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The epidemiology of cardiovascular disease in the UK 2014

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ABSTRACT

Cardiovascular disease (CVD) presents a significant burden to the UK. This review presents data from nationally representative datasets to provide up-to-date statistics on mortality, prevalence, treatment and costs. Data focus on CVD as a whole, coronary heart disease (International Classification of Diseases (ICD):I20–25) and cerebrovascular disease (ICD:I60–69); however, where available, other cardiovascular conditions are also presented. In 2012, CVD was the most common cause of death in the UK for women (28% of all female deaths), but not for men, where cancer is now the most common cause of death (32% of all male deaths). Mortality from CVD varies widely throughout the UK, with the highest age-standardised CVD death rates in Scotland (347/100 000) and the North of England (320/100 000 in the North West). Prevalence of coronary heart disease is also highest in the North of England (4.5% in the North East) and Scotland (4.3%). Overall, around three times as many men have had a myocardial infarction compared with women. Treatment for CVD is increasing over time, with prescriptions and operations for CVD having substantially increased over the last two decades. The National Health Service in England spent around £6.8 billion on CVD in 2012/2013, the majority of which came from spending on secondary care. Despite significant declines in mortality in the UK, CVD remains a considerable burden, both in terms of health and costs. Both primary and secondary prevention measures are necessary to reduce both the burden of CVD and inequalities in CVD mortality and prevalence.

INTRODUCTION

Cardiovascular disease (CVD) is the leading cause of death worldwide.¹ The 2013 Global Burden of Disease Study estimated that almost 30% of all deaths worldwide were caused by CVD. However, recent evidence from Europe suggests that in some countries cancer has overtaken CVD as the leading cause of death.² Over the last decade, survival from myocardial infarction (MI) has improved in England.³ The last decade has also seen changes in the number of prescriptions prescribed to treat various CVD conditions and the types of surgeries to treat MIs.

This review is based on the *Cardiovascular Disease Statistics 2014* report.⁴ This is the 19th edition of the report published by the British Heart Foundation. These reports aim to provide up-to-date statistics on CVD, coronary heart disease (CHD) and stroke in the UK. It is aimed at health professionals, medical researchers and others with an interest in CVD. In this review, we present selected data on CVD mortality, morbidity, treatment and costs in the UK, with additional data available in online supplementary

files. Data in this review focus on CVD (International Classification of Diseases (ICD)10:I00–99), CHD (ICD10:I20–25) and stroke (ICD10:I60–69). Where available and appropriate, we have also included data on the major conditions within the WHO ICD10 subchapters for CVD.

METHODS

We use a number of data sources to provide information on the mortality, morbidity and treatment of CVD. We aim to provide UK data; when this was not possible, we have provided information separately for the countries of the UK. The three main considerations when selecting data sources were the representativeness of data, its quality and the year of collection.

Mortality data from 2012 were provided by the Office for National Statistics (ONS), the National Records of Scotland and the Northern Ireland Statistics and Research Agency. We calculated age-standardised death rates using the 2013 European Standard Population. Mortality data are routinely collected in the UK, and it is a legal requirement to report a death that occurs in England, Wales, Scotland or Northern Ireland. Consequently, mortality data are representative of the entire UK population, are published annually and are considered high-quality data.

We obtained prevalence data from the Clinical Practice Research Datalink (CPRD) GOLD database, which is the world's largest validated computerised database of anonymised records for primary care.⁵ The CPRD GOLD database collates records from a widely used General Practice software system and covers approximately 8.8% of the UK population. CPRD data are regarded to be high quality and are updated on a monthly basis.⁵ Prevalence is calculated by dividing the number of cases by the patient population. We also used data from the Quality and Outcomes Framework (QOF) to estimate prevalence by Government Office Region and country. This framework became part of general practice contracts in 2004 and rewards general practitioners for keeping up-to-date records of the number of patients within their practices who are suffering from certain conditions. Prevalence data from QOF is updated annually and uses the list size of a general practice as the denominator. This means that changes in the registered population may affect the representativeness of the prevalence estimates between years.

Data on inpatient episodes due to CVD, CHD, stroke and other CVD conditions are from Hospital Episode Statistics (HES), published by national agencies of England, Wales, Scotland and Northern Ireland. An episode is defined as the

main diagnosis attributed to a patient when they are discharged from hospital. This data may include multiple hospital episodes for one person over the course of the year and does not include people who die before reaching hospital. HES data are updated monthly and collected from all people who are seen by a consultant in hospital; therefore, they are representative of the hospitalised population. There have been concerns over the quality of HES data due to lack of clinician engagement in the process of reporting and coding;⁶ however, this is currently the best nationally representative source of inpatient data.

