Cardiovascular disease

Summary

- Improved treatment and access to treatment with a reduction in smoking rates have resulted in a dramatic decline in cardiovascular disease (CVD) mortality rates. For the first time people are more likely to die from cancer than circulatory disease nationally and in Hampshire. In 2011 30% of deaths in Hampshire were attributable to cancer and 28% to CVD.
- Lifestyle risk factors for CVD (smoking, physical inactivity, poor diet, obesity and harmful alcohol intake) are modifiable. They are also the major risk factors for other serious illnesses such as cancer and respiratory disease.
- The gap between the expected number of people with CVD, based on research, and the prevalence rates recorded by GP practices suggest that there are thousands of Hampshire residents with undiagnosed CVD. The NHS Health Check programme is a major opportunity to diagnose CVD and encourage participants to improve their lifestyles and hence the years they live in good health.
- Because Hampshire's population is ageing with more people surviving cardiac events, the number of people with CVD is likely to continue to increase over the next decade. People with CVD may require more support from the NHS and social care than their healthy peers.
- Between 2008/9 and 2011/12 there has been a statistically significant increase in CVD hospital admissions, mostly planned admissions, from 1,136 per 100,000 people to 1,185. This increase cannot be explained on the basis of clinical need.
- Inequalities are apparent with worst outcomes for Hampshire's most deprived residents. There may also be inequalities between the sexes with women being less likely to have access to planned hospital care. Women seem to be at particularly high risk to stroke.
- The Department of Health published a Cardiovascular Disease Outcomes Strategy in 2013. This evidence based strategy should form the basis of CCG plans for effective CVD care.
- Hampshire is now part of the first population based cascade testing programme for Familial Hypercholesterolaemia in England.
- Results from an audit of people with Atrial Fibrillation (AF) using the Hampshire Health Record shows that more high risk AF should be anticoagulated.

Recommendations

- Implement Making Every Contact Count across the NHS and social care if Hampshire three pilots are successful.
- Encourage GP practices to maximise uptake and quality of NHS Health Check.
- CCGs should consider gender inequalities in accessing timely services as part of their commissioning strategies, particularly in stroke prevention.
- CCGs should evaluate cardiac rehabilitation in Hampshire in line with national guidance and ensure that all cardiac rehabilitation providers are participating in the national audit.
- Increase access to palliative care for CVD patients.

Cardiovascular disease

1. Introduction

Cardiovascular disease (CVD) should be thought of as a family of diseases with have common risk factors, but different outcomes[1]. This chapter considers:

- Coronary Heart Disease (CHD). This results from the narrowing and hardening of blood vessels (atherosclerosis) restricting blood supply to the heart muscle.
- Stroke. A loss of blood supply to the brain causing permanent neurological damage.
- Trans Ischaemic Attack (TIA). A loss of blood supply to the brain causing neurological symptoms that resolve within 24 hours.
- Heart failure. A chronic condition in which the heart becomes progressively less efficient as a pump. The Length of survival after diagnosis may be poorer than for many cancers[2].
- Atrial Fibrillation (AF). The most common abnormal irregular heart rhythm (arrhythmia). It can be asymptomatic, cause chest pain, breathlessness or lead to a stroke.
- Hypertension. High blood pressure, along with atherosclerosis and high cholesterol, is a major cause of CVD and is a serious, but often hidden medical condition.
- Familial Hypercholesterolaemia (FH). This is an inherited condition causing high cholesterol and premature CVD.

The improved medical management of CVD is a health related success. In 1961 there were 166,000 CVD deaths (more than half all deaths) in Great Britain. In 2009 there were 80,000 CVD deaths (32% of all deaths)[3]. This halving of the mortality number due to CVD has resulted from a combination of fewer people smoking, improved diagnosis and treatment including the introduction of drugs such as statins and improved surgical interventions. For the first time in 2011 there were more deaths from cancer in Hampshire than from CVD. Unfortunately the reduction in CVD mortality has the result of more people living with CVD. Rates of smoking have decreased, however, rising rates of physical inactivity, obesity and alcohol misuse threaten to slow, or even reverse, the rate at which CVD mortality is falling. As the population ages, a higher proportion of the population have CVD. People with CVD are more likely to require NHS and social care support.

2. Level of need in the population

2.1 Risk factors

Age, sex and family history are non-modifiable risk factors for CVD. Other behaviour related risk factors are modifiable. Small improvements in lifestyle at a population level can have an impressive impact on mortality as reduced smoking rates have demonstrated. Lifestyle risks are discussed in other JSNA chapters (tobacco control, obesity, physical activity). It is important to recognise that people with one lifestyle

[1] DH Cardiovascular Disease Team. Cardiovascular disease outcomes strategy. Department of Health, 5/3/2013.

[2] Stewart S, MacIntyre K, Hole DJ et al. More “malignant” than cancer? Five-year survival following first admission for heart failure. European Journal of Heart Failure 2000;3(3):315-322

[3] British Heart Foundation. Trends in coronary heart disease, 1961-2011. British Heart Foundation, February 2011.

risk factor are likely to have other lifestyle risk factors[4] and that people living in deprivation are more likely to have lifestyles that increase their chance of CVD. In the UK lifestyle risks have reduced at a faster rate in affluent areas, increasing inequalities. The key modifiable risk factors are listed below[5].

- Smoking. 17.2% of Hampshire's adults smoke which is statistically significantly lower than the English average of 20.7%.
- Physical inactivity. Only 13.1% of Hampshire's adults are physically active, which is better than the English average of 11.2%.
- Poor diet. 29.3% (less than 1 in 3) of Hampshire's adults eat healthily which is similar to the English average of 28.7%.
- Obesity. 23.7% (nearly 1 in 4) of Hampshire's adults are obese which is not significantly different to the English average of 24.2%.
- Harmful alcohol intake. 23.7% (nearly 1 in 4) of Hampshire's adults drink at increasing or higher risk levels. This is higher than the national average of 22.3%.

These are also risk factors for cancers, respiratory diseases, diabetes, kidney disease and liver disease. Reducing risk factors for CVD thus reduces the risk of illness and disability across many long term conditions.

2.2 Wider determinants of cardiovascular disease

The wider determinants of health such as housing, the environment in which people live, employment, social and cultural networks and education are important factors in the development of cardiovascular disease. Research[6] has repeatedly shown the relationship between these factors and CVD. Some of the main social determinants of CVD include professional context (working conditions and access to a job), social relationships and isolation, geographic environment and ethnicity (through discrimination). Social determinants have been shown to be related to various CVDs in various ways. For example, psychological stress has been linked to the development of cardiovascular risk factors such as hypertension and atherosclerosis.

2.3 Prevalence of CVD

The prevalence of CVD as recorded in general practice Quality Outcomes Framework (QOF) registers is a good guide to the amount of diagnosed disease in the population. QOF prevalence rates are not adjusted for age meaning that older populations tend to have higher rates of disease. This explains why New Forest has the highest QOF prevalence in Hampshire's for all cardiovascular diseases, despite having a relatively healthy older population. The rates for CHD are typical (figure 1).

