

An audit of the “deadly trio” in GP practices in Birmingham

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Article points

1. A project plan was developed that would quality assure secondary prevention, ensure that men with sufficient data had been treated if they had high cardiovascular risk and allow a case-finding strategy.
2. This method, using electronic linkage, has identified deficiencies in preventative care in people with diabetes.
3. Men at high risk of death from coronary heart disease were identified and all will be offered appropriate treatment.

Key words

- Audit
- Chronic kidney disease
- Coronary heart disease
- Type 2 diabetes

Authors' details can be found at the end of this article.

Male coronary heart disease (CHD) mortality in Birmingham is high and not improving (Heart of Birmingham Teaching PCT, 2010). CHD mortality can be reduced by early identification and treatment of comorbid conditions, such as diabetes and chronic kidney disease (British Cardiac Society et al, 2005). To identify gaps in preventative care for people with any one of these conditions, an audit of GP surgery data was carried out. The audit involved extraction of data from GP practices in the Heart of Birmingham PCT, with a view to targeting those who would benefit most from reduction of risk factors. Automated reports on these high-risk individuals were generated from the data and provided to GPs for follow-up. This article reviews the effectiveness of the audit protocol.

The Heart of Birmingham Teaching PCT has a population of about 350 000, of whom 80% are non-white and many live in an area that is rated as among the 10% most deprived nationally (Heart of Birmingham Teaching PCT, 2010). There is a marked reduction in life-expectancy, particularly in men and the premature deaths are largely due to mortality from coronary heart disease (CHD).

In Birmingham, like other inner-city areas throughout the UK, there has been a relative lack of improvement in CHD mortality compared with the UK general population (Cotterill et al, 2002), thus increasing inequalities. Moreover, since the population is mainly non-white, there is a high prevalence of diabetes (6.1% for 2009/10; 100th percentile; NHS Information Centre for Health and Social Care, 2010).

The “deadly trio”

The project started in 2007 when it had become accepted that to reduce CHD mortality, diabetes and chronic kidney disease (CKD) together with known vascular disease, required lipid and anti-platelet management to be at the same levels as for secondary prevention (British Cardiac Society et al, 2005). The presence of any one of these conditions was termed the “deadly trio” (DT). The excess rate of CHD in the authors' PCT was therefore likely to be due to the high prevalence of diabetes (Woods et al, 1989) and, potentially, under-treatment of those with diabetes with statin or aspirin, or both.

An observational study confirmed this, and demonstrated the potential for improved survival (Taylor, 2006). Therefore, a project plan was developed that would quality assure this

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1. There are six locality groups within the PCT, which has 78 general practices overall. Each locality has a GP lead.
2. Each lead agreed the overall plan and need, and the lead of one locality with three other colleagues agreed to pilot the project.
3. Data were electronically extracted on to an encrypted and password protected CD, which was then copied onto a secure server with access limited to the clinical project team, with the CD and instruction manual given back to the practice.
4. The number of men who had known deadly trio totalled 10 215, of whom 6804 had diabetes, 4118 had coronary heart disease and 2169 had chronic kidney disease stages 3 or worse.

secondary prevention, ensure that those men with sufficient data had been treated if they had a cardiovascular (CV) risk of >20% (using the Joint British Societies CV risk calculator) and allow a case-finding strategy. The project was initially limited to men because the aim of the National Regeneration Grant was to reduce male inequalities. (This type of grant is given to local areas of deprivation, and the residents decide how it should be spent – in this case they chose to focus on health.) The DT plan was also to screen men who had not had any CHD risk assessment; however, the authors wished to ensure that treatment of those with known disease was optimised before doing this.

Method

There are six locality groups within the PCT, which has 78 GP practices overall. Each locality has a GP lead. Each lead agreed the overall plan and need, and the lead of one locality with three other colleagues agreed to pilot the project. Members of the project team visited locality meetings and explained the reasons and likely benefits to the locality healthcare team. The project hinged around referral to the clinical director of the DT project.

Each practice gave consent to participate and the project was approved by the Caldicott Guardians. Data were electronically extracted on to an encrypted and password protected CD, which was then copied onto a secure server with

access limited to the clinical project team, with the CD and instruction manual given back to the practice (*Table 1*).

