Supplementary appendix for the Polish model [posted as supplied by authors]

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1. The Polish IMPACT model: introduction and detailed methodology

The tables included in this supplementary appendix document provide details about the methods that were used in creating the Polish IMPACT model. This model examines the effects of changes in treatments and risk factors trends on changes in mortality from coronary heart disease (CHD) among Polish adults aged 25-74 years. Earlier versions of the IMPACT mortality model have been previously applied to data from Europe, USA, New Zealand and China.[1-7] This cell-based mortality model, developed in Microsoft Excel, has been described in detail online and elsewhere[3 4]

Changes in mortality rates from CHD, Poland 1991-2005

Data sources used in examining the changes in mortality rates from 1991 to 2005 among Polish adults aged 25-74 years are shown in Table 2. Mortality rates from CHD were calculated using the underlying cause of death: International Classification of Diseases (ICD)-9 codes 410-414 and ICD-10 codes I20-I25. Both unadjusted and age-adjusted mortality rates were calculated. Age-standardization was done using the direct method based on the Polish population in 2005.

Official statistical data on deaths due to the coronary heart disease in Poland in 1991–2005 are not consistent because of the changes in the coding system introduced after 1996. Between 1996 and 1999, the number of deaths due to CHD increased considerably, while the number of deaths due to atherosclerosis decreased. This is most probably a bias, because before 1996 many of CHD cases were coded as “Atherosclerosis”. This problem was fixed by developing method of estimation of real CHD trends. This method and entire problem were described in separate paper[8]

Expected and *observed* number of deaths from CHD

The data sources needed to estimate the expected and observed number of deaths from CHD for 2005 are shown in Table 2. The expected number of deaths from CHD in 2005 was calculated by multiplying the age-specific mortality rates from CHD in 1991 by the population counts for 2005 in that age-stratum. Summing over all age strata then yielded the *expected* numbers of deaths from CHD. The difference between the number of *expected* and *observed* number of deaths from CHD represents the mortality fall, the total number of *deaths prevented or postponed* (**DPPs**) from the combined changes in treatment patterns and risk factor prevalence.

Treatments

The treatment arm of the Model includes the following populations of patients:

- those hospitalized with an acute myocardial infarction (AMI),
- patients admitted to the hospital with unstable angina,
- community-dwelling patients who have survived an AMI,
- patients who have undergone revascularisation procedure (coronary artery bypass grafting (CABG), or a percutaneous transluminal coronary angioplasty (PTCA), with or without stent.
- community-dwelling patients with angina pectoris (no revascularisation)
- patients admitted to hospital with heart failure,
- community-dwelling patients with heart failure (no hospital admission).
- Hypertensive individuals eligible for hypotensive therapy
- Hypercholesterolaemic subjects eligible for cholesterol lowering therapy

The main data sources used to estimate the numbers of these groups are shown in Table 2. For each of the groups, we estimated the number of DPPs that were attributable to various treatments. A listing of the treatments that were considered in the model and the data sources used to estimate the percentages of patients receiving treatments are shown in Tables 3 and 4.

The general approach to calculating the number of DPPs from an intervention among a particular patient group was first to stratify by age and sex, then to multiply the estimated number of patients in the year 2005 by the proportion of these patients receiving a particular treatment, by the 1-year case-fatality rate, and by the relative reduction in the case-fatality rate due to the administered treatment. Sources for estimates of efficacy (relative risk reductions) are shown in Table 3. Sources for treatment uptakes are shown in Table 4.
Age-specific case-fatality rates for each patient group are presented in Table 5.

We assumed that compliance (concordance)**,** the proportion of treated patients actually taking therapeutically effective levels of medication, was 100% among hospital patients, 70% among symptomatic community patients, and 50% among asymptomatic community patients[9] [10].

All these assumptions were tested in subsequent sensitivity analyses.

EXAMPLE 1: estimation of DPPs from a specific treatment

For example, in Poland, in 2005, approximately 12 230 men aged 55-64 were hospitalized with acute myocardial infarction (AMI). The expected age-specific 1-year case-fatality rate without treatment for this group was approximately 5.4%. From registry data[11] 96% of them were given aspirin or other antiplatelet drug, interventions with an expected mortality reduction of 15%. the number of deaths prevented or postponed for at least a year by the use of aspirin among men aged 55 to 64 were then calculated as:

$$12\,230 \times 0.054 \times 0.96 \times 0.15 = 95$$

This calculation was then repeated

a) for men and women in each age group, and

b) incorporating a Mant and Hicks adjustment for multiple medications

c) using maximum and minimum values for each parameter in each group, to generate a sensitivity analysis (see below).

Risk factors

The second part of the IMPACT model involves estimating the number of coronary heart disease DPPs related to changes in cardiovascular risk factor levels in the population. The Polish IMPACT model includes smoking, total cholesterol, systolic blood pressure, body mass index, diabetes, and physical activity. Data sources used to calculate the trends in the prevalence (or mean values) of the specific risk factors are shown in Table 2.

Two approaches to calculating DPPs from changes in risk factors were used.
In the **regression approach**—used for systolic blood pressure, total cholesterol, and body mass index--the number of deaths from CHD occurring in 1991 (the base year) were multiplied by the absolute change in risk factor prevalence, and by a regression coefficient quantifying the change in CHD mortality that would result from the change in risk factor level. Natural logarithms were used, as is conventional, in order to best describe the log-linear relationship between changes in risk factor levels and mortality.

EXAMPLE 2: estimation of DPPs from risk factor change using regression method:

Mortality fall due to reduction in systolic blood pressure in women aged 55-64

For example, in 1991, there were 2534 CHD deaths among women aged 55-64 years. Mean systolic blood pressure in this group decreased by 5.4 mmHg between 1991 and 2005. The meta-analysis reports an estimated age- and sex-specific reduction in mortality of 50 percent for every 20 mmHg reduction in systolic blood pressure, generating a logarithmic coefficient of –0.035[12]. The number of deaths prevented or postponed was then estimated as:

[deaths in 1991] * (1-EXP(coefficient*change)

= 2534 (1-EXP(-0.035*5.4)) = 436

This calculation was then repeated

a) for men and women in each age group, and

b) using maximum and minimum values in each group, to generate a sensitivity analysis.

Data sources for the number of CHD deaths are shown in Table 2, sources for the population means of risk factors are shown in Table 2, and sources for the coefficients used in these analyses are listed in Table 6.

EXAMPLE 3: estimation of DPPs from risk factor change using PARF method

The **population-attributable risk factor (PARF) approach** was used for smoking, diabetes, and physical activity. PARF was calculated conventionally as

(P x (RR-1)) / (1+P x (RR-1))

where P - prevalence of the risk factor and RR - the relative risk for CHD mortality associated with that risk factor. To assess the decline in CHD mortality the number of coronary heart disease deaths in 1991 (the base year) was multiplied by the difference between the population-attributable risk fraction in 1991 and that in 2005.

For example, the prevalence of diabetes among women aged 65-74 years was 8.7% in 1991 and 12.9% in 2005. Assuming a Relative Risk of 2.59[13], the PARF was ~0.1215 in 1991 and ~0.1702 in 2005. Assuming the number of CHD deaths in 1991 = 7 180, The number of deaths attributable to the increase in diabetes prevalence from 1991 to 2005 was therefore

(7 180) * (0.170 - 0.122) = ~350 DPPs

This calculation was then repeated

a) for men and women in each age group, b) for physical inactivity and smoking

c) using maximum and minimum values in each group, to generate a sensitivity analysis

Data sources for the prevalence of risk factors and for the number of CHD deaths are shown in Table 2. Sources for the relative risks used in these PARF analyses are listed in Table 7. All come from the InterHeart study[13], the largest international study to provide *independent* RR values, adjusted for other major risk factors.