[4] Buck D, Fronsini F. Clustering of unhealthy behaviours over time: implications for policy and practice. King's Fund, 2012.
[5] APHO. Hampshire Health Profile 2012. APHO, 2012. www.healthprofiles.info
[6] Lang T, Lepage B, Schieber AC, Lamy S, Kelly-Irving M. Social determinants of cardiovascular diseases. Public Health Reviews. 2012;33: 601-22.

Figure 1: QOF prevalence of CHD by Hampshire's districts, 2011/12

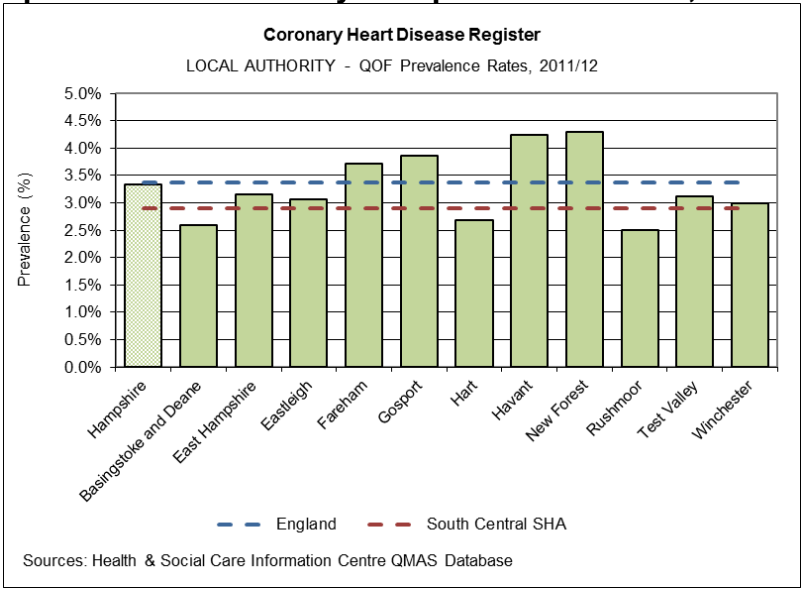

Table 1 shows QOF prevalence figures for Hampshire's CCGs. These figures show how common CVD is. As comparisons, Hampshire's QOF prevalence for cancer is 2.0% and for Chronic Obstructive Pulmonary Disease is 1.4%.

A significant proportion of CVD disease burden remains undiagnosed. Local prevalence figures estimate of how much disease would be expected on the basis of current research. The gap between the amount of disease expected and what is recorded on QOF registers provides an indication of how many undiagnosed patients there are. The earlier these people are identified the earlier they can be treated resulting in improved long term outcomes.

Table 1: Prevalence of most common cardiovascular diseases by Hampshire's CCGs

	CHD		Stroke/TIA		Atrial fibrillation	
CCG	QOF no.	QOF prevalence %	QOF no.	QOF prevalence %	QOF no.	QOF prevalence %
Fareham & Gosport	7517	3.8	3781	1.9	3575	1.7
NE Hants and Farnham	5656	2.6	3140	1.4	2865	1.8
North Hampshire	5708	2.7	2920	1.4	2805	1.3
SE Hampshire	8062	3.9	4067	1.9	4004	1.3
West Hampshire	18673	3.5	11208	2.1	9865	1.9
Hampshire	44334	3.3	24381	1.8	22411	1.8

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	Heart Failure		HF due to LVD		Hypertension	
CCG	QOF no.	QOF prevalence %	QOF no.	QOF prevalence %	QOF no.	QOF prevalence %
Fareham & Gosport	1385	0.7	797	0.4	30919	15.5
NE Hants and Farnham	1073	0.5	495	0.2	26974	12.4
North Hampshire	966	0.5	456	0.2	25789	12.0
SE Hampshire	1400	0.7	715	0.3	31669	15.2
West Hampshire	3758	0.7	2147	0.4	76897	14.2
Hampshire	8339	0.6	4514	0.3	186558	14.0

CCG level expected prevalence rates are available for CHD, stroke/TIA and hypertension (table 2).

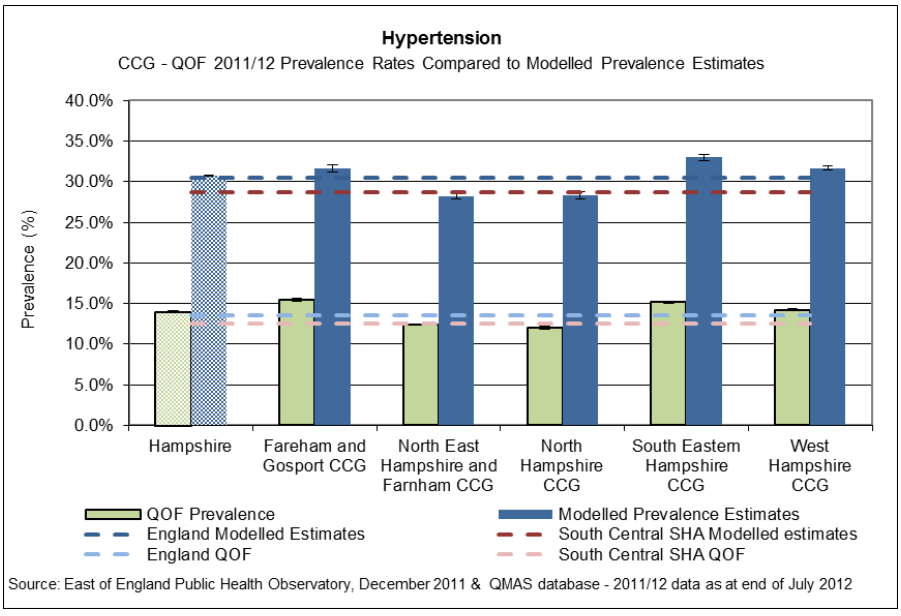
Table 2: Estimated numbers of patients missing from QOF disease registers

	Coronary Heart Disease			Stroke/TIA			Hypertension		
CCG	QOF prevalence %	Expected prevalence %	Undiagnosed no.	QOF prevalence %	Expected prevalence %	Undiagnosed no.	QOF prevalence %	Expected prevalence %	Undiagnosed no.
Fareham & Gosport	3.8	5.4	3165	1.9	2.5	1194	15.5	31.7	32315
NE Hants and Farnham	2.6	4.4	3916	1.4	2.0	1346	12.4	28.2	34370
North Hampshire	2.7	4.5	3805	1.4	2.0	1251	12.0	28.3	35030
SE Hampshire	3.9	6.4	5168	1.9	2.9	2141	15.2	33	37086
West Hampshire	3.5	5.5	10670	2.1	2.6	2669	14.2	31.7	94767
Hampshire	3.3	5.4	28213	1.8	2.5	9482	14.0	30.8	223870

Source: East of England Public Health Observatory, December 2011 & QMAS database - 2011/12 data as at end of July 2012

Nationally it is estimated that 18% of people with Atrial Fibrillation have not been diagnosed. In Hampshire this would mean that over 4,000 people are yet to be diagnosed. There are fewer people with a diagnosis of hypertension than without a diagnosis:

Figure 2: QOF prevalence and estimated prevalence compared for hypertension

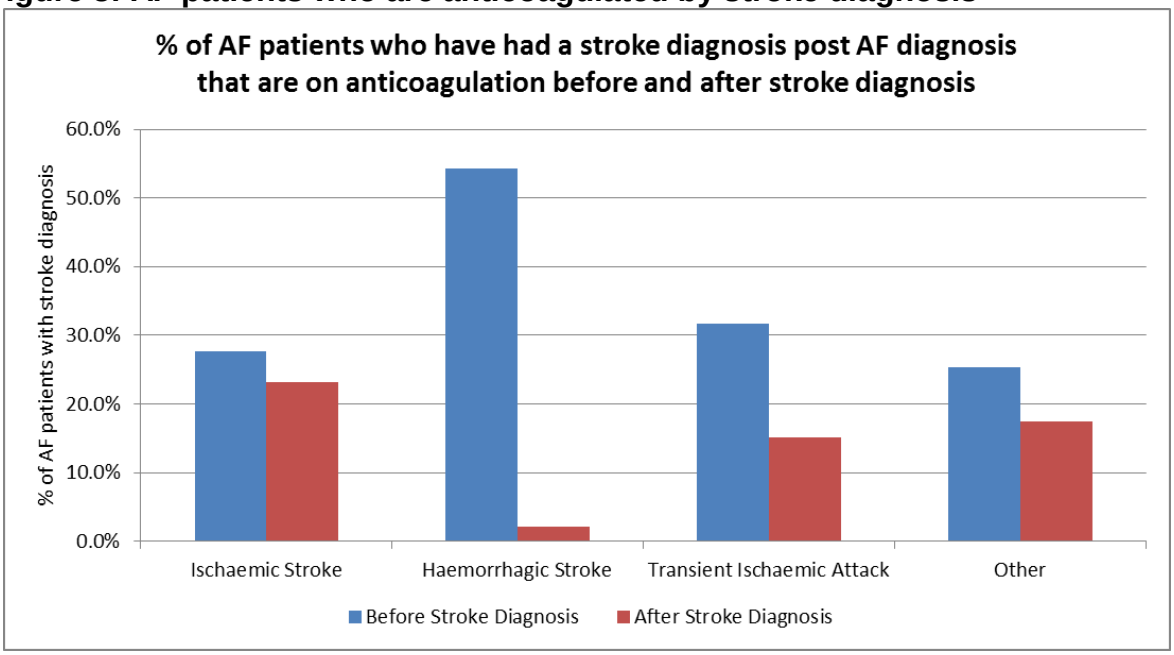


NHS England is currently developing a new tool to support case finding in general practice[7].

2.4 Atrial fibrillation and anticoagulation needs

AF is generally diagnosed opportunistically in primary care, at the time of a stroke or TIA, or during a Health Check. An audit of the care provided to people with AF across Southampton, Hampshire, Isle of Wight and Portsmouth was carried out using general practice and hospital data accessed through the Hampshire Health Record (HHR). 33,070 patients diagnosed with AF recorded by the end of 2007 were followed up for 5 years. Of these 2,117 (6.4%) had strokes or TIAs. Women were less likely to be diagnosed with AF but were more likely to have a stroke. Results showed that insufficient numbers of AF patients were receiving anticoagulation, with 37.8% of AF patients being contraindicated for anticoagulation, compared to 9.6% in the national GRASP-AF audit.

Figure 3: AF patients who are anticoagulated by stroke diagnosis



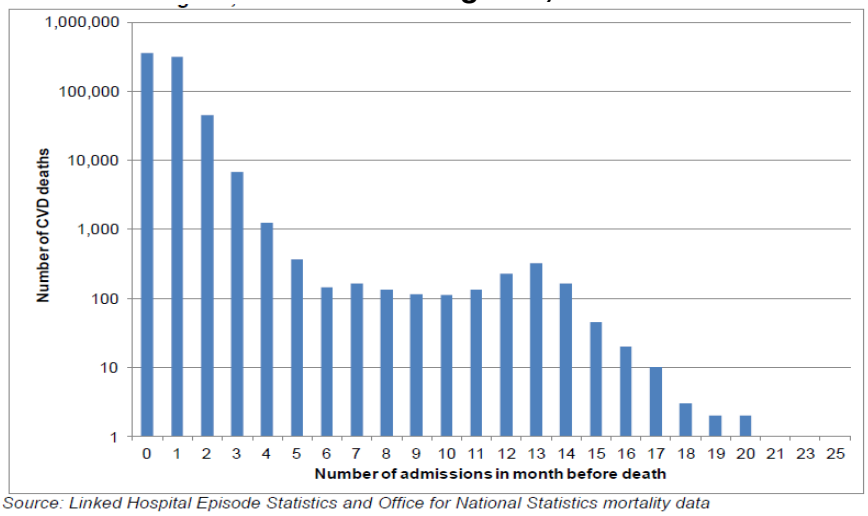
2.5 Palliative care needs

Figures are not available for Hampshire but national data[8] demonstrate that CVD patients on average have more than one hospital admission in the last six months of life. In the last month of life CVD patients can be admitted into hospital frequently (figure 4).

[7] DH Cardiovascular Disease Team. Cardiovascular disease outcomes strategy. Department of Health, 5/3/2013.

[8] National End of Life Intelligence Network. Deaths from cardiovascular diseases: implications for end of life care in England. NHS national End of Life Care Programme, February 2013.

Figure 4: Frequency of cardiovascular disease deaths by number of admissions in the last month of life in England, 2004-2008



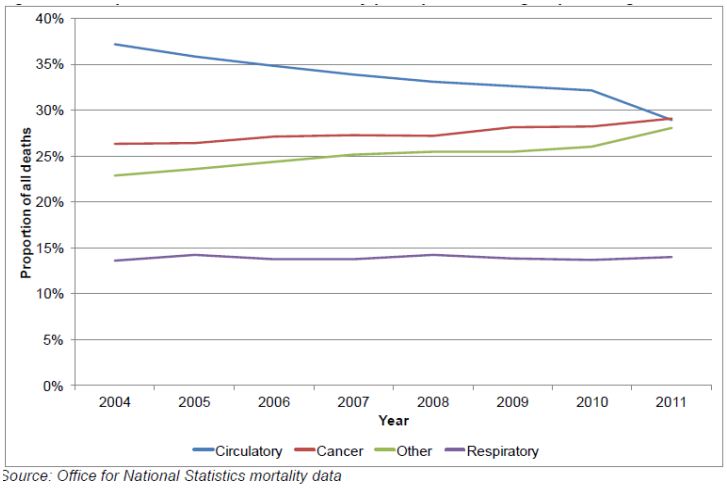
Source: Linked Hospital Episode Statistics and Office for National Statistics mortality data

People with CVD are more likely to die in hospital than people with other conditions (59% versus 51% between 2004 and 2011). 22% die at home, 17% in care homes, 2% in other places and less than 1% in hospices. Not all CCG palliative care plans specifically address the issue of palliative care for CVD patients.