Results

Cooperative agreement

A total of 67 out of 78 practices participated, so the practice population totalled 293 589 people. One practice was subsequently unable to produce data due to computing deficiencies.

Analysis of the database

Forty hours of consultant work was needed to quality-assure one small practice for all issues on all men. As a consequence, priority setting was used to first report those with DT. The priority settings included measures that have an early impact on CV disease (CVD) mortality.

Lifestyle

All those with diabetes still smoking and morbidly obese were recommended to be referred to the appropriate counselling and treatment service. Where GPs agreed, smokers and those with a BMI of ≥ 35 kg/m² were offered intervention from the relevant public health programmes.

Lipid and aspirin treatment

Those with diabetes who were not taking a statin or aspirin were identified with recommendations to “consider” treatment with simvastatin 40 mg at night, and aspirin 75 mg daily.

Deadly trio

The number of men who had known DT totalled 10 215, of whom 6804 had diabetes, 4118 had CHD and 2169 had CKD stage 3 or worse.

Red reports on men with diabetes

The database programme automatically produced individualised reports, which were produced on red paper and issued as “red reports”, to highlight their importance; these were also available electronically. Red reports asked the GP to consider adding an appropriate treatment or to refer to an appropriate service. Of the 6804 men with diabetes, 2492 (36.6%) had up-to-date prescriptions for aspirin, and 2385

Table 1. Data extracted from practice databases.

● Practice and person identifier.	● Total cholesterol level.
● Age.	● HDL-cholesterol level.
● Gender.	● Albumin:creatinine ratio.
● Ethnicity (by Read code).	● Estimated glomerular filtration rate (eGFR) or creatinine level (in which case an approximate eGFR value was calculated).
● Presence of appropriately Read-coded diabetes.	● Framingham risk equation.
● Coronary heart disease.	● Presence of treatment with aspirin or any statin, or both, at maximum dosage.
● Chronic kidney disease.	● All drug treatment at the last visit was also recorded, within the previous 2 years.
● Hypertension.	
● Left ventricular failure.	
● Smoking.	
● BMI (and hence obesity class adjusted by ethnicity).	
● Systolic blood pressure.	
● Last measured HbA _{1c} level.	

(35.1%) for a statin at dosage considered to be effective (simvastatin 40 mg or equivalent). In addition, 1840 (27.0%) men smoked and 1340 (19.7%) had a BMI ≥ 35 kg/m². These men were offered counselling or further treatment.

Microalbuminuria

There were 780 men with significant microalbuminuria (an albumin:creatinine ratio of more than 2.5 mg/mmol once) of whom nine had no blood pressure (BP) recorded, 364 had a systolic BP level of >129 mmHg; only 155 of whom had a systolic BP of >144 mmHg.

CKD

A total of 300 men had CKD stage 3 or worse (or one estimated glomerular filtration rate [eGFR] value <60 mL/min/1.72m²), of whom 142 had concomitant microalbuminuria. Of the remainder, 52 had a systolic BP of >130 mmHg.

Missing data

Of those with diabetes, ethnicity data were missing in six; smoking in 22, height in 127, weight in 53, total cholesterol in 208, HDL-cholesterol in 5794, systolic BP in 118, creatinine in 150, microalbuminuria in 1633, and HbA_{1c} level in 1943. In those with missing HbA_{1c} data, 36 had had the blood test but the result was not yet available, and 1184 had a fasting plasma glucose estimation recorded.

Discussion

There was a variable number of missing data. When the data were directly input from a template, there were very small numbers of missing data. Large numbers of missing data occurred with laboratory tests. Most practices use a system where laboratory data is returned to the practice electronically, but then must be signed off by the GP who assigns a Read code. The investigation can then be found in an electronic search. There is more than one Read code available for most laboratory measurements. All of these could potentially be included in the search, but there still might be an exceptional usage. It is possible to search under “high level” Read codes. An example of this would be the diabetes code, which contains

subsequent data such as type 1 and type 2 diabetes. Even then, there can be an unusual use in one practice, which may mean that the data were missed. Where possible, the data were checked back with practices to ensure verification. Verification also took place in the early stages with the pilot practices. It was decided at an early stage that the investigators and their GP colleagues might not have sufficient time to aim for 100% quality on the first audit cycle. The focus was on the use of statins and aspirin because they were likely to reduce CV events quickly.