The rationale for choosing the regression or PARF approaches for specific risk factors in the Polish IMPACT Model is detailed in Table 8.

OTHER METHODOLOGICAL CONSIDERATIONS

Several methodological issues will be discussed below. These include adjusting the relative reduction in case-fatality rate for patients receiving multiple treatments, establishing rules for avoiding double-counting individual patients who may fall into more than a single disease category (patient group), treatment overlaps, and sensitivity analyses.

POLYPHARMACY ISSUES

Individual CHD patients may take a number of different medications. However, data from randomized clinical trials on efficacy of treatment combinations are sparse. Mant and Hicks suggested a method to estimate case-fatality reduction by polypharmacy[14]. This approach was subsequently endorsed by Yusuf[15] and Law and Wald[16].

EXAMPLE 4: estimation of reduced benefit if patient taking multiple medications (Mant and Hicks approach)

If we take the example **of secondary prevention following acute myocardial infarction,** good evidence (Table 3) suggests that, for each intervention, the relative reduction in case fatality is approximately: aspirin 15%, beta-blockers 23%, ACE inhibitors 20%, statins 22% and rehabilitation 26%. The Mant and Hicks approach suggests that in individual patients receiving all these interventions, case-fatality reduction is very unlikely to be simply additive, i.e. not **106%** (15% + 23%+ 20% + 22% + 26%). Instead, having considered the 15% case fatality reduction achieved by aspirin, the next medication, in this case a beta-blocker, can only reduce the **residual** case fatality (1-15%). Likewise, the subsequent addition of an ACE inhibitor can then only decrease the **remaining** case fatality, which will be 1 - [(1-0.15) X (1-0.23)].

The **Mant and Hicks approach** therefore suggests that a **cumulative relative benefit** can be estimated as follows:

Relative Benefit = 1 - [(1-relative reduction in case-fatality rate for treatment A) X (1- relative reduction in case-fatality rate for treatment B) X ...X (1- relative reduction in case-fatality rate for treatment N).

In considering appropriate treatments for AMI survivors, applying relative risk reductions (RRR) for aspirin, beta-blockers ACE inhibitors statins and rehabilitation then gives:

Relative Benefit = 1 - [(1 –aspirin RRR) X (1 - beta-blockers RRR) X (1 - ACE inhibitors RRR) X (1- statins RRR) X (1- rehabilitation RRR)]

= 1 - [(1- 0.15) X (1-0.23) X (1-0.20) X (1- 0.22) X (1- 0.26)]

= 1 - [(0.85) X (0.77) X (0.80) X (0.78) X (0.74)]

= 0.70 i.e. a 70% lower case fatality

This represents a **34%** relative reduction (0.70/1.06) on the simple additive value of **106%.**

Potential overlaps between patient groups: avoiding double counting

There are potential overlaps between CHD patient groups (Table 9).

For example, approximately half the patients having CABG surgery have a previous AMI[17], approximately 25% of AMI survivors develop heart failure within 12 months[18], and over 50% of CHD patients have a history of hypertension[19]. All these assumptions were tested in subsequent sensitivity analyses.

SENSITIVITY ANALYSES

Because of uncertainties surrounding many of the values, a multi-way sensitivity analysis was performed using the analysis of extremes method[20]. For each model parameter, a lower and upper value was assigned using either 95% confidence intervals where available (for instance therapeutic effectiveness quantified as a relative risk reduction in the relevant meta-analyses), or otherwise plus or minus 20%.

An analysis of extremes was therefore performed whereby the maximum and minimum feasible values were fed in to the model. By multiplying through, the resulting product then generated maximum and minimum estimates for deaths prevented or postponed (Table below).

EXAMPLE: sensitivity analysis for AMI patients given aspirin

An example of calculating lower and upper-bound estimates for DPPs for treatment with aspirin among men aged 55-64 years who were hospitalized with an AMI is presented here. 95% confidence intervals from the meta-analysis were used for relative mortality reduction; lower and upper bound estimates for the other parameters were calculated as minus or plus 20% [except for treatment uptake that was capped at 99%]. Multiplying all the lower-bound estimates yielded the minimum [lower bound] estimate and multiplying the upper-bound estimates yielded the maximum [upper bound] estimate.

Table 1. Example of sensitivity analysis.

	Patient numbers	Treatment Uptake	Relative Mortality Reduction*	One year case fatality	Deaths prevented or postponed
	A	**B**	**C**	**D**	**(A x B x C x D)**
Best Estimate	12 226	0.96	15%	5.4%	95
Minimum estimate	9 781	0.77	11%*	4.3%	36
Maximum estimate	14671	0.99	19%*	6.5%	179

* 95% CI from the Antithrombotic Trialists' Collaboration meta-analysis[21], see Table 3.

This approach may be described as a "robust" approach for two reasons.
a) maximum and minimum values for each variable were deliberately forced to provide a wider range rather than a narrower one, e.g. relative mortality reduction $\pm$20% rather than say, $\pm$10%.

b) the resulting product, for instance the minimum estimate, was generated by assuming that the lowest feasible values all occurred at the same time, a most unlikely situation.

2. Sources of data used in Polish IMPACT Model

Table 2. Main Data Sources for the Parameters Used in the Polish IMPACT Model

	1991	2005
Population statistics (number)	Central Statistical Office	Central Statistical Office
Deaths by age and sex (number)	NIPH (ICD-9 codes 410-414)*	NIPH (ICD-10 codes I20-25)
Number of patients admitted yearly		
Myocardial infarction: ICD9: 410 ICD 10: I21	NIPH	NIPH
Angina pectoris: ICD9: 413 ICD10: I20	NIPH	NIPH
Heart failure: ICD10: I50	NIPH	NIPH
Number of patients treated with		
CABG:	KROK	KROK
PTCA:	Assume zero	PL-ACS
Cardiopulmonary resuscitation in the community		
Numbers & Uptake		
Uptake	Assume 1% of admitted AMI patients	Rudner et al[22]
Acute myocardial infarction		
Hospital Resuscitation	Assume 2% of admitted AMI patients	PL-ACS, NIPH
Thrombolysis	MONICA	PL-ACS, NIPH
Primary angioplasty	Assume zero	PL-ACS, NIPH
Aspirin	MONICA	PL-ACS, NIPH
Beta blockers	MONICA	PL-ACS, NIPH
ACE inhibitors	MONICA	PL-ACS, NIPH
Primary CABG surgery	Assume zero	PL-ACS, NIPH
Primary PTCA (angioplasty)	Assume zero	PL-ACS, NIPH
Angina pectoris: unstable		
Prevalence	Extrapolated	NIPH
Platelet IIB/IIIA Inhibitors	Assume zero	PL-ACS
Aspirin alone	Expert opinion	PL-ACS
Aspirin & Heparin	Expert opinion	PL-ACS
Primary CABG surgery	Assume zero	PL-ACS, KROK