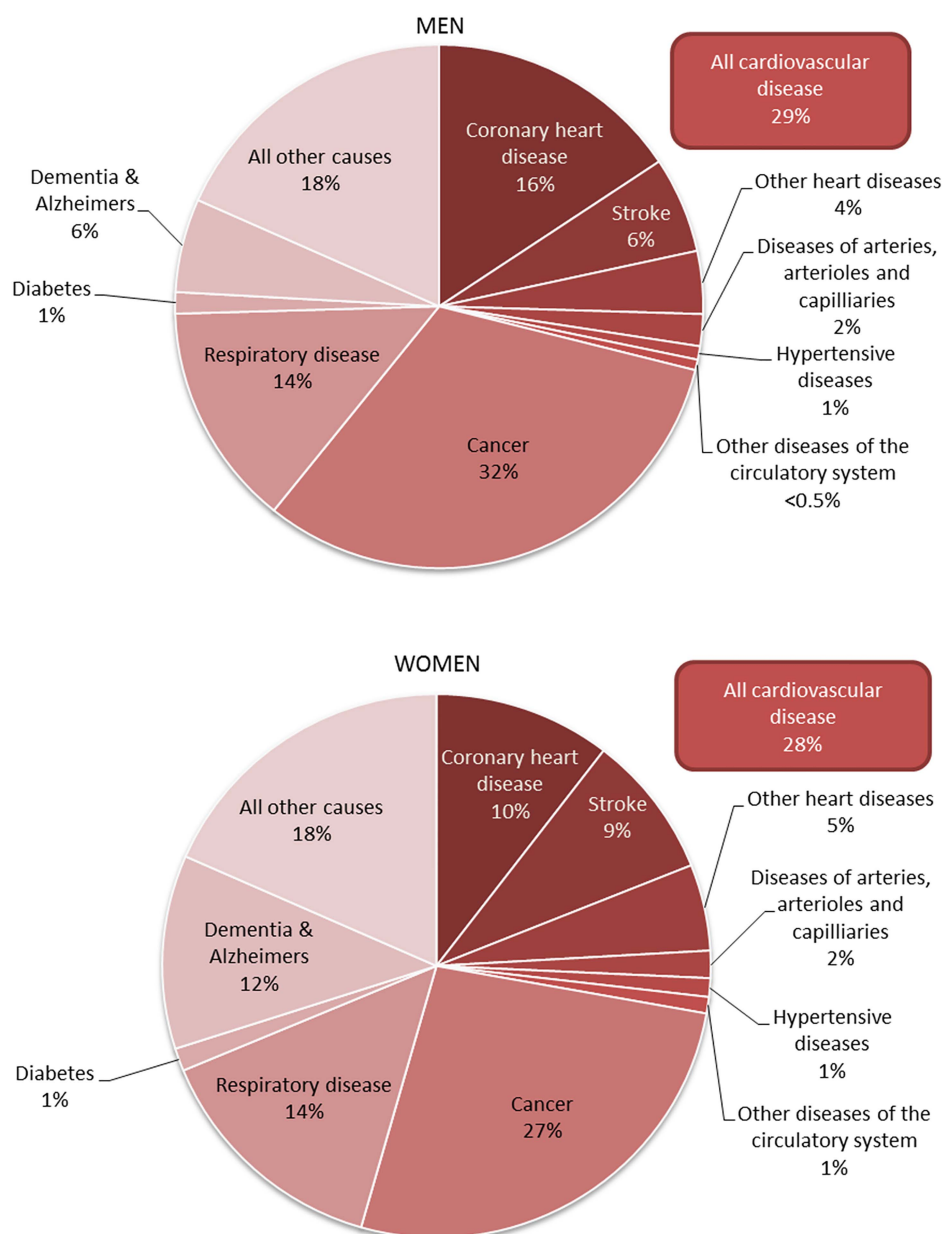
Data on revascularisations are published by the British Cardiovascular Intervention Society (BCIS) and are updated annually. We report on trends in percutaneous coronary interventions (PCIs) and coronary artery bypass grafts (CABGs). The BCIS conducts an annual audit of revascularisation procedures in the UK and >97% of PCI cases are included in the audit.⁷

Prescription data come from Prescription Costs Analysis (PCA) reports published by the ONS, the Welsh Government, the Information Services Division in Scotland and the Business Services Organisation in Belfast. PCA data represent all

prescriptions prescribed in the community and are updated annually. The data are classified using the therapeutic groups of the British National Formulary. Data on the percentage of individuals taking certain prescriptions are collected by the Health Survey for England (HSE). The health surveys of Wales, Scotland and Northern Ireland do not collect this data. The HSE is a cross-sectional annual survey that aims to be representative of people living in private households in England; it uses a stratified random probability sample of private households to achieve this. Information on prescriptions is collected during a nurse visit, which is preceded by a general interview. In the 2013 survey, the response rate for all sampled households was 58% for the general interview and 40% for the nurse visit.