2.6 Deaths from CVD

Nationally the drop in mortality attributable to CVD in recent years has been dramatic, whereas mortality attributable to cancer has been creeping up. For the first time in 2011 a higher proportion of deaths were attributable to cancer than CVD (29.1% vs. 28.9%) (figure 5)[9].

Figure 5: Proportion of all deaths caused by principle disease groups in England, 2004-11



Source: Office for National Statistics mortality data

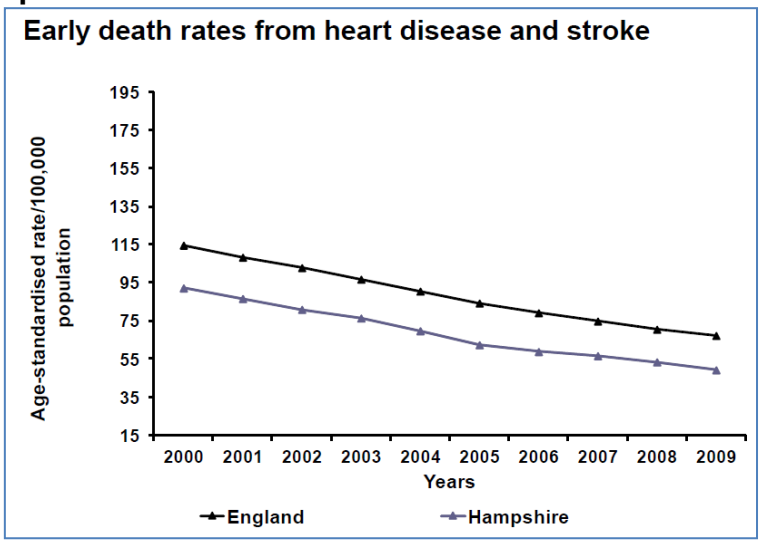
The national pattern is mirrored in Hampshire. In the 2010 JSNA, 30% of Hampshire deaths were attributable to CVD compared to 28% of deaths being attributable to

[9] National End of Life Intelligence Network. Deaths from cardiovascular diseases: implications for end of life care in England. NHS national End of Life Care Programme, February 2013.

cancer. In 2011 the position had reversed with cancer becoming the main cause of death in Hampshire (30%) following by CVD (28%, with 12% being caused by CHD, 8% by stroke and 8% by other circulatory diseases). The decline in CVD mortality in Hampshire has run parallel to the national decline, but at a consistently lower rate.

In 2009 Hampshire's mortality rate from premature CVD was 49.2 per 100,000, significantly lower than the national average of 67.3 deaths per 100,000 (figure 6)[10].

Figure 6: Age standardised rate of CVD mortality in under 75s, England and Hampshire compared 2000-2009



Men are statistically significantly more likely to die as a result of CVD than women. The extent of the difference varies with specific disease (table 3). Men have higher rates of premature mortality (<75 years old) for all conditions, statistically significantly higher rates of mortality from CHD and preventable causes across all ages. Men tend to get CHD about 10 years younger than women[11]. However the mortality advantage for women is absent for stroke across all ages. CHD is the most important cause of mortality from CVD:

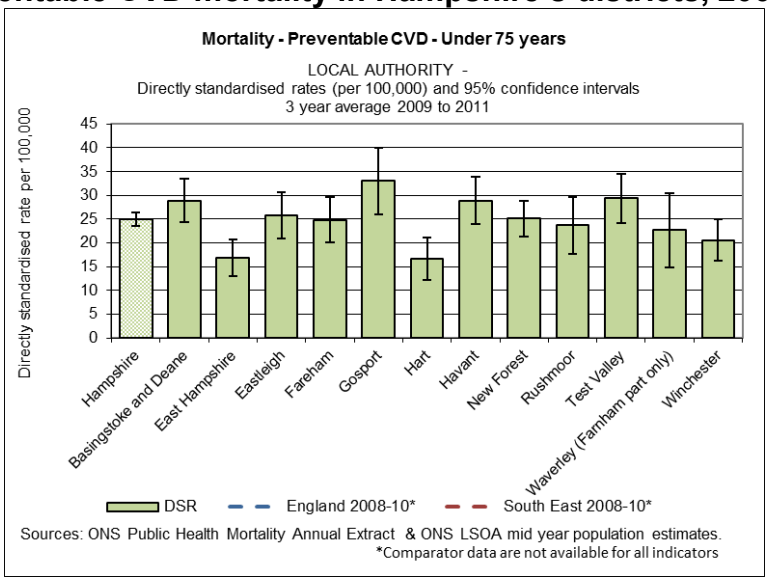
Table 3: Mortality rates from CVD in Hampshire compared for men and women

Condition	Mortality in men, DSR per 100,000 (95%CI)	Mortality in women, DSR per 100,000 (95%CI)
CVD, all ages	165 (161-170)	105 (102-108
CVD, premature mortality	66 (62-69)	27 (25-29)
CHD, all ages	84 (80-87)	38 (36-40)
CHD, premature mortality	38 (36-41)	11 (9-12)
Preventable CVD under 75yrs	39 (37-42)	12 (10-13)
Stroke, all ages	36 (34-38)	34 (33-36)
Stroke, premature mortality	10 (9-11)	7 (6-8)

[10] APHO. Hampshire Health Profile 2012. APHO, 2012. www.healthprofiles.info
[11] Cardio & Vascular Coalition. Modelling the UK burden of cardiovascular disease to 2020. British Heart Foundation, September 2008.

Outcomes are strongly linked to deprivation. Preventable CVD mortality in the under 75s is strongly associated with deprivation. In Hampshire between 2009 and 2011 the most deprived quintile had a directly standardised mortality rate of 44 per 100,000 (95%CI 32-56) which was statistically significantly higher than the least deprived quintile (20 per 100,000 95%CI 18-21) and second least deprived quintile (25 per 100,000 95%CI 22-28) (figure 7).

Figure 7: Preventable CVD mortality in Hampshire's districts, 2009-11



3. Projected service use and outcomes

3.1 Projected prevalence and incidence of CVD

In 2008 the Cardio & Vascular Coalition[12], established by the British Heart Foundation, attempted to model the burden of CVD up to 2020. The Coalition was unable to create a successful model due to the complexity around predicting trends in all relevant variables. In interviews carried out by the Coalition[13] most experts expected the prevalence of CVD to increase because CVD is strongly associated with an ageing population and more people are surviving major cardiac events. Most experts also expected the incidence of CVD to increase because of increasing rates of obesity, unhealthy diets and a lack of physical activity.