Primary PTCA (angioplasty)	Assume zero	PL-ACS
Secondary prevention following AMI		
Aspirin	Pol-MONICA	WOBASZ, SPOK
Beta blockers	Pol-MONICA	WOBASZ, SPOK
ACE inhibitors	Assume zero	WOBASZ, SPOK
Statins	Assume zero	WOBASZ, SPOK
Warfarin	Assume zero	WOBASZ
Secondary prevention following CABG or PTCA		
Aspirin	Assume zero	WOBASZ
Beta blockers	Assume zero	WOBASZ
ACE inhibitors	Assume zero	WOBASZ
Statins	Assume zero	WOBASZ
Warfarin	Assume zero	WOBASZ
Rehabilitation	Assume zero	EUROASPIRE
Congestive Heart Failure		
ACE inhibitors	Assume zero	HF2005
Beta blockers	Assume zero	HF2005
Spironolactone	Assume zero	HF2005
Aspirin	Assume zero	HF2005
Statins	Assume zero	HF2005
Treatment for chronic angina		
CABG surgery	KROK	NHDS
PTCA (angioplasty)	Assume zero	NHDS
Community angina pectoris: total		
Prevalence		WOBASZ
Aspirin	Assume zero	WOBASZ
Statins	Assume zero	WOBASZ
Community Chronic heart failure		
Prevalence		Expert opinion, Spanish data
ACE inhibitors	Assume zero	HF2005
Beta blockers	Assume zero	HF2005
Spironolactone	Assume zero	HF2005
Aspirin	Assume zero	HF2005
Statins	Assume zero	HF2005
Hypertension		
Prevalence	NATPOL II (1996)	WOBASZ
Treated (%)	NATPOL II (1996)	WOBASZ

Statins etc for primary prevention		
Hypercholesterolemia (%)	not needed	WOBASZ
Treated (%)	Assume zero	WOBASZ
POPULATION RISK FACTOR PREVALENCE		
Current smoking	Central Statistical Office	Central Statistical Office
Systolic blood pressure	NATPOL 1997 (extrapolated to 1991)	WOBASZ
Cholesterol	MONICA	MONICA
Physical activity	NATPOL 1997 (extrapolated to 1991)	WOBASZ
Obesity (BMI)	NATPOL 1997 (extrapolated to 1991)	WOBASZ
Diabetes	NATPOL 1997 (extrapolated to 1991)	WOBASZ

Key:
ACE denotes angiotensin-converting enzyme, AMI acute myocardial infarction, CABG coronary artery bypass graft surgery, GUS – Central Statistical Office, HF2005 – Multicenter Study of Heart Failure Treatment in Poland (2005), ICD International Classification of Diseases, KROK – Cardiosurgery Registry, NATPOL – set of country representative cardiovascular risk factors surveys, NIPH – National Institute of Public Health, PL-ACS Polish Acute Coronary Syndromes Registry, PTCA percutaneous transluminal coronary angioplasty, SPOK – Study on quality of secondary prevention of myocardial infarction in Poland, WOBASZ – Multicenter Study on Health of Polish Citizens.

*corrected for change in death registry system[8],

Table 3. Clinical efficacy of interventions: relative risk reductions obtained from meta-analyses, and randomised controlled trials*

TREATMENTS	**Relative Risk Reduction** (95% CI)	**Comments**	**Source paper: First author (year), notes**
Acute myocardial infarction			
Thrombolysis	31% (95% CI: 14, 45)	<55 yrs: OR=0.692; RRR=30.8 (95% CI: 14-45) 55-64 yrs: OR=0.736; RRR=26.4 (95% CI: 17-40) 65-74 yrs: OR=0.752; RRR=24.8 (95% CI: 15-37) >75 yrs: OR=0.844; RRR=15.6 (95% CI: 4-30)	Estess(2002)[23], [updated FTT]
Aspirin	15% (95% CI: 11, 19)	OR=0.85 (95% CI: 0.81, 0.89). RRR 15% (95% CI: 11,19) page 75:outcome is vascular and nonvascular deaths	Antithrombotic Trialists' Collaboration (2002)[21]
Primary angioplasty STEMI	32% (95% CI: 5, 50)	OR 0.68 (95% CI: 0.50, 0.95). RRR 32% (95% CI: 5,50) outcome compares primary angioplasty to thrombolytics, not specific to STEMI, in results on page 3.	Cucherat (2003)[24]
Primary PTCA Non-STEMI	32% (95% CI: 5, 51)	OR 0.65 (95% CI: 0.49, 0.95). RRR 32% (95% CI: 5,51) for cardiovascular death on page 917. [RRR for cardiovascular death or MI was 26 (95% CI: 3,44) and was 24 (95% CI: 0,42) for any death]	RITA 3 (Fox 2005)[25]
Primary CABG surgery	39% (95% CI: 23, 52)	OR 0.61 (95% CI: 0.48, 0.77). RRR 39% (95% CI: 23,52) on page 565, 0-5 yr mortality	Yusuf (1994)[26]

Beta blockers	4% (95% CI: -8, 15)	OR 0.96 (95% CI: 0.85, 1.08), RR 4% (95% CI: -8,15) on page 1732.	Freemantle (1999)[27]
ACE inhibitors	7% (95% CI: 2, 11)	OR 0.93, (0.89, 0.98), RR 7% (2,11) for 30 day mortality in MI.	ACE Inhibitor Myocardial Infarction Collaborative Group 1998[28]
Cardio-pulmonary resuscitation (CPR)			
Community CPR	5% (95% CI: 4, 15.3)	Nichol study reports overall median survival to discharge at 7.4% in this multi-country/site review, page 520 The Model focuses on 30/7 survival. Discharge survival will therefore provide an over-estimate, which we have explicitly addressed by assuming 5% at 30/7. Rea looks at odds of bystander dispatcher assisted CPR and bystander CPR without dispatch assistance and compares to No bystander CPR. 7265 out-of-hospital arrests attended. OR 0.59 - 0.69 for these two groups which would give RRRs of 41% and 31%. [Consider as crude equivalent of CPR to no CPR comparison]. 15.3% survival to discharge in King-county, WA; consider as maximum value. Use Nichol (1999)[28] 5% as average Rudner reports 10% survival to discharge and 6% after 1 year in Katowice Poland. Assumed worse in whole Poland Graham et al 1999 meta anlysis of papers 1973 - 1996 report 6.4% at discharge.	Nichol (1999)[29] Rea (2001)[30] Rudner (2004)[22]
Hospital CPR	33% (95% CI: 10, 36)	AMI accounted for 35% of adult total cases. Adult survival to discharge 36% post VF or VT (majority of post AMI cases, only 10.6% post Asystole, Adult survival to discharge 18% overall, but this reflected	Nadkarni (2006)[31] Tunstall-Pedoe(1992)[32]

		ALL Medical arrests in hospital. (varied from 10-36% depending on type of initial rhythm) (tables 4 & 5 page 55) Review of 36,000 adults with cardiac arrests in the 253 US/Canadian Hospitals National Registry of CPR. Nadkarni, JAMA, 2006:295 (1) 50-57) Older article from Tunstall-Pedoe on page 1350 shows survival at 24 hrs to be 32%, discharge to home at 21%, and 1 year survival to be 15% overall. (16% and 8% in general wards, 31% and 16% in coronary care unit (page 1349), etc. Assume in Poland in 2005 is better. Corroboration: Model assumes that approximately 2% AMI admissions have primary VF (Olmsted County study).	
Secondary Prevention in CHD Patients			
Aspirin	15% (95% CI: 11, 19)	OR 0.85 (95% CI: 0.49, 0.95), RR 15% (95% CI: 11, 19) outcome is vascular and nonvascular deaths on page 75. This data seems to be appropriate to this outcome in CHD patients	Antithrombotic Trialists' Collaboration (2002)[21]
Beta blockers	23% (95% CI: 15, 31)	OR 0.77 (95% CI: 0.85, 0.69), 23% (95% CI: 15,31) on page 1734. Odds of death in long term trials.	Freemantle (1999)[27]
ACE inhibitors	20% (95% CI: 13, 26)	OR 0.80 (95% CI: 0.74, 0.87), 20% (95% CI: 13,26) on page 1577, death up to 4 years [endpoint of study looking at those with heart failure or LV dysfunction.]	Flather (2000)[33]
Statins	22% (95% CI: 10, 26)	OR=0.78 (95% CI: 0.74—0.84). RRR=22% (95% CI: 10, 26) RR=0.77 (95% CI: 0.68—0.87). RRR=23% (95% CI: 13,30) in those with other CHD	Cholesterol Treatment Trialists' Collaborators (2005)[34]