Cost data for England come from programme budgeting data, an analysis of commissioning expenditure by healthcare condition (eg, circulatory disease) and care setting (eg, primary, secondary, community). Estimates of expenditure are calculated using the price paid for specific activities and services purchased from healthcare providers for each region. Regions follow standard guidance, procedures and mappings when calculating

Figure 1 Deaths by cause and sex, UK. This figure compiles data from the four countries of the UK. In Northern Ireland, the data for lung cancer only includes International Classification of Diseases-10 code C34. Adapted from England and Wales, Office for National Statistics (2014) Deaths registered by cause, sex and age. <http://www.statistics.gov.uk> (accessed January 2014); Scotland, National Records of Scotland (2014) Deaths, by sex, age and cause. <http://www.gro-scotland.gov.uk> (accessed January 2014); Northern Ireland, Statistics and Research Agency (2014) Registrar General Annual Report. NISRA: Belfast.



programme budgeting data. Around 80% of planned National Health Service (NHS) funding in England is allocated to Primary Care Trusts (this will now change to Clinical Commissioning Groups), who are then free to commission local health services to meet local needs.⁸

MORTALITY

In 2012, for the first time since the middle of the 20th century,⁹ CVD went from being the main cause of death to the second cause of death in the UK. Twenty-eight per cent of deaths were caused by CVD in 2012, and 29% were caused by cancer. When analysed by sex, however, CVD was still a larger cause of death than cancer for women, but this was no longer the case for men (figure 1).

The main causes of CVD death are CHD and stroke. In 2012, 46% of CVD deaths were from CHD and 26% were from stroke. Overall, CHD was responsible for 16% of all male deaths and 10% of all female deaths, a total of just under 73 500 deaths. Around 41 000 deaths were from stroke, making up 6% and 9% of total deaths in men and women, respectively (figure 1).

In this review, we treat deaths before the age of 75 as premature. More than one quarter of premature deaths in men and

around 18% of premature deaths in women were from CVD in 2012 (see online supplementary tables). In total that year, there were nearly 42 000 premature deaths from CVD in the UK. CHD by itself was the most common single cause of premature death in the UK in men, responsible for about 15% of premature male deaths in 2012. In women, CHD caused around 8% of premature deaths.

REGIONAL VARIATIONS IN MORTALITY

Age-standardised CVD mortality rates by local authority showed a clear trend for higher CVD rates in Scotland and the North of England and lower CVD rates in the South of England. Glasgow City had the highest CVD mortality rate for both premature mortality (144/100 000 population) and mortality at all ages (400/100 000 population). Half of all the local authorities with the 10 highest CVD mortality rates in the UK were in Scotland, four were in the North of England and one was in Wales (table 1). Age-standardised CVD mortality rates were highest in Scotland in 2012 at 347/100 000 population and lowest in the South West of England at 269/100 000 population (see online supplementary data).

Table 1 Rankings for 10 local authorities with highest cardiovascular disease mortality rates and 10 local authorities with the lowest cardiovascular disease mortality rates, UK 2010/2012

All ages				Under 75			
Code	Local authority	Region	Age-standardised death rate per 100 000	Code	Local authority	Region	Age-standardised death rate per 100 000
<i>10 highest death rates</i>				<i>10 highest death rates</i>			
00QS	Glasgow City	Scotland	399.89	00QS	Glasgow City	Scotland	143.54
30UG	Hyndburn	North West	395.23	00BN	Manchester	North West	133.92
00PL	Blaenau Gwent	Wales	395.11	00EY	Blackpool	North West	125.27
00BT	Tameside	North West	393.82	00QJ	Dundee City	Scotland	123.21
00EX	Blackburn with Darwen	North West	393.34	00QU	Inverclyde	Scotland	122.85
00RC	Renfrewshire	Scotland	389.62	00QZ	North Lanarkshire	Scotland	122.62
00RJ	Eilean Siar	Scotland	386.95	00RJ	Eilean Siar	Scotland	119.02
36UG	Scarborough	Yorkshire and The Humber	385.37	00PL	Blaenau Gwent	Wales	118.24
00QZ	North Lanarkshire	Scotland	384.95	00QG	West Dunbartonshire	Scotland	116.25
00QG	West Dunbartonshire	Scotland	381.43	00EX	Blackburn with Darwen	North West	114.31
<i>Median death rates</i>				<i>Median death rates</i>			
37UC	Bassetlaw	East Midlands	290.71	47UD	Redditch	West Midlands	74.56
26UH	Stevenage	East of England	290.47	95X	Ards	Northern Ireland	74.32
<i>10 lowest death rates</i>				<i>10 lowest death rates</i>			
19UG	Purbeck	South West	231.26	19UD	East Dorset	South West	47.92
43UL	Waverley	South East	230.93	43UD	Guildford	South East	47.85
19UD	East Dorset	South West	224.22	45UF	Horsham	South East	47.83
12UG	South Cambridgeshire	East of England	222.48	11UC	Chiltern	South East	47.74
24UP	Winchester	South East	221.58	43UL	Waverley	South East	47.07
00BD	Richmond upon Thames	London	215.49	43UE	Mole Valley	South East	44.81
24UG	Hart	South East	213.12	12UG	South Cambridgeshire	East of England	44.54
00AW	Kensington and Chelsea	London	197.31	24UP	Winchester	South East	43.41
00AA	City of London	London	177.63	24UG	Hart	South East	34.94
00HF	Isles of Scilly	South West	157.34	00HF	Isles of Scilly	South West	0.00

England and Wales: rates calculated in partnership with the Office for National Statistics; Scotland: rates calculated in partnership with the National Records of Scotland; Northern Ireland: rates calculated in partnership with Northern Ireland Statistics and Research Agency.