The Cardio and Vascular Coalition calculated that if BMIs increased in the UK between 2007 and 2016 at the same rate as in the USA between 1996 and 2006, smoking prevalence would have to decrease by 0.9% a year (22% to 15% over a decade) to offset the increased CVD risk posed by rising obesity. On balance it is likely that service need will increase in the next decade as more of Hampshire's ageing population will have CVD and more people will survive acute cardiovascular

[12] Cardio & Vascular Coalition. Modelling the UK burden of cardiovascular disease to 2020. British Heart Foundation, September 2008.
[13] Cardio & Vascular Coalition. CHD in England: opportunities and challenges over the next 10 years. British Heart Foundation, April 2008.

events. The Projecting Older People Population Information system (POPPI) has projected numbers for heart attack and stroke up to 2020 (table 4)[14]:

Table 4: Predicted numbers of older people (65+) in Hampshire with long standing health conditions caused by heart attack and stroke

Condition	2012	2014	2016	2018	2020
Heart attack	12,579	13,445	14,095	14,718	15,370
Stroke	5,941	6,366	6,681	6,998	7,340

3.2 Projected CVD mortality

The Cardio and Vascular Coalition looked at age specific mortality rates from CHD and stroke in 2004 and projected the mortality in the UK in 2020[15]. As a result of an ageing population the number of CHD deaths in men is expected to increase by 49% and the number of CHD deaths in women is expected to increase by 39%. Stroke mortality was even more strongly affected by an ageing population. Stroke deaths in men are anticipated to increase by 61% and stroke deaths in women by 42%. Falling age and sex standardised mortality rates can mask higher absolute numbers of deaths in older age groups, even if older age groups generally getting healthier. This means that commissioners and providers will have to provide care for more CVD patients overall because Hampshire's population is ageing. Greater emphasis on commissioning preventive services would help partially counteract this demographic shift.

There are particular concerns that younger adults are becoming less healthy due to increasing obesity and high blood pressure. Since 2002 CHD mortality rates in 35-44 year old men declined to 15 deaths per 100,000 in 2010. However this rate of decrease appears to be slowing[16].

4. Current services

4.1 NHS Health Check programme

Primary care has an important role because it is the most accessed part of the NHS and because GP staff can understand their patients in the full context of their lives[17]. The NHS Health Check programme integrates prevention, early detection, mitigation of risk factors and treatment of CVD. Health Checks are being delivered through 140 out of 142 GP practices in Hampshire. All 40-74 year olds without existing CVD are being invited over a five year period for an NHS Health Check. At a Health Check a person is encouraged to reduce their risk through lifestyle improvements and/or the prescription of statins or antihypertensives.

With an eligible population of over 410,000 Hampshire's Health Check programme is one of the largest in England. In 2012/13 41,426 people were invited to have a NHS

[14] http://www.poppi.org.uk/ Last viewed 13.5.13
[15] Cardio & Vascular Coalition. Modelling the UK burden of cardiovascular disease to 2020. British Heart Foundation, September 2008.
[16] British Heart Foundation. Coronary heart disease statistics: a compendium of health statistics, 2012 edition. British Heart Foundation, October 2012.
[17] Thorlby R. Reclaiming a population health perspective: future challenges for primary care. Nuffield Trust, April 2013.

Health Check in Hampshire. In 2013/14 over 80,000 residents will be invited to participate as the full implementation takes effect.

The NHS Health Check provides a systematic approach to identify the thousands of Hampshire residents with undiagnosed CVD and then prescribing appropriate medication and advice. Between 1/4/2011 and 19/10/12 the diseases in table 5 were diagnosed. Cholesterol lowering statins were prescribed to 688 (4.8%) of Health Check attendees. Rates of diagnosis and prescribing varied considerably across practices.

Table 5: Diseases diagnosed following Health Checks, 1/4/2011 to 19/10/12

Disease	No. of diagnoses	% of Health Checks
Hypertension	273	1.9%
Hypercholesterolaemia	134	0.9%
Diabetic hyperglycaemia	71	0.5%
Type II diabetes	60	0.4%
CHD	23	0.2%
Atrial fibrillation	14	0.1%
Chronic Kidney Disease (stages 3 to 5)	11	0.1%

4.2 Familial Hypercholesterolaemia service

Hampshire is implementing a population approach to minimise the effects of a genetic condition called Familial Hypercholesterolaemia (FH). FH affects about 1 in 500 people but most (85%) of those affected are unaware of their status. Left untreated, 50% of men have CHD by the time they are 50 and at least 30% of women by the time they are 60[18]. The FH service identifies potential FH gene carriers, genetically tests them and then extends genetic and cholesterol testing to their relatives (in a cascade). By diagnosing FH carriers before they become symptomatic, high dose statins can be prescribed and life expectancy increased by an average of nine years[19]. CCGs in Hampshire are leading in the commissioning of this innovative service.

4.3 Hospital treatment for CVD

Hampshire's hospital admission rate for CVD (planned and emergency cases) in 2011/12 was 1,185 (95%CI 1,168-1,201) per 100,000 people. This represents a statistically significant increase in CVD admissions since 2008/09 when the overall CVD admission rate was 1,136 (95%CI 1,120-1,153) per 100,000 people (table 6).

Since 2008/09 there has been a statistically significant increase in the rate of admissions for elective (planned) CVD interventions from 516 per 100,000 to 567 per 100,000 in 2011/12. In contrast emergency CVD admissions have not increased over this time. Between 2008/09 and 2011/12 there have been statistically significant

[18] NICE. Familial hypercholesterolaemia: costing report, implementing NICE guidance. *NICE*, December 2009.
[19] Gill PJ, Harnden A, Karpe F. Easily missed? Familial hypercholesterolaemia. BMJ 2012;344:e3228.

reductions in elective and emergency CHD admission rates; a statistically significant increase in the stroke admission rate; and non-statistically significant increases in the admission rates of AF and heart failure. The overall statistical increase in CVD admissions suggests that either that reduction in CVD mortality is associated with a greater prevalence of CVD (more people are surviving with CVD), or that thresholds for admission have been lowered.

Table 6: Trends in admission in Hampshire for different cardiovascular diseases

Disease/ admission type	Trend in admissions in DSR per 100,000 (95% CI) 2008/9 to 2011/12	Ratio of female to male admissions, 2011/12	% under 75 years, 2011/12	Admission rate in most deprived quintile vs. least (95%CI), 2009/10 to 2011/12 pooled
CVD*/ elective	Significant increase, 516(504-527) in '08/'09 572 (560-584) in '11/'12	1 to 2.11	89.5%	Significantly greater, 657(614-701) vs. 532(522-541)
CVD/ emergency	Flat trend, 562(551-57) in '08/'09 567(556-578) in '11/'12	1 to 1.68	70.0%	Significantly greater, 816(771-862) vs. 508(500-517)
CHD**/ elective	Significant decrease, 173(167-179) in '08/'09 151(145-156) in '11/'12	1 to 3.16	86.1%	Significantly greater, 180(157-203) 150(146-155)
CHD/ emergency	Significant decrease, 168(162-174) in '08/'09 156(151-162) in '11/'12	1 to 2.45	75.0%	Significantly greater, 274(247-203) 133(129-138)
Stroke/ emergency	Significant increase, 84(79-88) in '08/'09 102(98-107) in '11/'12	1 to 1.37	59.8%	Significantly greater, 137(118-155) 86(83-90)
Atrial Fibrillation/ all admissions	Non-significant increase, 125(120-130) in '08/'09 136(130-141) in '11/'12	1 to 1.88	77.9%	No trend, 118(101-135) 137(133-141)
Heart failure/ all admissions	Non-significant increase, 56(52-59) in '08/'09 60(57-64) in '11/'12	1 to 2.05	48.3%	Significantly greater, 97(82-111) 53(50-55)

**CVD includes all diseases of the circulatory system, ICD10 codes I00 to I99.*
***CHD includes angina pectoris, acute myocardial infarction (MI), subsequent MI, certain complications following acute MI, other acute ischemic heart disease (IHD) and chronic IHD, ICD10 codes I20 to I25.*

Women are less likely to be admitted to hospital for all types of CVD with fewer being admitted for planned interventions and more as emergencies.

