 (1.31-2.53)     | 2.12 (1.22-3.68)     | 1.56 (0.97-2.50)     | 0.98 (0.43-2.25)     | 3.36 (1.11-10.17)    | 0.98 (0.81-1.20)     | 1.71 (1.32-2.22)     | 1.80 (1.42-2.28)     |
| Missing              | 1.36 (0.95-1.94)     | 1.22 (0.65-2.29)     | 1.53 (0.94-2.50)     | 0.62 (0.23-1.69)     | 2.01 (0.60-6.75)     | 1.05 (0.86-1.29)     | 1.44 (1.09-1.89)     | 1.07 (0.82-1.41)     |
| Registration year    | 0.99 (0.99-1.00)     | 0.99 (0.98-1.00)     | 0.99 (0.98-1.00)     | 0.99 (0.98-1.01)     | 1.00 (0.98-1.02)     | 0.99 (0.99-0.99)     | 1.00 (1.00-1.01)     | 0.99 (0.98-1.00)     |
| Charlson comorbidity index | | | | | | | |
|     | 0    | 1 (Ref) | 1     | 2     | 3     | 4 and above |
|-----|------|---------|-------|-------|-------|-------------|
|     | N/A  |         | N/A   | N/A   | N/A   | N/A         |
| 1   | N/A  | N/A     | N/A   | N/A   | N/A   | N/A         | 1.44 (1.23-1.67) |
| 2   | N/A  | N/A     | N/A   | N/A   | N/A   | N/A         | 3.66 (2.78-4.83) |
| 3   | N/A  | N/A     | N/A   | N/A   | N/A   | N/A         | 3.85 (2.45-6.04) |
| 4   | N/A  | N/A     | N/A   | N/A   | N/A   | N/A         | 10.65 (7.45-15.22) |
Table S2. (Officially confirmed exposed case analysis) Baseline characteristics of those exposed and unexposed to childhood maltreatment.

| Baseline Characteristics (Standard Deviation, Interquartile range or Percentage) | Exposed Group | Unexposed Group |
|---|---|---|
| **Number of patients** | 22 078 | 44 156 |
| **Median follow-up period (person years)** | 2.4 (IQR 0.96-5.4) | 2.3 (IQR 0.8-5.2) |
| **Age at cohort entry (years)** | 26.7 (SD 9.4) | 26.8 (SD 9.3) |
| **Age when maltreatment occurred (years)** | 9.3 (SD 5.0) | - |
| **Sex; Male (%)** | 6 982 (31.6%) | 13 964 (31.6%) |
| **Body mass index** | | |
| <25kg/m² | 6 395 (29.0%) | 17 030 (38.6%) |
| 25-30kg/m² | 2 447 (11.1%) | 6 452 (14.6%) |
| >30kg/m² | 2 242 (10.2%) | 4 057 (9.2%) |
| Not available | 10 994 (49.8%) | 16 617 (37.6%) |
| **Smoking status** | | |
| Current smoker | 8 826 (40.0%) | 9 451 (21.4%) |
| Non-current/Not available | 13 252 (60.0%) | 34 705 (78.6%) |
| **Townsend index** | | |
| (Least deprived) 1 | 1 764 (8.0%) | 7 066 (16.0%) |
| 2 | 2 294 (10.4%) | 6 940 (15.7%) |
| 3 | 3 665 (16.6%) | 8 133 (18.4%) |
| 4 | 5 423 (24.6%) | 8 269 (18.7%) |
| 5 | 5 393 (24.4%) | 6 438 (14.6%) |
| Not available | 3 539 (16.0%) | 7 310 (16.6%) |
| **Charlson Co-morbidity Index** | | |
| (Least co-morbid) 0 | 15 730 (71.3%) | 36 289 (82.2%) |
| 1 | 5 810 (26.3%) | 7 266 (16.5%) |
| 2 | 347 (1.6%) | 418 (1.0%) |
| 3 | 110 (0.5%) | 112 (0.3%) |
| 4 and above | 81 (0.4%) | 71 (0.2%) |
| **Lipid lowering drug use** | 180 (0.8%) | 435 (1.0%) |
| **Pre-existing cardiometabolic disease** | | |
| All cardiovascular disease | 207 (0.9%) | 165 (0.4%) |
| Ischaemic heart disease | 79 (0.4%) | 76 (0.2%) |
| Heart failure | 19 (0.1%) | 15 (0.0%) |
| Stroke/Trans-ischaemic attack | 108 (0.5%) | 75 (0.2%) |
| Peripheral vascular disease | 29 (0.1%) | 23 (0.1%) |
| Hypertension | 387 (1.8%) | 655 (1.5%) |
| Diabetes mellitus | 248 (1.1%) | 262 (0.6%) |
Table S3. (Officially confirmed exposed case analysis) The risk of developing cardiometabolic disease in those exposed and unexposed to childhood maltreatment.