Table 2 Prevalence of cardiovascular conditions, UK 2013

	MI (%)	Angina (%)	Heart failure (%)	Atrial fibrillation (%)	Stroke (%)
<i>Men</i>					
0–44	0.06	0.05	0.05	0.09	0.11
45–54	1.14	0.92	0.33	0.76	0.89
55–64	3.55	3.60	1.12	2.28	2.69
65–74	7.05	8.83	2.92	6.20	6.40
75+	12.08	16.96	7.84	15.38	14.89
All ages	2.46	3.05	1.22	2.47	2.53
<i>Women</i>					
0–44	0.02	0.03	0.04	0.03	0.11
45–54	0.29	0.50	0.15	0.26	0.79
55–64	0.89	1.74	0.45	0.91	1.96
65–74	2.06	4.66	1.32	3.28	4.39
75+	5.50	11.15	5.89	11.71	12.43
All ages	0.87	1.79	0.76	1.56	1.99
<i>Number of cases in sample</i>					
Men	47 449	57 927	22 954	46 597	47 888
Women	19 747	41 840	18 201	36 967	46 549

Estimates are based on records from a sample of general practices in each of the constituent countries of the UK; estimates for all ages are age-standardised to the European Standard Population. This table is based on data from the Clinical Practice Research Datalink GOLD database, 2014. Copyright and database rights over the data belong to the Crown. The interpretation and conclusions contained in this review are those of the authors alone. Adapted from Clinical Practice Research Datalink (CPRD), personal communication, 2014. MI, myocardial infarction.

PREVALENCE

We obtained prevalence data by age through the CPRD GOLD database. Obtaining data from this database is prolonged and expensive; therefore, it was not possible to provide data for conditions within other ICD10 subchapters. Throughout the UK, prevalence of MI in men was almost three times greater than for women in 2013. Applying country-specific and age-specific

population estimates, obtained from the national statistics agencies, to prevalence data from the CPRD GOLD database suggests that >915 000 people in the UK have suffered an MI and >1.3 million are living with angina. Consequently, if we combine estimates for MI and angina, we find that almost 2.3 million people in the UK are living with some form of CHD. Applying prevalence figures for heart failure to population estimates suggests that there are >308 000 men and 250 000 women in the UK living with heart failure. Using the same method, we estimate that 1.1 million people are living with atrial fibrillation in the UK (table 2).

REGIONAL VARIATIONS IN PREVALENCE

Estimates of the number of people in the UK who have CVD, derived from the CPRD GOLD database, are broadly supported by results from the QOF. QOF data suggest that in 2012/2013 there were around 2.3 million people suffering from CHD, 1.2 million people suffering from stroke, around 1 million from atrial fibrillation and just over 480 000 from heart failure. QOF only measures certain cardiovascular conditions; therefore, prevalence data are not available for all ICD10 chapters.

Comparing between regions in England, those in the North had a higher prevalence for CVD than those in the South, with the highest prevalence reported in the North East for all diseases described here (4.5% for CHD, 2.1% for stroke). London had the lowest prevalence for all (2.1% for CHD, 1.0% for stroke). For CHD, the North East, North West and Yorkshire and The Humber all had a prevalence of 4% or higher. Among UK countries, England had the lowest prevalence for all cardiovascular conditions (3.4% for CHD, 1.7% for stroke) except hypertension (13.6%), for which Northern Ireland was lowest (12.9%). Scotland had the highest prevalence for CHD (4.3%), stroke (2.1%) and peripheral arterial disease (0.9%), while Wales had the highest for hypertension (15.5%), heart failure (0.9%) and atrial fibrillation (1.8%). It should be noted that these rates have not been adjusted to account for differences in the age structure of populations (table 3).