The age range during which people are admitted varies by disease and whether the admission is elective or emergency. 89.5% of people with CVD who have a planned (elective) admission to hospital are under the age of 75, compared with 70% of people with CVD admitted as an emergency. People with CHD are generally younger than people with AF, who are generally younger than people who have a stroke. Less than half (48.3%) of people with heart failure are under 75.

Admissions for CVD are strongly associated with deprivation apart from AF where there is not a statistically significantly higher admission rate in the most deprived quintile of Hampshire's residents than in the least deprived. The gradient in admission rates is steeper for emergency admissions than elective admissions. Based on point estimates there are 308 more emergency admissions per 100,000 people in the most deprived quintile than in the least deprived quintile. There are 125 more elective admissions per 100,000 in the most deprived quintile than the in least deprived quintile, a smaller gap. As is the case with women there may be opportunities to identify disease earlier in relatively deprived communities and plan hospital admissions so as to avoid more expensive emergency admissions later on.

There are geographical variations in admission rates that cannot be explained by varying levels of deprivation or other forms of need. This can be shown by comparing elective and emergency CHD admission rates at a district level (figures 8 and 9).

Emergency CHD admission rates tend to be higher in relatively deprived districts (Gosport, Havant and Rushmoor) and lower in relatively affluent districts (Hart, parts of Farnham and Winchester). This pattern would be expected based on the association between deprivation and cardiovascular disease.

In contrast there appears to be little association between deprivation and rates of elective CHD admissions. There is also far greater variation between districts. The highest rates are found in Hart, Rushmoor and Waverley (Surrey county but North East Hampshire & Farnham CCG). Gosport and Havant have elective CHD admission rates that are significantly lower than the Hampshire average.

Figure 8: Emergency admission rates for CHD by local authority, 2009/10 to 2011/12 pooled

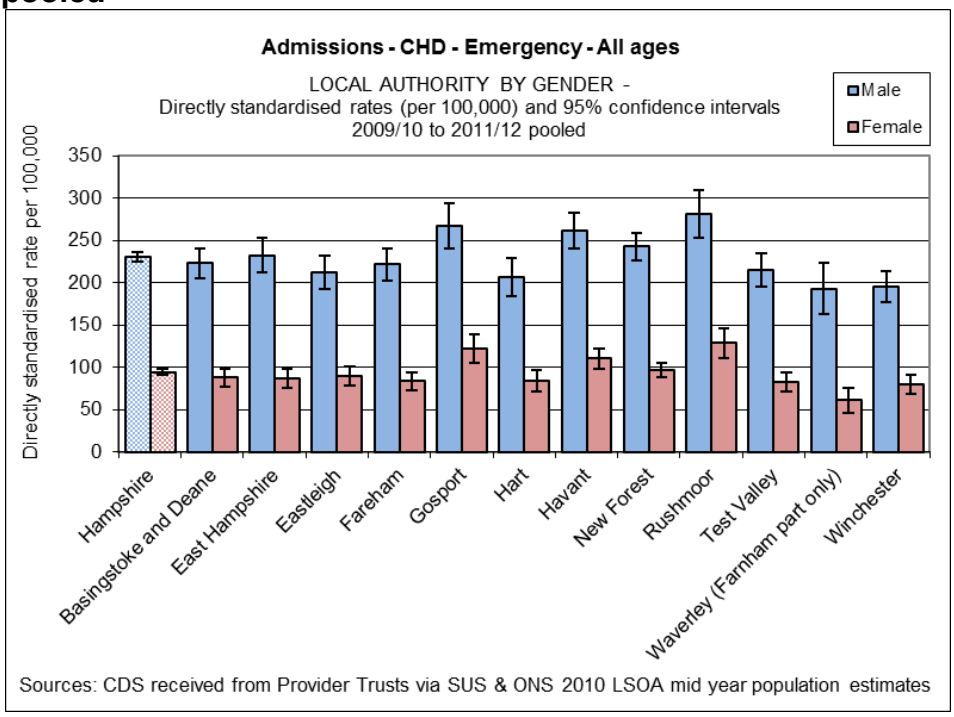
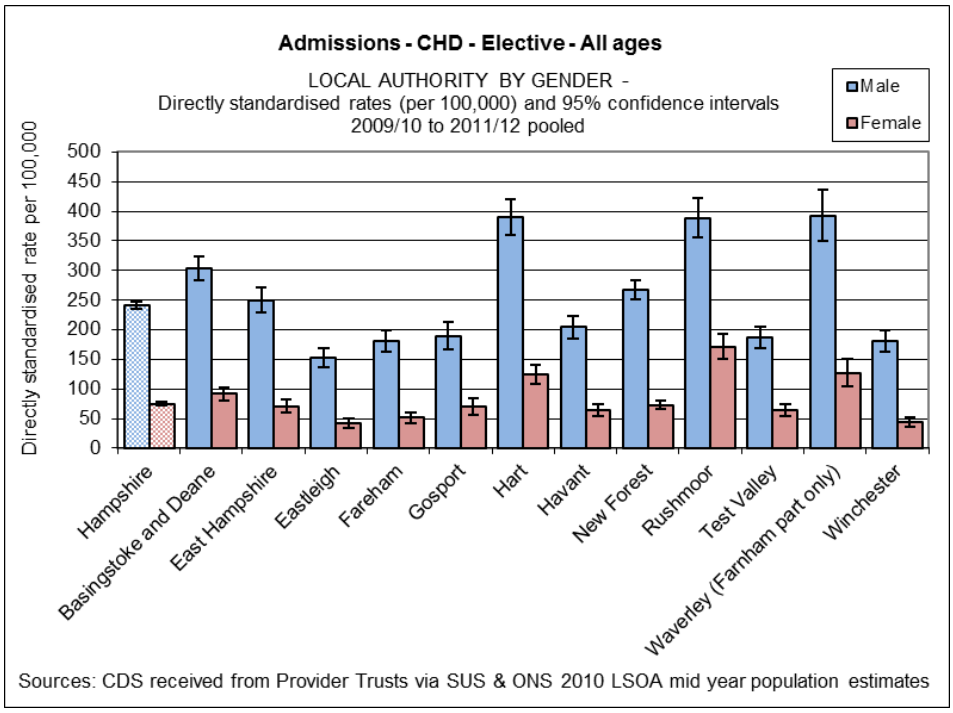


Figure 9: Elective admission rates for CHD by local authority, 2009/10 to 2011/12



This pattern may be associated with proximity to particular acute trusts. Hart, Rushmoor and Waverley residents access cardiology services at Frimley Park Hospital NHS Foundation Trust. Admission rates are also relatively high for Basingstoke and Deane, which is served by North Hampshire hospital, and New Forest where some residents are referred to Bournemouth which is known to have

one of the highest angioplasty rates in England. In contrast districts served by Southampton University Hospital and Portsmouth Hospital's Trust have lower elective CHD admission rates, despite containing areas of relatively high need. Frimley Park and Hampshire Hospitals have 24 hour a day primary Percutaneous Coronary Intervention (pPCI) services which may affect which hospitals patients are sent to. The reasons for higher admissions at Frimley Park, Hampshire Hospitals and Bournemouth are likely to be related to service availability and warrant further investigation.