		OR=0.77 (95% CI: 0.71-0.83). RRR=23% (95% CI: 17, 29) Wilt (2004) Section CHD mortality, page 1430.	Wilt (2004)[35]
Warfarin	22% (95% CI: 13, 31)	OR=0.78 (95% CI: 0.67-0.90), RRR=22% (95% CI: 10, 33) Meta-analysis looking at oral anticoagulant therapy in coronary artery disease (31 trials about 18,000 patients) by intensity of INR control: High intensity (INR>2.8) warfarin vs. control for outcome of death had OR of 0.78(95% CI: 0.69-0.87) corresponding to a RRR of 22% (95% CI: 13, 31); Moderate intensity warfarin (INR 2-3.0) vs. control had OR of 0.82 (95% CI: 0.23-2.33) not significant but corresponding RRR of 18% (95% CI: -133, 77)	Anand and Yusuf (1999)[36] Lau (1992)[37]. Table 1, page 253 (anticoagulants).
Chronic Angina			
CABG surgery years 0-5	39% (95% CI: 23, 52)	OR= 0.61 (95% CI: 0.48-0.77), RR 39% (95% CI: 23,52) on page 565, 5 yr mortality	Yusuf (1994)[26]
CABG surgery years 6-10	32% (95% CI: 2, 30)	OR= 0.83 (95% CI: 0.70-0.98), RR 17 (95% CI: 2,30) on page 565, 10 yr mortality OR= 0.68 (95% CI: 0.56-0.83), RR 32 (95% CI: 17,44) on page 565, 7 yr mortality CABG compared to medical treatment	Yusuf (1994)[25]

Aspirin	15% (95% CI: 11, 19)	OR= 0.85 (95% CI: 0.81-0.89), RR 15% (95% CI: 11,19) outcome is vascular and nonvascular deaths on page 75.	Antithrombotic Trialists' Collaboration (2002)[21]
Statins	**22%** (95% CI: 10-26)	RR=0.78 (95% CI: 0.74—0.84). RRR=22% (95% CI: 10, 26) RR=0.77 (95% CI: 0.68—0.87). RRR=23% (95% CI: 13,30) in those with other CHD	Cholesterol Treatment Trialists' Collaborators (2005)[33]
Unstable Angina			
Aspirin alone	15% (95% CI: 11, 19)	OR= 0.85 (95% CI: 0.81-0.89), RR 15% (95% CI: 11,19) outcome is vascular and nonvascular deaths on page 75. Assume appropriate for unstable angina patients	Antithrombotic Trialists' Collaboration (2002)[12]
Aspirin & Heparin	33% (95% CI: -2,56)	OR 0.67 (95% CI: 0.48,1.02) RR 33% (95% CI: -2, 56) in table 2. The study outcome is composite MI death and non fatal MI, compares those on ASA+Hep to ASA only	Oler (1996)[38] .
Platelet glycoprotein IIB/IIIA inhibitors	9% (95% CI: 2,16)	RR 0.91 (95% CI: 0.84, 0.98) RR 9% (95% CI: 2,16) study looked at acute coronary syndrome without persistent ST elevation	Boersma (2002)[39]
Primary PTCA Non-STEMI	32% (95% CI: 5-51)	OR 0.68 (95% CI: 0.49, 0.95). RRR 32% (95% CI: 5, 51) for	RITA 3 (Fox 2005)[25] Cardiovascular deaths, table 3
Primary CABG surgery	**43%** (95% CI: 19,60)	OR 0.57 (95% CI: 0.40, 0.81). RR 43% (95% CI: 19,60) reduction in mortality at 5 years in those with class III/IV angina, table 4, page 566.	Yusuf (1994)[26]

Heart failure in patients requiring hospitalisation			
ACE inhibitors	20% (95% CI: 13,26)	OR 0.80 (95% CI: 0.74, 0.87). RR 20% (95% CI: 13,26) on page 1577, [death up to 4 years was study endpoint for those with heart failure or LV dysfunction].	Flather (2000)[33]
Beta blockers	35% (95% CI: 26,43)	OR 0.65 (95% CI: 0.57, 0.74). RR 35% (95% CI: 26,43) : all cause mortality	Shibata (2001)[40]
Spironolactone	30% (95% CI: 18, 41)	OR 0.70 (95% CI: 0.59, 0.82). RR 30% (95% CI: 18,41) in those that had at least one cardiac related hospitalization. [31% (95% CI: 18-42) in entire study population of those with CHF, page 711]	Pitt (1999)[41]
Aspirin	15% (95% CI: 11,19)	OR= 0.85 (95% CI: 0.81, 0.89), RR 15% (95% CI: 11,19) outcome is vascular and nonvascular deaths on page 75.	Antithrombotic Trialists' Collaboration (2002)[21]
Statins	22% (95% CI: 10-26%)	OR=0.78 (95% CI: 0.74, 0.84). RRR=22% (95% CI: 10-26), post AMI OR=0.77 (95% CI: 0.68, 0.87). RRR=23% (95% CI: 13,30) in those with other CHD	Cholesterol Treatment Trialists' Collaborators (2005)[34]
Heart failure in the community			
ACE inhibitors	20%	OR 0.80 (95% CI: 0.74, 0.87). RR 20% (95% CI: 13,26) on	Flather (2000)[33]

	(95% CI: 13,26)	page 1577, death up to 4 years [in those with heart failure or LV dysfunction].	
Beta blockers	35% (95% CI: 26,43)	OR 0.65 (95% CI: 0.57, 0.74). RR 35 (95% CI: 26,43). Section 3.3 page 353	Shibata (2001)[40]
Spironolactone	31% (95% CI: 18, 42)	OR 0.69 (95% CI: 0.58, 0.82). RR 31% (95% CI: 18-42) in entire study population consisting of those with CHF, page 711 [30 (95% CI: 18, 41) in those with a cardiac related hospitalization].	Pitt (1999)[41]
Aspirin	15% (95% CI: 11, 19)	OR= 0.85 (0.81, 0.89), RR 15% (11,19) outcome is vascular and nonvascular deaths on page 75. Assume appropriate for patients with CHF due to CHD	Antithrombotic Trialists' Collaboration (2002)[21]
Statins	22% (95% CI: 10-26%)	OR=0.78 (95% CI: 0.74, 0.84). RRR=22% (95% CI: 10-26) OR=0.77 (95% CI: 0.68, 0.87). RRR=23% (95% CI: 13,30) in those with other CHD	Cholesterol Treatment Trialists' Collaborators (2005)[34]
Hypertension treatment			
	13% (95% CI: 6,19)	OR 0.87 (95% CI: 0.81, 0.94). RRR 13% (95% CI: 6, 19) in those with high blood pressure without disease at entry. [RRR 29% (95% CI: 17, 37) those with average blood pressure and CHD, treated with ACEI]	Law (2003)[42]