Table 3 Prevalence of selected long-term conditions by Government Office Region for England and by country England, Scotland, Wales, Northern Ireland and UK 2012/2013

Country/Government Office Region (GOR)	Patient list	Coronary Heart Disease Register (%)	Stroke or Transient Ischaemic Attacks Register (%)	Hypertension Register (%)	Heart Failure Register (%)	Atrial Fibrillation Register (%)	Peripheral Arterial Disease Register (%)
East Midlands	4 735 883	3.6	1.8	14.3	0.8	1.6	0.6
East of England	6 113 986	3.3	1.7	14.1	0.7	1.6	0.6
London	9 056 401	2.1	1.0	11.0	0.5	0.9	0.4
North East	2 696 547	4.5	2.1	15.5	0.9	1.7	1.0
North West	7 397 503	4.0	1.9	14.2	0.8	1.6	0.9
South East	9 074 471	3.0	1.7	13.4	0.6	1.6	0.6
South West	5 536 574	3.5	2.0	14.5	0.8	1.9	0.7
West Midlands	5 880 643	3.4	1.8	14.7	0.8	1.5	0.7
Yorkshire and The Humber	5 524 195	4.0	1.9	14.0	0.8	1.6	0.8
England	57 925 541	3.4	1.7	13.6	0.7	1.5	0.7
Scotland	5 552 133	4.3	2.1	13.7	0.8	1.5	0.9
Wales	3 180 153	3.9	2.0	15.5	0.9	1.8	0.7
Northern Ireland	1 909 338	3.9	1.8	12.9	0.8	1.5	0.7
UK	66 657 827	3.5	1.7	13.7	0.7	1.5	0.7

England—Copyright Health and Social Care Information Centre 2014.

Adapted from England—Information Centre QOF achievement data 2012/2013; Wales—StatsWales. QOF 2012/2013 achievement data; Scotland—ISD Scotland. QOF achievement data 2013/2013; Northern Ireland—Department of Health, Social Services and Public Safety. QOF achievement data 2012/2013. QOF, Quality and Outcomes Framework.

Table 4 Inpatient episodes by main diagnosis in National Health Service Hospitals, by sex, UK 2012/2013

	England		Scotland		Wales		Northern Ireland		UK	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
All diagnoses	7 888 761	9 824 399	685 043	766 766	423 756	535 894	302 738	290 630	9 276 644	11 391 970
All diseases of the circulatory system (I00–I99)	777 888	596 206	84 849	65 675	49 192	38 084	24 198	19 013	936 127	718 978
Rheumatic heart disease (I00–I09)	4373	5418	369	642	292	400	75	174	5109	6634
Hypertensive diseases (I10–I15)	7444	8541	876	873	652	669	492	554	9464	10 637
Ischaemic heart disease (I20–I25)	265 102	138 987	31 576	16 645	17 112	9214	9986	4699	323 776	169 545
Pulmonary heart disease and diseases of pulmonary circulation (I26–I28)	24 815	29 394	2398	2872	1559	1569	539	714	29 311	34 549
Other forms of heart disease (I30–I52)	217 761	178 427	21 865	18 088	14 603	11 811	7016	6222	261 245	214 548
Cerebrovascular disease (I60–I69)	96 502	99 579	11 776	12 297	6134	6878	1448	1507	115 860	120 261
Diseases of arteries, arterioles and capillaries (I70–I79)	54 233	32 180	6323	4713	2959	1892	1537	1363	65 052	40 148
Diseases of veins and lymphatic system nec. (I80–I89)	87 905	85 450	8255	8238	4928	4818	2783	3267	103 871	101 773
Other and unspecified disorders of the circulatory system (I95–I99)	19 753	18 230	1411	1307	953	833	459	376	22 576	20 746

Finished consultant episodes; ordinary admissions and day cases combined. Pregnancy cases not included. International Classification of Diseases-10 codes in parentheses. Due to rounding, figures for Northern Ireland do not sum up exactly to I00–I99.

Adapted from Department of Health (2013). Hospital Episode Statistics 2012/2013. <http://www.hesonline.nhs.uk> (accessed January 2014); Information Services Division Scotland (2015) Main diagnosis discharges from hospital 2012/2013. Personal correspondence; NHS Wales Informatics Service (2013). The Patient Episode Database for Wales—2012/2013. <http://www.infoandstats.wales.nhs.uk> (accessed January 2014); Hospital Information Branch (2012). Northern Ireland Episode Based Acute Inpatient and Day Case Activity Data (2012/2013) <http://www.dhsspsni.gov.uk> (accessed January 2014). Personal correspondence.

INPATIENT EPISODES

In the UK, there were >1.6 million episodes related to CVD in NHS hospitals, accounting for 10.1% of all inpatient episodes among men and 6.3% among women. The proportion of inpatient episodes attributed to CHD was almost twice as high among men as among women, accounting for 3.5% of all inpatient episodes in men and 1.5% in women in the UK. Stroke accounted for around 1.1% of inpatient episodes in women and 1.2% in men in the UK. As a proportion of all conditions, stroke accounts for about 1.1% of all hospital episodes in the UK (table 4).