The procedures that are undertaken when people are admitted to hospital with CVD is shown in table 7. Statistically significant higher rates of angioplasty are provided in the most deprived quintile than in the least deprived quintile, which reflects need. However the very low rate of angioplasty in women relative to men (ratio of 1 female admission to 3.4 male admissions) suggests unmet need in some women. The rate of implantable cardiovascular device procedures has increased significantly between 2008/09 and 2011/12, as a result of technological developments and the fact that UHS is a centre for this service.

Table 7: Trends in procedure rates for implantable cardiovascular devices and angioplasty, 2008/9 to 2011/12

Procedure	Trend in procedures in DSR per 100,000 (95% CI) 2008/9 to 2011/12	Ratio of female to male admissions, 2011/12	% under 75 years, 2011/12	Procudure rate in most deprived quintile vs. least (95%CI), 2009/10 to 2011/12 pooled
Implantabe cardiovascular devices	Significant increase, 64(60-67) in '08/'09 74(71-78) in '11/'12	1 to 2.12	Data not available	Non-significantly greater, 86(72-100) 70(67-73)
Primary angioplasty in STEMIs	Flat trend, 20(17-22) in '08/'09 21(19-24) in '11/'12	1 to 3.40	Data not available	Significantly greater, 40(29-51) 19(17-21)

Hampshire's acute trusts participate in the Myocardial Ischaemia National Audit Project (MINAP) which evaluates how the NHS cares for people with heart attacks[20]. Data are collected on two types of heart attack. The first is ST-elevation myocardial infarction (STEMI). Primary PCI, where blocked arteries are mechanically re-opened with a balloon catheter is the best treatment for this if provided within a short time window. Minimising delay before pPCI is administered is critical. The second type of heart attack is the non STEMI (nSTEMI). These do not require immediate pPCI. However outcomes are better for people admitted onto cardiac care units and who then receive angioplasty.

The table below shows the speed of treating STEMI patients with pPCI, and the proportion of patients admitted to specialist Heart Attack Centres.

[20] MINAP. How the NHS cares for patients with heart attack: annual public report, April 2011 – March 2012. Myocardial Ischaemia National Audit Project 2012.

Table 8: Access to primary PCI following a STEMI

Table: Primary PCI and admission to heart attack centres for STEMI patients

	Primary PCI <90mins of arrival at Heart Attack Centre		Primary PCI <120mins of calling for help		% of patients with direct admission to Heart Attack Centre	
Acute trust	**2010/11**	**2011/12**	**2010/11**	**2011/12**	**2010/11**	**2011/12**
Basingstoke & N Hampshire	94%	99%	87%	89%	100%	97%
Frimley Park Hospital	76%	92%	54%	76%	75%	83%
Queen Alexandra Hospital, Portsmouth	88%	79%	54%	53%	79%	72%
Royal Bournemouth General Hospital	92%	79%	76%	62%	93%	98%
Southampton General Hospital	92%	93%	62%	61%	88%	85%
England: overall	90%	92%	59%	62%	79%	79%

Prompt access to pPCI for Hampshire patients is generally favourable when compared to English STEMI patients in general. The exception appears to be Queen Alexandra Hospital (part of Portsmouth Hospitals Trust) where rates for pPCI in under 90 minutes, 120 minutes, and the percentage of patients admitted to the trust's Heart Attack Centre were lower than the national average. Performance at the trust against the MINAP indicators deteriorated between 2010/11 and 2011/12. Basingstoke and North Hampshire Hospitals had the shortest times to pPCI and almost all patients (97%) being admitted into their Heart Attack Centre in 2011/12.

The quality of care for nSTEMI patients is monitored in MINAP through patients accessing a cardiologist or their team, being referred onto a cardiac unit and being referred for angiography. Other quality indicators recorded through the cardiologist professional routes ensure that those doctors delivering a pPCI service are having adequate exposure to doing the intervention to perform Figures are shown in table 9.

Table 9: Quality markers monitored through MINAP

Table: Care of patients with nSTEMI

	nSTEMI patients seen by a cardiologist or member of team		nSTEMI patients admitted to cardiac unit or ward		nSTEMI patients that were referrred for or had angiograph	
Acute trust	**2010/11**	**2011/12**	**2010/11**	**2011/12**	**2010/11**	**2011/12**
Basingstoke & N Hampshire	99%	95%	43%	73%	81%	73%
Frimley Park Hospital	95%	99%	40%	37%	87%	84%
Queen Alexandra Hospital, Portsmouth	100%	100%	16%	18%	78%	84%
Royal Bournemouth General Hospital	97%	97%	89%	95%	90%	90%
Southampton General Hospital	98%	99%	79%	82%	80%	76%
England: overall	91%	93%	67%	72%	45%	58%

MINAP data less complete for nSTEMI than STEMI. More likely to be entered if admitted to cardiac unit.

Hampshire nSTEMI patients are more likely to be seen by a cardiologist, or member of a cardiologist's team, than is the case nationally. At Queen Alexandra Hospital all nSTEMI patients had seen a member of the cardiology team. Only Royal Bournemouth General Hospital and Southampton General Hospital had higher rates of admission onto cardiac units than the national average. Other trusts fell well below the national average. In particular on 18% of Queen Alexandra patients were admitted onto a cardiac unit in 2011/12 compared to 72% nationally. (This may partly be the result of Queen Alexandra being better at entering the results of nSTEMI patients who are not admitted onto a cardiac unit than is the case nationally). All local acute trusts had higher referral rates for angiography than the national average.

4.4 Cardiac rehabilitation

People who have had any recent cardiac event benefit from cardiac rehabilitation (CR). The CHD National Service Framework[21] recommended that 85% of people who have had a myocardial infarction (MI), percutaneous coronary intervention (PCI, a surgical intervention to increase or restore blood flow through cardiac arteries) and coronary artery bypass graft (CABG, heart bypass surgery) should receive CR. Once that target had been achieved CR should be made available to heart failure patients and others with CVD.

We do not have Hampshire data regarding access to CR, but national figures through the 2012 National Audit of Cardiac Rehabilitation[22] show that between April 2010 and March 2011 uptake of CR for MI, PCI and CABG patients increased from 42% to 44%. 70% of people participating in CR were men, suggesting a possible disadvantage in access for women. The more co-morbidities patients had the worse outcomes were, including higher rates of anxiety and depression. Only half the teams providing CR included a dietician, and only a tenth a psychologist.