In the UK, prevention of CVD is target driven by achievement of QOF indicators and financial reward. For known CHD and diabetes, the indicator is a total cholesterol of <5 mmol/L (BMA and NHS Employers, 2009). The standard used, however, suggests adding a statin to all who need secondary or secondary level prevention (Taylor, 2006), even if the total cholesterol was <5 mmol/L. While there is now controversy about aspirin therapy (Belch et al, 2008; Ogawa et al, 2008), when the audit commenced it was standard prevention treatment.

The amount of under-treatment appears considerable, but this should be interpreted with caution. For aspirin therapy, there were no data for therapy with warfarin, or clopidogrel, nor reasons for exception reporting. Exception reports should include information about contraindications and non-adherence. The automated reports that were produced relied on detecting the statins from the prescriptions, and the dose being the standard maximum and then linking this with the disease registers.

The reports were speedy and accurate, but did produce problems because of the lack of exception code data. They were coloured red, since this worked in the UKPDS (UK Prospective Diabetes Study; UKPDS Group, 1998) when protocol irregularities occurred and needed resolution. It was also hoped that they would produce a Hawthorne effect (Mayo, 1949), since the authors were concerned to produce a rapid improvement. Often the Hawthorne effect is described as an increase in worker productivity produced by the psychological stimulus of being singled out and

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made to feel important. Individual behaviours alter because they know they are being studied. In the present case the authors were keen that the area of preventative treatment was considered important.

There remains the possibility that the most important problem that causes under-treatment is the achievement of indicators under QOF; this gives the impression to the GP, practice nurse and person with diabetes that diet alone is sufficient if total cholesterol is <5 mmol/L.

There were a large number of men who did not have a recorded HbA_{1c} value. One laboratory at the time did not routinely provide HbA_{1c} data, just fructosamine, which could have been Read coded differently. A large number of those with missing HbA_{1c} data had had a fasting plasma glucose level measured and recorded.

The numbers with CKD were smaller than expected because the PCT has a relatively young population, and because eGFR had only recently been introduced. Microalbuminuria testing, just like that of HbA_{1c} was not well recorded. This may have been due to the previous recommendations in favour of early morning sampling. In those with microalbuminuria, the target value for systolic BP is <130 mmHg. This was not frequently achieved.

HDL-cholesterol level was frequently not recorded. This was a systematic error. Practices often requested “lipids” and then would not receive a measured HDL level. One laboratory would only measure HDL as part of a complete risk assessment – they would perform the Framingham risk equation if all other variables were provided by the practice.

This and other instances were, in reality, an attempt to limit or gate-keep a test that is relatively expensive. This work demonstrates deficiencies of standard care for those with diabetes. The same occurs for the men with CHD or CKD. Resolution of this would mean 5000 more prescriptions of a statin or related drug annually. If the authors were to achieve the goal of about 5000 more annual prescriptions of simvastatin and aspirin, then this will be costly. The authors therefore ensured that an additional £500 000 was added to the primary care prescribing budget. There was an increase

of 2000 statin prescription items from September 2006 to September 2007.

A repeat audit, including automated reports on angiotensin-converting enzyme inhibitors, is planned and will seek to check that total cholesterol values have fallen. It is hoped that the amount of under-treatment will be reduced. In that audit, exception codes and other therapies, such as warfarin, will be sought. Those men who did not have identified vascular disease and who did not have sufficient data for a Framingham risk equation were also then invited for screening, which will be part of a subsequent report.

Conclusion

This method using electronic linkage has identified deficiencies in preventative care in people with diabetes. Semi-automated reporting to the practice was used to alert the GP to the possibility of under-treatment. Men at high risk of CHD mortality have been identified and all will be offered appropriate treatment. This methodology is generalisable to other inner-city areas. Phase 2 of the programme offered screening to all those who have not been screened before. This method, or one using similar electronic searches such as MSD Informatics Clinical Audit (Hoddesdon, Hertfordshire), or a dedicated Primus (Moorgate, London) search is likely to improve care. ■

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Declaration of interest

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