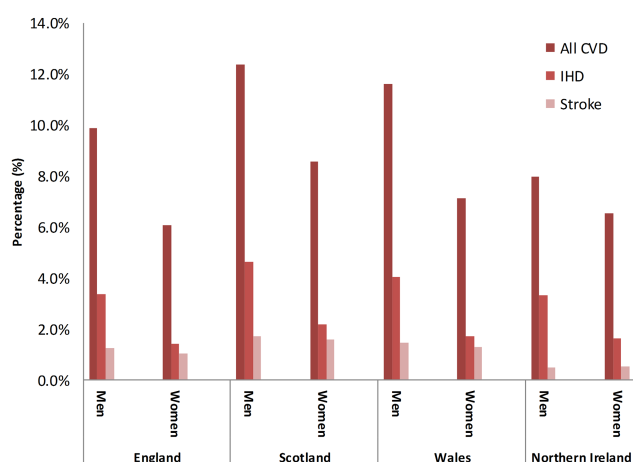


Figure 2 Percentage of all inpatient episodes for selected cardiovascular conditions, by sex and country of the UK, 2012/2013. Adapted from Department of Health (2013). Hospital Episode Statistics 2012/2013. <http://www.hesonline.nhs.uk> (accessed January 2014); Information Services Division Scotland (2015) Main diagnosis discharges from hospital 2012/2013. Personal correspondence; NHS Wales Informatics Service (2013). The Patient Episode Database for Wales—2012/2013. <http://www.infoandstats.wales.nhs.uk> (accessed January 2014); Hospital Information Branch (2012). Northern Ireland Episode Based Acute Inpatient and Day Case Activity Data (2012/2013) <http://www.dhsspsni.gov.uk> (accessed January 2014). Personal correspondence. CVD, cardiovascular disease; IHD, ischaemic heart disease.

The highest proportion of inpatient episodes for all CVD were in Scotland (12.4% of men and 8.6% of women). The lowest proportion of CVD inpatient episodes were in Northern Ireland for men (8.0%) and in England for women (6.1%) (figure 2). Northern Ireland had the lowest proportion of inpatient episodes for stroke (0.5% for both men and women), and Scotland had the highest proportion (1.7% for men and 1.6% for women).

PRESCRIPTIONS

Prescription data is not available for the UK as a whole; therefore, we present England data here (table 5) and data for the other UK countries in online supplementary tables. The rapid increase in the number of prescriptions for the treatment and prevention of CVD began in the late 1980s. In 2013, >300 million prescriptions were dispensed for CVD in England, more than six times as many as issued in 1981, and an increase of 2.2% from the number of prescriptions in 2012. Since 1990, the number of prescriptions dispensed for antiplatelet drugs has increased steadily; there are now >38 million prescriptions for antiplatelet drugs in England every year. The increase in the number of prescriptions of lipid-lowering drugs was slow until the late 1990s, but since then has been very rapid, with the number of prescriptions for lipid-lowering drugs now more than six times higher than in 2000. HSE data show that 16% of men and 12% of women report being prescribed lipid-lowering medicines. Also, 14% of men and 15% of women reported being prescribed antihypertensives specifically for hypertension (figure 3).

OPERATIONS

The total number of operations carried out to treat CHD is increasing in the UK. The number of PCIs carried out in the UK in 2012 was more than two times higher than a decade earlier; >90 000 procedures were carried out in 2012 in the UK. The number of CABGs reached a peak in the late 1990s/early 2000s. CABGs have become less common due to the more widespread use of less-invasive procedures such as PCIs. Just under 17 000 CABGs were carried out in the UK in 2012 (figure 4) and >6000 carotid endarterectomies in 2011/2012 (see online supplementary tables).

Table 5 Prescriptions used in the prevention and treatment of cardiovascular disease, England 1981–2013

Prescriptions	1981	1991	2001	2006	2007	2008	2009	2010	2011	2012	2013
Digoxin and other positive inotropic drugs (2.1)	4243	3822	4031	4126	4141	4149	4119	4088	4006	3900	3770
Diuretics (2.2)	20 678	22 195	30 203	37 582	37 355	37 536	37 511	37 687	37 563	37 258	36 650
Antiarrhythmic drugs (2.3)	232	532	1292	1265	1247	1226	1188	1174	1156	1129	1107
Beta-adrenoreceptor blocking drugs (2.4)	9827	14 282	20 439	27 378	26 810	27 634	28 529	29 686	30 924	32 355	33 597
Antihypertensive and heart failure drugs (2.5)	4912	6431	25 047	47 742	53 634	57 823	60 838	63 571	65 449	67 184	68 652
Nitrates, calcium blockers and other antianginal drugs (2.6)	5156	16 718	26 814	34 707	37 214	39 100	40 575	42 043	43 086	44 675	45 868
Anticoagulants and protamine (2.8)	629	1356	4609	6790	7309	7991	8546	9157	9773	10 723	11 906
Antiplatelet drugs (2.9)	281	3619	18 891	32 779	35 382	38 124	39 107	38 182	38 351	38 603	38 661
Antifibrinolytic drugs and haemostatics (2.11)			282	327	352	358	363	373	392	396	393
Lipid-lowering drugs (2.12)	295	1066	13 523	42 098	47 412	52 190	56 452	59 550	61 649	64 399	66 795
All prescriptions for disease of the circulatory system	46 252	70 022	145 131	234 793	250 855	266 130	277 244	285 530	292 370	300 647	307 424

The data up to 1990 are not consistent with data from 1991 onwards. Figures up to 1990 are based on fees and on a sample of 1 in 200 prescriptions dispensed by community pharmacists and appliance contractors only. Figures from 1991 are based on items and cover all prescriptions dispensed by community pharmacists, appliance contractors, dispensing doctors and prescriptions submitted by prescribing doctors for items personally administered. British National Formulary codes in parentheses.