5. User views

Local user views available for CVD come from satisfaction surveys following NHS Health Checks. Satisfaction surveys are sent to 25% of people who have had a Health Check. Results from the first 1,288 self-selecting responders showed that 79.7% thought that the Health Check met their expectations while 9.5% did not. 83.5% felt that their risk of CVD had been explained in a way that made sense. 57.2% felt that their Health Check prompted them to improve their lifestyle, though almost a quarter (23.4%) felt it did not. Following their Health Check 36.2% were doing more exercise and 46.9% were eating more healthily. Only 3% had stopped smoking without the support of smoking cessation services.

[21] Department of Health. Coronary heart disease national services framework. Department of Health, March 2000.
[22] British Heart Foundation. 2012 National audit of cardiac rehabilitation. BHF, 2013. http://www.bhf.org.uk/pdf/NACR_Report_Final_2012.pdf Last viewed 22/5/13.

6. Evidence of what works

6.1 Clinical effectiveness evidence

There is a wealth of clinical evidence around the prevention and treatment of CVD. The real challenge is to implement existing best practice and to ensure services are affordable. The Department of Health produced a Cardiovascular Disease Outcomes Strategy in 2013. This strategy follows up the CHD National Service Framework, but with a greater emphasis on doing what is affordable, or better still cost saving. Compared with the CHD National Service Framework there is more prominence given to recognising common risk factors for CVD, a broader understanding of what is included under CVD, a greater emphasis on the need for prevention and early intervention, more up to date recommendations around acute care, and greater emphasis on cardiac rehabilitation. A useful summary of the strategy's priorities and their potential costs and benefits is provided in Annex A of the strategy.

Three interventions with a strong evidence base which may have not been a sufficient focus in the past are:

- Hypertension: this major risk factor for CVD is also thought to be the most under diagnosed cardiovascular disease with an estimated 223,870 undiagnosed people with hypertension in Hampshire. NICE published a guideline on its management in 2011[23], the implementation of which would make an important contribution to cardiovascular health.
- Peripheral Arterial Disease: 20% of people aged over 60 years have some form of PAD. Outcomes are sub-optimal because of late identification and treatment. Prompt treatment prevents secondary cardiovascular events, improves quality of life and may prevent amputation. NICE's most cost effective care pathway has a cost per QALY of £16,000[24]. However routine data are not available for PAD making it difficult for commissioners to identify what improvements are needed in current services.
- Familial hypercholesterolaemia. Hampshire CCGs are among the first to implement a FH service in England. The success of the programme will depend on the quality of implementation and engagement from GPs.

6.2 Cost effectiveness evidence

Circulatory disease is one of the most costly areas of NHS spend in Hampshire. The 2010/11 programme budget analysis for Hampshire PCT showed that circulatory disease was the third highest spending programme with a budget of £147 million[25], though with spend on musculoskeletal poised to overtake. Mental health was the highest spending programme with a budget of £218 million followed by social care with a budget of £156 million. Spending on cancer was £116 million. Part of the costs of CVD relate to its impact on the cost of emergency care. The Nuffield Trust[26] identified the top five most costly emergency events for a typical English GP practice

[23] http://www.nice.org.uk/CG127 Last viewed 20/5/13.
[24] NICE. Clinical Guideline 147. Lower limb peripheral arterial disease: diagnosis and management. NICE, 2012.
[25] Director of Public Health. Hampshire director of public health annual report: programme budgeting and diabetes. NHS Hampshire, 2011.
[26] Thorlby R. Reclaiming a population health perspective: future challenges for primary care. Nuffield Trust, April 2013.

with 10,000 registered patients. Three out of five were cardiovascular events (table 10).

Table 10: Most costly single emergency events by tariff for a typical GP practice with 10,000 patients (Nuffield Trust)

Emergency event	Tariff	Number expected per 10,000	Total cost
EB01Z Non-interventional acquired cardiac conditions, 19 years and over	£836	48	£40,128
AA22Z Non-transient stroke or cerebrovascular accident, nervous system infections or encephalopathy	£4,348	6	£26,088
AA26Z Muscular, balance, cranial or peripheral nerve disorders; epilepsy; head injury	£1,571	14	£21,994
FZ35C General abdominal disorders without clinical complications	£991	22	£21,802
EB10Z Actual or suspected myocardial infarction	£3,872	5	£19,360

To manage successfully the increasing pressure on NHS and social care budgets it is critical to ensure that CVD services provide best value for money. Well-designed CVD prevention and behaviour change interventions are highly cost effective, or even cost saving. The NHS Health Check has become a mandated Public Health service partly because the Department of Health calculated a cost per QALY of £2,142[27], well below the NICE threshold for cost effectiveness of £20,000 per QALY. Familial hypercholesterolaemia cascade testing is even better value at £1,376 per QALY[28]. Brief interventions by general practice staff can be particularly cost effective. NICE[29] examined interventions to increase physical activity, all of which were highly cost effective. The most cost effective was an exercise prescription compared to advice only; £20.19 per QALY; though brief interventions in primary care were also cost effective. Health England[30] considered 14 health improvement interventions of which six were cost saving. Of those that could be provided in general practice brief smoking cessation interventions delivered in a GP practice saves £2,169 per QALY. Brief alcohol interventions in general practice saves £750 per QALY and brief interventions to promote physical activity saves £2,151 per QALY. Spending a higher proportion of CVD budgets on prevention would be highly cost effective.

The Cardiovascular Disease Outcomes Strategy provides evidence that the following interventions are cost effective: NHS Health Check, identification of FH, management of AF, management of obesity with bariatric surgery, management of PAD, cardio-pulmonary resuscitation, reducing treatment time for STEMI, ensuring

[27] http://www.nhshealthcheck.nhs.uk/default.aspx?aID=18 Last viewed 20/5/13.
[28] Allaby M, Griffin M. Implementation of the NICE clinical guideline CG71 on familial hypercholesterolaemia: a report for the South Central Cardiovascular Network. October 2009, Public Health Resources Unit.
[29] NICE. Four commonly used methods to increase physical activity: brief interventions in primary care, exercise referral schemes, pedometers and community-based exercise programmes for walking and cycling. NICE, March 2006.
[30] Matrix Insight. Prioritising investments in preventative health. Health England, September 2009.

non-STEMI patients are seen by a cardiologist or member of a cardiology team, reduced variation in length of stay for angiography patients, thrombolysis for stroke, stroke early supported discharge, and cardiac rehabilitation. The following interventions are potentially cost saving: reducing lifestyle risks, management of chronic HF, management of diabetic foot, non-elective cardiac care, and 24/7 TIA services. CCGs and hospital trusts are likely to already be implementing some recommendations in the Cardiovascular Disease Outcomes Strategy. Commissioners and providers should complete a gap analysis between current provision and the strategy's recommendations. It may be particularly helpful to ensure that all potentially cost saving interventions are been implemented.

7. Recommendations

- Implement Making Every Contact Count across the NHS and social care if Hampshire three pilots are successful.
- Encourage GP practices to maximise uptake of NHS Health Check.
- CCGs should consider gender inequalities in accessing timely services as part of their commissioning strategies, particularly in stroke prevention.
- CCGs should evaluate cardiac rehabilitation in Hampshire in line with national guidance and ensure that all cardiac rehabilitation providers are participating in the national audit.
- Increase access to palliative care for CVD patients.