Therapies for primary prevention of raised cholesterol			
Statins	35% (95% CI: 11, 52)	OR 0.65 (95% CI: 0.48, 0.89). 35% (95% CI: 11,52) for CHD mortality (only trials using statins), figure 3 on page 4	Pignone (2000)[43]
Gemfibrozil	7% (95% CI: -8, 19)	OR 0.93 (95% CI: 0.81, 1.08); RRR 7% (95% CI: -8, 19)	Studer (2005)[49]
Niacin	5% (95% CI: -10, 18)	OR 0.95 (95% CI: 0.82, 1.10); RRR 5% (95% CI: -10, 0.18)	Studer (2005)[49]

***** Relative Risk Reduction calculated as 1- Odds Ratio

****** Gemfibrozil and Niacin are not widely used in Poland thus removed from model.

Table 4. Data sources for treatment uptake levels in Poland 2005: Medical and surgical treatments included in the model

TREATMENTS	**Treatment Uptake in 2005** ***(weigheted averages for all age strata#)*****; data for 1991 in parentheses**	**Source (year)**
ACUTE MYOCARDIAL INFARCTION		
Thrombolysis	4,3% (10%)	National Registry of Acute Coronary Syndromes (2005) Pol-MONICA (1991)[44]
Antiplatelet	81% (65%)	
Primary angioplasty	39% (0%)	
Primary CABG	1% (0%)	
Beta blockers	64% (38%)	
ACE inhibitors	62%(13%)	
Cardio-pulmonary resuscitation		
In the Community	16%	Rudner (2004)[22]
In Hospital	2%*	Bunch (2003)[45]
SECONDARY PREVENTION (POST-AMI)		
Aspirin	56% (55%)	WOBASZ (2003-2005) Pol-MONICA (1991)
Beta blockers	48% (30%)	WOBASZ (2003-2005) Pol-MONICA (1991)
ACE inhibitors	49% (0%)	WOBASZ (2003-2005)
Statins	35% (0%)	WOBASZ (2003-2005)
Warfarin	3% (0%)	WOBASZ (2003-2005)
SECONDARY PREVENTION (POST-REVASCULARISATION)		
Aspirin	84% (0%)	WOBASZ (2003-2005)
Beta blockers	67% (0%)	WOBASZ (2003-2005)
ACE inhibitors	65% (0%)	WOBASZ (2003-2005)
Statins	66% (0%)	WOBASZ (2003-2005)
Warfarin	7% (0%)	WOBASZ (2003-2005)
CHRONIC ANGINA		
CABG surgery	11% (0%)	National Registry of Cardiosurgery (2005)
Aspirin in community	43% (?%)	WOBASZ (2003-2005)
Statins in community	21% (0%)	WOBASZ (2003-2005)

UNSTABLE ANGINA		
Aspirin & Heparin	58% (10%)	PL-ACS (2005)
Aspirin alone	26% (30%)	PL-ACS (2005)
Platelet glycoprotein IIB/IIIA inhibitors	1% (0%)	PL-ACS (2005)
CABG surgery for UA	1% (0%)	PL-ACS (2005)
Angioplasty for UA	14% (0%)	PL-ACS (2005)
Heart Failure including a hospital admission		
ACE inhibitors	86% (0%)	HF2005
Beta blockers	61% (0%)	
Spironolactone	64% (0%)	
Aspirin	65% (0%)	
Statins	41% (0%)	
Heart Failure in the community		
ACE inhibitors	49% (0%)	HF2005
Beta blockers	46% (0%)	
Spironolactone	27% (0%)	
Aspirin	37% (0%)	
Statins	31% (0%)	
HYPERTENSION TREATMENTS	45% (32%)	WOBASZ (2003-2005) NATPOL (1991)**
HYPERLIPIDAEMIA - 1' PREVENTION		
Statins	11% (0%)	WOBASZ (2003-2005)

Uptake percentages as reported in source papers. Values may differ from those in Table 1 of manuscript, which report weighted averages for ALL age groups 25-84 years included in the Model.

* Assume approximately 2% of AMI admissions have primary ventricular fibrillation (Olmsted county)[51].

** Extrapolated from 1997-2002 data.

Table 5. Age-specific case fatality rates for each patient group

*excluding heart failure patients (already considered within heart failure groups)

GROUP	**AMI**	**Post AMI**	**Unstable Angina**	**CABG surgery**	**Angioplasty**	**Heart Failure *Hospital***	***Community***	**Hypertension**	**Hypercholesteraemia**
Interval	**30 day**	**One year***	**One year***	**One year***	**One year***	**One year**	**One year**	**One year**	**One year**
Mean	0.084	0.051	0.069	0.020	0.016	0.246	0.081	0.010	0.006
MEN									
25-34	*0.011*	0.008	0.016	0.003	0.003	0.034	0.011	0.000	0.000
35-44	*0.012*	0.009	0.024	0.005	0.005	0.068	0.022	0.001	0.001
45-54	*0.023*	0.017	0.034	0.007	0.007	0.096	0.032	0.002	0.002
55-64	*0.054*	0.034	0.056	0.012	0.012	0.140	0.045	0.006	0.006
65-74	*0.101*	*0.073*	0.070	0.023	0.025	0.283	0.093	0.014	0.014
75-84	*0.164*	*0.122*	0.091	0.042	0.042	0.337	0.111	0.035	0.035
85+	*0.279*	*0.189*	0.118	0.075	0.074	0.418	0.138	0.094	0.094
WOMEN									
25-34	*0.011*	*0.004*	*0.016*	*0.003*	*0.003*	0.034	0.011	0.000	0.000
35-44	*0.013*	*0.006*	*0.024*	*0.005*	*0.005*	0.068	0.022	0.001	0.001
45-54	*0.026*	*0.010*	*0.034*	*0.007*	*0.007*	0.096	0.032	0.001	0.001
55-64	*0.061*	*0.019*	*0.056*	*0.012*	*0.012*	0.140	0.045	0.002	0.002
65-74	*0.114*	*0.084*	*0.070*	*0.023*	*0.027*	0.222	0.081	0.007	0.007
75-84	*0.167*	*0.116*	*0.091*	*0.042*	*0.039*	0.289	0.094	0.021	0.021
85+	*0.267*	*0.177*	*0.118*	*0.075*	*0.061*	0.368	0.121	0.079	0.079
SOURCE	**US Medicare**	**US Medicare**	**Van Domberg[46]**	**US Medicare**	**US Medicare**	**US Medicare**	**US Medicare**	**NHANES & Vital Statistics**	

Table 6. Specific Beta Coefficients For Major Risk Factors: Data sources, values and comments.

Estimated β coefficients from multiple regression analyses for the relationship between absolute changes in population mean risk factors and % changes in coronary heart disease mortality for men and women, stratified by age.

	Age groups (years)				
SYSTOLIC Blood Pressure	25-44	45-54	55-64	65-74	75-84
Men (hazard ratio per 20 mmHg)	**0.49**	**0.49**	**0.52**	**0.58**	**0.65**
Men (log hazard ratio per 1 mmHg)	**-0.036**	**-0.035**	**-0.032**	**-0.027**	**-0.021**
Min	-0.029	-0.028	-0.026	-0.022	-0.017
Max	-0.043	-0.042	-0.039	-0.032	-0.025
Women (hazard ratio per 20 mmHg)	**0.40**	**0.40**	**0.49**	**0.52**	**0.59**
Women (log hazard ratio per 1 mmHg)	**-0.046**	**-0.046**	**-0.035**	**-0.032**	**-0.026**
Min	-0.037	-0.037	-0.028	-0.026	-0.021
Max	-0.055	-0.055	-0.042	-0.039	-0.031

Source: Prospective studies collaborative meta-analysis, Lancet 2002[12]
*UNITS: % mortality change per 20 mmHg change in Systolic BP
Strengths: massive dataset, adjusted for regression dilution bias, consistent with randomized clinical trials, results stratified by sex and age, with 95% CIs
Limitations: some publication bias still possible.