Adapted from Office for National Statistics (2014). Prescription cost analysis 2013. Health and Social Care Information Centre, and previous editions.

COSTS OF CVD

Cost data are not available for the UK as a whole; therefore, we present England data here. More than £6.8 billion was spent on treating CVD within the NHS in England in 2012/2013. The highest expenditure was on secondary care with £4373 million spent on secondary care for CVD in England. Within secondary care, emergency admissions had the greatest expenditure. Within primary care, the second highest setting for expenditure, the majority of costs were due to prescribing (£1387.5 million). Economic cost data for Wales, Scotland and Northern Ireland come from different sources (see online supplementary tables) and so may not be comparable. In 2012/2013 in Wales, a total of £442.3 million was spent on CVD, in Northern Ireland, £393 million was spent and in Scotland it is estimated that >£750 million was spent on treatment of CVD (figure 5).

SUMMARY AND DISCUSSION

Although CVD is no longer the biggest cause of death overall in the UK, it is still the largest cause of death for women. Overall

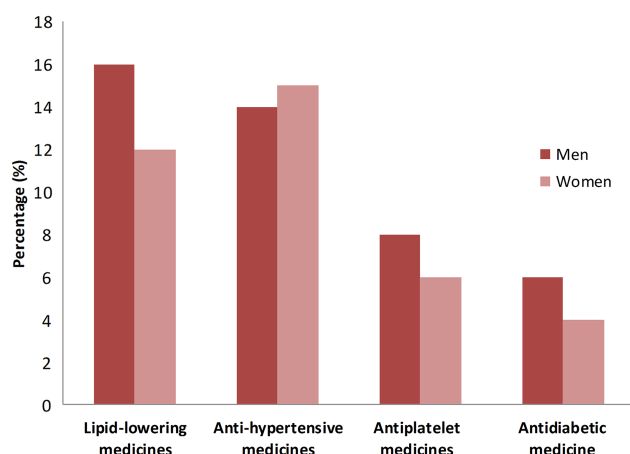


Figure 3 Percentage of individuals aged 16 and over taking cardiovascular-related prescriptions, by sex, England 2012–2013. Medicines are included in the 'Anti-hypertensive medicines' category only if they were specifically prescribed for hypertension. Adapted from Joint Health Surveys Unit. Health Survey for England 2013. London: Health and Social Care Information Centre 2014.

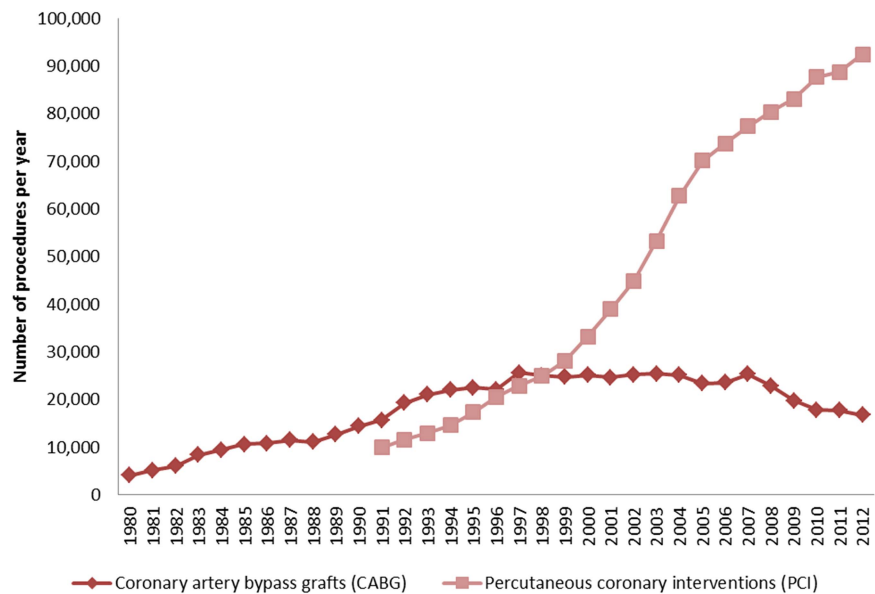
figures also mask substantial regional inequalities in mortality from CVD, with the highest CVD death rates occurring in Scotland and the North of England. Improved survival also means that there is a high prevalence of CVD conditions such as MI and angina; again, prevalence is higher in the North of England. There are also a large number of hospitalisations and operations resulting from CVD, which are in conjunction with an increase in the number of prescriptions dispensed for CVD conditions.