|                                | All Cardiovascular Disease | Ischaemic Heart Disease | Stroke/Trans-Ischaemic Attack | Heart Failure | Peripheral Vascular Disease | Hypertension | Type 2 Diabetes Mellitus |
|--------------------------------|-----------------------------|-------------------------|-------------------------------|--------------|----------------------------|--------------|-------------------------|
| Exposed                        | 21,871                      | 21,999                  | 21,970                        | 22,059       | 22,049                     | 21,691       | 21,830                  |
| Unexposed                      | 43,991                      | 44,080                  | 44,081                        | 44,141       | 44,133                     | 43,501       | 43,894                  |
| Number of Patients             |                             |                         |                               |              |                            |              |                         |
| Exposed                        | 131                         | 56                      | 74                            | 15           | 15                         | 309          | 225                     |
| Unexposed                      | 131                         | 59                      | 57                            | 19           | 16                         | 402          | 183                     |
| Numbers of Outcomes            |                             |                         |                               |              |                            |              |                         |
| Exposed                        | 131                         | 56                      | 74                            | 15           | 15                         | 309          | 225                     |
| Unexposed                      | 131                         | 59                      | 57                            | 19           | 16                         | 402          | 183                     |
| Person-years                   | 85,298                      | 86,036                  | 85,953                        | 86,436       | 86,431                     | 83,366       | 84,878                  |
|                                |                             | 158,433                 | 158,529                       | 158,879      | 158,814                    | 154,130      | 157,415                 |
|                                |                             |                         |                               |              |                            |              |                         |
| Incidence Rate Ratio           |                             |                         |                               |              |                            |              |                         |
| Exposed                        | 15.4                        | 6.5                     | 8.6                           | 1.7          | 1.7                        | 37.1         | 26.5                    |
| Unexposed                      | 8.3                         | 3.7                     | 3.6                           | 1.2          | 1.0                        | 26.1         | 11.6                    |
| Rate (per 10000 person years) |                             |                         |                               |              |                            |              |                         |
| Unadjusted Incidence Rate Ratio| 1.85 (1.45-2.36)            | 1.75 (1.21-2.52)        | 2.39 (1.70-3.38)               | 1.45 (0.74-2.86) | 1.72 (0.85-3.48) | 1.42 (1.23-1.65) | 2.28 (1.88-2.77) |
| p-value                         | <0.001                      | 0.003                   | <0.001                        | 0.281        | 0.130                      | <0.001       | <0.001                  |
| Adjusted Incidence Rate Ratio  |                             |                         |                               |              |                            |              |                         |
| Exposed                        | 1.77 (1.36-2.30)            | 1.62 (1.09-2.41)        | 2.38 (1.64-3.45)               | 1.53 (0.74-3.19) | 1.03 (0.47-2.25) | 1.60 (1.36-1.87) | 2.07 (1.68-2.56) |
| Unexposed                      | 1.017                       | 0.017                   | <0.001                        | 0.250        | 0.949                      | <0.001       | <0.001                  |
| p-value                         | <0.001                      | 0.017                   | <0.001                        | 0.250        | 0.949                      | <0.001       | <0.001                  |

*Unadjusted incidence rate ratio
** All cardiovascular disease, ischaemic heart disease, stroke/trans-ischaemic attack, heart failure and peripheral vascular disease outcomes were adjusted for body mass index, age, sex, smoking, diabetes status, lipid lowering drug use, hypertension and Townsend deprivation score at baseline as well as year of registration into the database. The hypertension outcome was adjusted for these factors excluding hypertension. The type 2 diabetes outcome was adjusted for these factors excluding hypertension and diabetes status.
Table S4. (Officially confirmed exposed case analysis) The risk of mortality in those exposed and unexposed to childhood maltreatment.

|                                | Exposed |    | Unexposed |    |
|--------------------------------|---------|----|-----------|----|
| **Number of Patients**         | 22,078  | 44,156 |
| **Numbers of Outcomes**        | 211     | 196 |
| **Person-years**                | 83,463  | 155,860 |
| **Incidence Rate (per 10,000 person years)** | 25.2 | 12.6 |
| **Incidence Rate Ratio (95% Confidence intervals)** | 2.01 (1.66-2.44) |  |
| **p-value**                     | <0.001  |    |           |    |
| **Adjusted Incidence Rate Ratio (95% Confidence intervals)** | 1.58 (1.27-1.96) |  |
| **p-value**                     | <0.001  |    |           |    |

* Unadjusted incidence rate ratio
** Adjusted for body mass index, age, sex, smoking status, diabetes status, lipid lowering drug use, hypertension, Charlson comorbidity score and Townsend deprivation score as well as year of registration into the database.