CHOLESTEROL	Age groups (years)					
	25-44	45-54	55-64	65-74	75-84	85+
Men & Women (Mortality reduction per 1 mmol/l)	**0.900**	**0.650**	**0.450**	**0.333**	**0.317**	**0.250**
Log coefficient	**-1.2942**	**-0.8238**	**-0.5245**	**-0.3719**	**-0.3512**	**-0.2709**
Lower 95% CI	-1.035	-0.659	-0.420	-0.298	-0.281	-0.217
Upper 95% CI	-1.553	-0.989	-0.629	-0.446	-0.421	-0.325

Source: Law & Wald meta-analysis[47]
*UNITS: % mortality change per 1 mmol/l (38.6 mg/dl) change in total cholesterol
Strengths: adjusted for regression dilution bias, includes randomized clinical trials, RCT values consistent with observational data, results stratified by sex and age, with 95% CIs
Limitations: some publication bias still possible.

BODY MASS INDEX (BMI)

	Age groups (years)				
	<44	45-59	60-69	70-79	80+
Risk reduction per 1 kg/m^2: James Asia Pacific data	0.1100	0.0900	0.0500	0.0400	0.0300
Asia Pacific age gradient therefore:	1.22	**1.00**	0.56	0.44	0.33
Bogers relative risks, CHD deaths per 5 kg/m^2		**1.16**			
Age specific relative risks per 1 kg/m^2, applying age gradients from James et al	1.04	**1.03**	1.02	1.01	1.01
Men & Women, log coefficients*	**0.0363**	**0.0297**	**0.0165**	**0.0132**	**0.0099**
Minimum values	0.0255	0.0209	0.0116	0.0093	0.0070
Maximum values *(from James et al)*	0.0466	0.0381	0.0212	0.0169	0.0127

Source: Bogers et al.,[48] James et al. 2004[49]
*UNITS: % mortality change per 1 kg/m^2 change in BMI
Strengths: Large number of studies included. Adjusted for blood pressure, total cholesterol, and physical activity. 95% CIs also provided.
Limitations: Observational data; age gradient applied from James study.

Table 7. Relative Risks Used in the United States IMPACT Model for Smoking, Diabetes and Physical Inactivity for Coronary Heart Disease Mortality. (Best, Minimum and Maximum Estimates from the InterHeart Study)
(and see Introduction for a worked example)

Yusuf InterHEART Study. Lancet 2004.[13] ***Odds ratios for relative effect of risk factors*** *(99% Confidence Intervals, NOT 95%)*

	Both sexes		**Men**		**Women**	
	Young	**Old**	**≤55 years**	**>55 years**	**≤65 years**	**> 65 years**
Lifestyle factors						
Smoking	***3·33 (2·86-3·87)***	***2·44 (2·10-2·84)***	**3·33 (2·80-3·95)**	**2·52 (2·15-2·96)**	***4·49 (3·11-6·47)***	***2·14 (1·35-3·39)***
Fruit and vegetables	*0·69 (0·58-0·81)*	*0·72 (0·61-0·85)*	0·72 (0·59-0.88)	0·77 (0·64-0·93)	*0·62 (0·44-0·87)*	*0·55 (0·38-0·80)*
Exercise	***0·95 (0·79-1·14)***	***0·79 (0·66-0·94)***	**1·02 (0·83-1·25)***	**0·79 (0·66-0·96)**	***0·74 (0·49-1·10)***	***0·75 (0·46-1·22)***
Alcohol	*1·00 (0·85-1·17)*	*0·85 (0·73-1·00)*	1·03 (0·87-1·23)	0·86 (0·73-1.01)	*0·74 (0·41-1·31)*	*0·83 (0·49-1·42)*
Hypertension	*2·24 (1·93-2·60)*	*1·72 (1·52-1·95)*	1·99 (1·66-2·39)	1·72 (1·49-1·98)	*2·94 (2·25-3·85)*	*1·82 (1·39-2·38)*
Diabetes	***2·96 (2·40-3·64)***	***2·05 (1·71-2·45)***	**2·66 (2·04-3·46)**	**1·93 (1·58-2·37)**	***3·53 (2·49-5·01)***	***2·59 (1·78-3·78)***
Abdominal obesity	*1·79 (1·52-2·09)*	*1·50 (1·29-1·74)*	1·83 (1·52-2·20)	1·54 (1·30-1·83)	*1·58 (1·14-2·20)*	*1·22 (0·88-1·70)*
Psychosocial	*2·87 (2·19-3·77)*	*2·43 (1·86-3·18)*	2·62 (1·91-3·60)	2·45 (1·82-3·29)	*3·92 (2·26-6·79)*	*2·31 (1·22-4·39)*
High ApoB/ApoA1 ratio	*4·35 (3·49-5·42)*	*2·50* (2·05-3·05)*	4·16 (3·19-5·42)	2·51 (2·00-3·15)	*4·83 (3·19-7·32)*	*2·48 (1·60-3·83)*

Smoking, adverse lipid profile, hypertension, and diabetes had a greater relative effect on risk of acute myocardial infarction in younger than older individuals

*The INTERHEART study quoted a value of only 1.02 for exercise in men aged <55 years. This was clearly an outlier. We have therefore assumed a value of 0.77 in line with men and women in the other age groups, and consistent with most other studies[50].

Table 8. Polish IMPACT Model Risk Factor Methodology: Rationale for choice of regression or PARF approaches for specific risk factors

Modelling TREATMENT effects appears reasonably precise, because each treatment has a meta-analysis with a fairly well quantified efficacy value, plus 95% confidence intervals. Quantifying the mortality reduction attributable to the change in a specific RISK FACTOR remains a less precise science. This table explains the rationale for choosing the best approach for each risk factor: regression based on absolute change in the risk factor*, regression based on relative change in the risk factor*, or population attributable risk fraction (PARF).
We also specify the best data source for each.

*Absolute and Relative beta regression approaches are illustrated earlier in the Supplementary Appendix.
An ABSOLUTE beta regression coefficient quantifies the CHD mortality reduction for each UNIT change in risk factor, e.g. mmHg change for BP, or mg/dl change for cholesterol
A RELATIVE beta regression coefficient quantifies the CHD mortality reduction for each % relative change in risk factor, e.g. a 12 mmHg fall in SBP, from 120 mmHg to 108 mmHg, would represent a **10%** relative decrease (12/120).