Cancer has overtaken CVD to become the main cause of death in a number of European countries, for example, in Belgium, Denmark and France,² indicating that the UK is one of many countries undergoing this change. The decrease in mortality from CVD in the UK is partially due to improved case fatality rates after MIs over the last decade and partially due to a decline in incidence.³ Although the data we present here shows large increases in treatment over the past decade, Unal *et al*¹⁰ estimated that between 1981 and 2000, 58% of the decline in deaths from CHD was due to improvements in risk factors, such as smoking, and 48% was due to treatments.

Accurate incidence data is difficult to obtain, but conditions such as MI can be measured using HES or general practice data linked to mortality, or through disease registries such as the Myocardial Ischaemia National Audit Project. These sources provide information on both new cases presenting to the health service and on those who die before reaching hospital. We have not presented incidence data in this review, but there is published evidence that the incidence of some CVDs is declining over time. Measured using HES linked to mortality, the incidence of MI has declined in many developed countries, including England, since the 1970s.^{3 11 12} Measured using general practice data, between 1999 and 2008, the incidence of stroke in the UK dropped by 30%.¹³ However, it has been demonstrated that only using one source of incidence data can underestimate MI by 25–50%.¹⁴

Despite the substantial shift towards PCIs in the past years, CABG procedures remain as one of the main surgical treatments for certain more complex conditions.¹⁵ For example, it is recommended that CABGs remain as the standard revascularisation care for patients with complex coronary lesions or severe left main coronary disease. Where patients are eligible for both CABG and PCI, the National Institute for Health and Care Excellence reports that although CABG is still effective it is not cost-effective when compared with PCI and so the latter procedure should be performed.¹⁶

Figure 4 Number of coronary artery bypass operations and percutaneous coronary interventions per year, UK 1980 to 2012. Operations performed in NHS hospitals and selected private hospitals are included. Adapted from British Cardiovascular Intervention Society (2013). BCIS Audit returns. Personal communication; The Society for Cardiothoracic Surgery in Great Britain and Ireland (2014). <http://bluebook.scts.org/#ActivityRates> (accessed in March 2014).



While we aimed to use high-quality nationally representative data sources, all have their limitations. Mortality and HES cover the entire population; however, data from the CPRD database came from about 9% of the population. It is possible therefore that CPRD data are not nationally representative; however, the fact that QOF prevalence data (which covers virtually all general practices) supports CPRD prevalence estimates lends some credibility to the representativeness of the CPRD database.

CONCLUSION

CVD remains a substantial burden to the UK, both in terms of health and economic costs. Despite significant declines in

incidence and mortality, CVD is still the biggest cause of mortality in women. The improvements in survival mean that there is now a high prevalence of people living with CVD, and consequently high numbers of prescriptions for secondary prevention. The most recent HSE reports that lipid-lowering drugs are the most prescribed medicine for men, and the second most prescribed for women.¹⁷ This review highlights the stark regional inequalities in the mortality and prevalence of CVD. Prevention measures to improve diet, physical activity, binge drinking and tobacco use are necessary to tackle both these regional inequalities and premature mortality from CVD.

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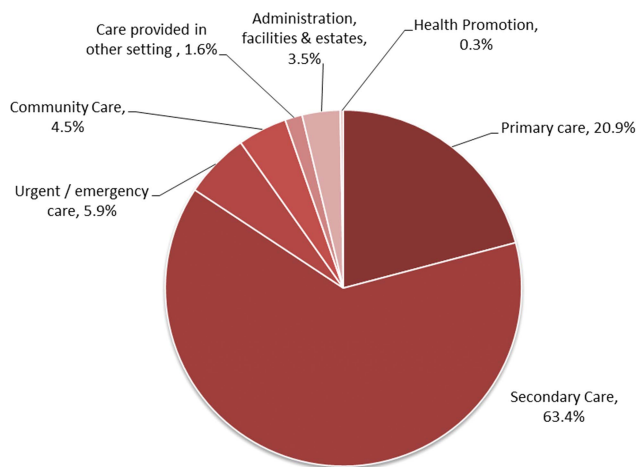


Figure 5 Percentage of National Health Service (NHS) expenditure on cardiovascular disease by care setting, England 2012/2013. Expenditure data included are taken from the 2012–2013 programme budgeting returns. Programme budgeting returns are based on a subset of primary care trust (PCT) accounts data and represent a subset of overall NHS expenditure data. Estimates of expenditure are calculated using price paid for specific activities and services purchased from healthcare providers. PCTs follow standard guidance, procedures and mappings when calculating programme budgeting data. Adapted from NHS England—Analytical services—Programme Budgeting Team (2014) 2012/2013 Programme Budgeting Benchmarking Tool. <http://www.england.nhs.uk/resources/resources-for-ccgs/prog-budgeting/> (accessed February 2014).

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