Risk Factor	**Source**	**Strengths**	**Limitations**	**Comments and recommend-ation**	**DPP value in Polish Model** (contribution to total CHD mortality fall)
BLOOD PRESSURE					
1. Systolic BP: regression using absolute beta approach	PSC 2002[12]	Large meta-analyses. Age and sex stratified. SBP preferable to DBP, because stronger relationship with CHD deaths	Observational data- assume complete reversibly of risk	CURRENT APPROACH Supersedes relative approach.	68,880 (20%)
2. Diastolic BP. Regression using absolute beta	Law 2003[42]	Appeared adequate in England and Whales model log linear.	SBP superior to DBP as a risk factor for CHD.	Superseded	310,880 (91%)
3. PARF	Midspan	Original approach in Scottish IMPACT Model	Sensitive to reference value and category cut-offs. Estimated DPPs always appeared very low.	Obsolete	-

CHOLESTEROL					
1. Regression using absolute Beta	Law et al, meta-analysis[51]	Large meta-analysis, split by age and sex; cohort and RCT results very consistent; supported by more recent reviews	Published in 1994	CURRENT APPROACH	82,830 (24%)
2.Regression using relative Beta*	Vartiainen 1994[52]	Appeared satisfactory in earlier IMPACT Models; similar to log-linear approach.	Not log-linear	Superseded	101,915 (30%)
3. PARF using quintiles	Midspan	Used in 1996	Sensitive to reference value and category cut-offs	Obsolete since 1997	-
BMI					
1.Regression using absolute Beta	Bogers et al 2006[48]	Large meta-analysis, Broadly consistent with Asian and PSC analyses; age-splits taken from James et al. Adjusted for major confounders: smoking, cholesterol, blood pressure, and physical activity	An "upstream" CHD risk factor. CHD risk partly or wholly mediated through "downstream factors: BP, cholesterol and impaired glucose tolerance.	CURRENT APPROACH Potential confounding addressed by using this adjusted value	-25,905 (-7.6%)
2.Regression using relative Beta	Never required				
3. PARF using OBESITY quintiles	Inter Heart[53]	Large, global study	Sensitive to reference value and category cut-offs. Under-estimation likely.	An arbitrary approach to a continuous variable. Superseded	-39,840 (-12%)

SMOKING					
1. PARF	Inter Heart[13]	Log linear. InterHeart large, global study. RRs consistent with other studies. Appropriate for a dichotomous variable.	Regression approach might provide useful alternative approach?	CURRENT APPROACH	39,925 (12%)
2. Regression using absolute beta	Vartiain en 1994[52]	Used in earlier IMPACT Models. Result consistent with PARF approach.	Not dichotomous. Not log-linear	Superseded	47,380 (14%)

DIABETES					
1. PARF approach	Inter Heart[13]	Large, global study. RRs consistent with other studies. Appropriate method for dichotomous variable.	Case control study, albeit huge.	CURRENT APPROACH	-33,465 (-10%)
2. Regression approach	-	-	Appropriate Betas not identified, and methodologically dubious	Not attempted	-

PHYSICAL ACTIVITY					
1. PARF approach	Inter Heart[13]	Large, global study. RRs consistent with other studies. Appropriate method for dichotomous variable.	Alternative PARF methods possible. Important to use independent RR values. (Aim to examine activity sub-categories in future studies)	CURRENT APPROACH	17,445 (5%)
2. Regression approach	-	-	Appropriate Betas do not exist, and methodologically dubious	Not attempted	-

Table 9. Main Assumptions and Overlap Adjustments Used in the Polish IMPACT Model

Treatment category	*ASSUMPTIONS AND OVERLAP ADJUSTMENTS*	Justification
Post-AMI patients	Assume 25% already counted as HF patients	Unal (2004)[4]
	Therefore assume residual case fatality halved, having transferred these HF patients to the HF group	Unal (2004)[4]
Post-CABG patients	Assume 2/3 had MI, already counted as Post AMI	Unal (2004)[4]
Post-PTCA survivors	Assume 50% had prior AMI, already counted as Post AMI	Unal (2004)[4]
	Assume 25% also had CABG, thus already counted as Post CABG	NHDS
	Assume 25% had prior PTCA, i.e. repeats, already counted	NHDS
Chronic angina treatment: PTCA patients progressing to CABG surgery	Assume that 20% of PTCA go to CABG	NHDS
Angina in the community	Start with the total patient numbers with angina in the community, based on NHANES prevalence	Capewell (2000)[3]
	Then deduct patients counted elsewhere: -Patients already treated for unstable angina in hospital, -50% of those receiving CABG for angina -50% of those receiving secondary prevention post AMI/post CABG/Post Angioplasty,	
Heart failure in the community	Based on NHANES prevalence	NHANES 1999-2000
	Assume 50% of heart failure is due to CHD	
	Deduct patients treated for severe heart failure in the hospital (already counted)	
Hypertension treatment: overlaps with other CHD patient groups	Total hypertensive patient numbers in community calculated, then deduct: -50% of post AMI patients -50% of community angina patients -50% of community heart failure patients	NHANES 1999-2000
Fall in population blood pressure	Estimate the number of DPPs by hypertension treatment	Capewell (1999)[56] Capewell (2000)[3]
	-Then subtract this from the total DPPs attributed to the secular fall in population BP	

AMI denotes acute myocardial infarction, CABG coronary artery bypass graft surgery, CHD coronary heart disease, DPPs deaths prevented or postponed, HF heart failure, NHANES National Health and Nutrition Examination Survey, and PTCA percutaneous transluminal coronary angioplasty.

2. Result tables

Table 10. Estimated coronary heart disease deaths prevented or postponed by medical and surgical treatments in Poland in 2005

Patient groups & specific treatments	Patients Eligible	Treatment Uptake (%)	Relative Risk Reduction (%)	Mean Case Fatality	Absolute Risk Reduction	Deaths Prevented or Postponed					
						Number*	*Minimum Estimate**	*Maximum Estimate**	% of total mortality fall	*Minimum*	*Maximum*
Acute myocardial infarction	52180					**1340**	*370*	*2550*	**5.1**	*1.4*	*9.7*
Community resuscitation		19	0.06	0.063	0.053	**330**	*170*	*560*	**1.3**	*0.6*	*2.1*
Hospital resuscitation		4	0.33	0.063	0.33	**610**	*160*	*840*	**2.3**	*0.6*	*3.2*
Thrombolysis		4	0.27	0.063	0.016	**30**	*20*	*60*	**0.1**	*0.1*	*0.2*
Aspirin		81	0.15	0.063	0.01	**350**	*180*	*640*	**1.3**	*0.7*	*2.4*
Beta blocker		64	0.04	0.063	0.003	**70**	*-100*	*410*	**0.3**	*-0.4*	*1.6*
ACE inhibitor		62	0.07	0.063	0.004	**130**	*20*	*290*	**0.5**	*0.1*	*1.1*
Primary angioplasty		39	0.36	0.063	0.021	**360**	*200*	*670*	**1.4**	*0.8*	*2.6*
Primary CABG		1	0.39	0.063	0.025	**10**	*10*	*20*	**0**	*0*	*0.1*
minus AMI treatments in 1991						**-560**	*-280*	*-920*	**-2.1**	*-1.1*	*-3.5*
Unstable angina	105920					**1110**	*550*	*1850*	**4.2**	*2.1*	*7.1*
Aspirin & heparin		58	0.33	0.054	0.018	**910**	*420*	*1430*	**3.5**	*1.6*	*5.4*
Aspirin alone		26	0.15	0.054	0.008	**200**	*90*	*290*	**0.8**	*0.3*	*1.1*
GP IIB/IIIA antagonists & clopidogrel		1	0.09	0.054	0.005	**0**	*0*	*0*	**0.0**	*0.0*	*.00*
CABG surgery for UA		1	0.43	0.054	0.02	**30**	*10*	*40*	**0.1**	*0.0*	*0.2*
Angioplasty for UA		14	0.32	0.054	0.02	**220**	*100*	*340*	**0.8**	*0.4*	*1.3*
minus UA treatments in 1991						**-250**	*-80*	*-250*	**-1**	*-0.3*	*-1*

Patient groups & specific treatments	Patients Eligible	Treatment Uptake (%)	Relative Risk Reduction (%)	Mean Case Fatality	Absolute Risk Reduction	Deaths Prevented or Postponed					
						Number*	*Minimum Estimate**	*Maximum Estimate**	% of total mortality fall	*Minimum*	*Maximum*
Secondary prevention post-myocardial infarction	213970					**1300**	*520*	*2650*	**4.9**	*2.0*	*10.1*
Aspirin		75	0.15	0.039	0.006	**430**	*180*	*890*	**1.6**	*0.7*	*3.4*
Beta blocker		63	0.23	0.039	0.009	**550**	*230*	*1150*	**2.1**	*0.9*	*4.4*
ACE inhibitor		59	0.20	0.039	0.008	**450**	*180*	*930*	**1.7**	*0.7*	*3.6*
Statin		57	0.22	0.039	0.008	**360**	*150*	*750*	**1.4**	*0.6*	*2.9*
Warfarin		3	0.22	0.039	0.008	**40**	*10*	*60*	**0.2**	*0.0*	*0.2*
minus secondary prevention post-MI in 1991						**-540**	*-220*	*-1130*	**-2.1**	*-0.8*	*-4.3*
Secondary prevention post-CABG/PTCA	100890					**630**	*260*	*1310*	**2.4**	*1.0*	*5.0*
Aspirin		84	0.15	0.014	0.002	**120**	*50*	*260*	**0.5**	*0.2*	*1.0*
Beta blocker		67	0.23	0.014	0.003	**150**	*60*	*320*	**0.6**	*0.2*	*1.2*
ACE inhibitor		65	0.20	0.014	0.003	**130**	*50*	*270*	**0.5**	*0.2*	*1.0*
Statin		66	0.22	0.014	0.003	**140**	*60*	*300*	**0.5**	*0.2*	*1.1*
Acenocoumarol		7	0.22	0.014	0.003	**20**	*10*	*30*	**0.1**	*0.0*	*0.1*
Rehabilitation		24	0.26	0.014	0.004	**60**	*30*	*130*	**0.2**	*0.1*	*0.5*
Chronic angina	706670					**710**	*300*	*1510*	**2.7**	*1.1*	*5.8*
CABG surgery 1991-2005		100	0.39	0.015	0.003	**360**	*160*	*790*	**1.4**	*0.6*	*3.0*
minus CABG surgery in 1991						**-10**	*0*	*-10*	**0.0**	*0.0*	*0.0*
Aspirin in the community		43	0.15	0.007	0.0004	**220**	*90*	*460*	**0.8**	*0.3*	*1.7*
Statins in the community		21	0.23	0.007	0.002	**130**	*50*	*270*	**0.5**	*0.2*	*1.0*

Table 10 (continued)

Heart failure with hospital admission	18330					**1470**	*700*	*3550*	**5.6**	*2.7*	*13.6*
ACE inhibitor		86	0.20	0.206	0.041	**320**	*130*	*650*	**1.2**	*0.5*	*2.5*
Beta blocker		61	0.35	0.206	0.071	**490**	*300*	*1510*	**1.9**	*1.1*	*5.8*
Spironolactone		64	0.30	0.206	0.062	**350**	*150*	*740*	**1.3**	*0.6*	*2.8*
Aspirin		65	0.15	0.206	0.031	**180**	*70*	*380*	**0.7**	*0.3*	*1.4*
Statins		41	0.23	0.206	0.047	**130**	*50*	*280*	**0.5**	*0.2*	*1.0*
Heart failure in the community	122680					**1630**	*730*	*3760*	**6.2**	*2.8*	*14.4*
ACE inhibitor		49	0.20	0.061	0.009	**220**	*150*	*830*	**0.8**	*0.6*	*3.2*
Beta blocker		46	0.35	0.061	0.021	**630**	*260*	*1300*	**2.4**	*1.0*	*5.0*
Spironolactone		27	0.31	0.061	0.019	**340**	*140*	*710*	**1.3**	*0.5*	*2.7*
Aspirin		37	0.15	0.061	0.009	**230**	*90*	*470*	**0.9**	*0.4*	*1.8*
Statin		31	0.23	0.061	0.014	**210**	*90*	*450*	**0.8**	*0.3*	*1.7*
Hypertension treatments	8488520	45	0.13	0.003	0.0004	**580**	*-440*	*1260*	**2.2**	*-1.7*	*4.8*
Statins for primary prevention lipid reduction	14046930	11	0.35	0.002	0.0008	**880**	*360*	*1830*	**3.4**	*1.4*	*7.0*
Total Treatments						**9640**	*3350*	*20270*	**36.8**	*12.8*	*77.5*

* **reported numbers are rounded to nearest 10.**

Table 11. Estimated coronary deaths prevented or postponed as a result of risk factor changes in men and women in Poland 1991 - 2005.

Population risk factor	Absolute level of risk factor		Change in risk factor		Beta regression coefficient	Relative Risk	Deaths Prevented or Postponed					
							no. of deaths			percent of total reduction		
	1991	2005	Absolute change	Relative change (%)			Best estimate*	*Minimum**	*Maximum**	% of total fall	*Minimum %*	*Maximum %*
Smoking prevalence (%)												
Men	55.8	40.1	-15.7	-28.0		3.1	**2980**	*2390*	*3580*	**15%**	*12%*	*18%*
Women	28.1	25.1	-3.0	-4.0		4.2	**-10**	*-10*	*-10*	**0%**	*0%*	*0%*
Systolic blood pressure (mmHg) (antihypertensive treatment effects subtracted)												
Men	140.1	137.4	-2.7	-1.8	-0.034		**-1720**	*-1250*	*-2380*	**-8%**	*-6%*	*-12%*
Women	136.6	131.5	-5.2	-3.4	-0.042		**1690**	*1100*	*2360*	**29%**	*19%*	*40%*
Total cholesterol (mmol/l) *(statin effects subtracted)*												
Men	5.6	5.2	-0.4	-8.6	-0.95		**8390**	*6010*	*10340*	**41%**	*29%*	*51%*
Women	5.6	5.2	-0.4	-7.6	-0.91		**1920**	*1440*	*2200*	**33%**	*25%*	*38%*
Physical inactivity (%)												
Men	64.6	38.7	-25.9	-40.1		1.29	**2000**	*1600*	*2400*	**10%**	*8%*	*12%*
Women	68.8	44.5	-24.3	-35.3		1.35	**630**	*510*	*760*	**11%**	*9%*	*13%*
Body mass index (kg/m2)												
Men	26.0	26.9	0.9	3.2	0.030		**-870**	*-480*	*-1340*	**-4%**	*-2%*	*-7%*
Women	25.7	26.6	0.9	3.2	0.027		**-290**	*-160*	*-450*	**-5%**	*-3%*	*-8%*
Diabetes prevalence (%)												
Men	2.9	3.3	0.4	12.7		2.47	**-190**	*-130*	*-250*	**-1%**	*-1%*	*-1%*
Women	3.3	4.2	0.9	28.5		3.40	**-460**	*-310*	*-630*	**-8%**	*-5%*	*-11%*
Total risk factors												
Men							**10 600**	*8130*	*12340*	**52%**	*40%*	*61%*
Women							**3 480**	*2570*	*4230*	**60%**	*44%*	*73%*

* reported numbers are rounded to the nearest 10.

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