Identifying patients with ischaemic heart disease in general practice: cross sectional study of paper and computerised medical records

Jeremy Gray, Azeem Majeed, Sally Kerry, Gill Rowlands

Battersea Research Group, Lavender Hill Group Practice, London SW11 5TU
Jeremy Gray
general practitioner

School of Public Policy, University College London, London WC1H 9EZ
Azeem Majeed
senior lecturer in general practice

Department of General Practice and Primary Care, St George's Hospital Medical School, London SW17 0RE
Sally Kerry
statistician

Gill Rowlands
STaRNet coordinator

Correspondence to:
J Gray
jgray@drs.desk.sthames.nhs.uk

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Abstract

Objectives To identify patients with ischaemic heart disease by using a practice computer and to estimate the work required to do so.
Design Cross sectional study. Data from the notes and from the computer records of 1680 patients were used to build a database. This was used to compare different methods of identifying patients with ischaemic heart disease.
Setting 11 general practices in the Battersea primary care group in south London.
Subjects 1 in 40 random sample of patients aged 45 or older.
Main outcome measures Numbers of patients identified with ischaemic heart disease.
Results The combination of the Read code for ischaemic heart disease (G3) and a prescription for a nitrate had a 73% sensitivity and a yield (100/positive predictive value) of one case of ischaemic heart disease for every 1.2 sets of notes reviewed. By searching the records of patients also receiving aspirin, atenolol, digoxin, or a statin, the sensitivity was increased to 96% but the yield fell to one in three.
Conclusion Although commonly used to identify cases, a computer search for G3 code or nitrate missed almost 30% of patients with ischaemic heart disease. A substantially higher percentage of patients can be identified by adding other drugs to the search strategy.

Introduction

A validated method for identifying all patients with ischaemic heart disease is urgently required in primary care. The national service framework[1] requires general practitioners to identify their patients with ischaemic heart disease and to create disease registers by April 2001. These measures are a start towards improving the quality of care for patients with ischaemic heart disease.[2–4]

The simplest method of searching for patients with ischaemic heart disease is to use the practice computer to identify patients who have the Read code for ischaemic heart disease (G3) or who have been prescribed nitrates. We conducted this study to validate this strategy and compare it with alternative, perhaps more powerful, strategies.

Methods

We used the paper medical records to determine whether a patient had ischaemic heart disease. Cases were defined as "definite" if the records confirmed the diagnosis with the report of a diagnostic electrocardiogram, raised cardial enzyme activity confirming myocardial infarction, or positive results on a coronary angiogram, exercise test, or thallium scan. Cases were defined as "probable" if the written record strongly suggested ischaemic heart disease and the patient was receiving drugs that could be used to treat angina.

We expected that the sensitivities of the different search strategies would be around 90% and that 100 patients with definite ischaemic heart disease would enable sensitivity to be estimated with a precision of plus or minus 6%. Using a predicted prevalence from a pilot study of 6.5%, we estimated that 100 patients with ischaemic heart disease could be identified by searching the records of 1540 patients who were over 45 years old.

Eleven general practices in Battersea participated (list sizes 3000 to 10 200, total 63 500). We collected information on a diagnosis of ischaemic heart disease and drugs commonly prescribed for this condition for a 1 in 40 random sample of patients aged 45 years or older.[5] We calculated the sensitivity and positive predictive value for identifying patients with ischaemic heart disease by search strategies combining increasing numbers of drugs with and without the G3 Read code. Confidence intervals were adjusted for practice clustering.[6]

Results

We examined the records of 1680 patients and found 80 definite and 13 probable cases of ischaemic heart disease. The G3 Read code had a sensitivity of 47% and a positive predictive value of 83% (table). Nitrate prescriptions had, by chance, the same results. A search based on G3 or nitrate prescriptions had a sensitivity of 73% and a positive predictive value of 79%. The search for G3 (alone or combined) with five additional drugs (nitrates, aspirin, atenolol, digoxin, or statins) identified

Results of incremental search strategies for detecting cases of ischaemic heart disease in 11 practices

Search strategy	Sensitivity (%) (95% CI) (n=93)	No (%) of patients with marker (n=1680)	Positive predictive value (%) (95% CI)	Yield*	No of patients not identified (No of practices)
With G3 Read code					
G3	47 (36 to 59)	53 (3.2)	83 (70 to 96)	1 in 1.2	49 (11)
G3 or nitrate	73 (59 to 87)	86 (5.1)	79 (71 to 87)	1 in 1.2	25 (10)
G3 or nitrate or aspirin	89 (83 to 96)	182 (10.8)	46 (35 to 56)	1 in 2.1	10 (7)
G3 or nitrate or aspirin or atenolol	94 (87 to 100)	239 (14.2)	36 (27 to 46)	1 in 2.8	6 (4)
G3 or nitrate or aspirin or atenolol or digoxin or statin	96 (89 to 100)	271 (16.1)	33 (23 to 42)	1 in 3	4 (2)
Without G3 Read code					
Nitrate	47 (36 to 59)	53 (3.2)	83 (70 to 96)	1 in 1.2	49 (11)
Nitrate or aspirin	82 (76 to 87)	171 (10.2)	44 (34 to 55)	1 in 2.2	17 (8)
Nitrate or aspirin or atenolol	87 (79 to 96)	229 (13.6)	35 (28 to 43)	1 in 2.8	12 (5)
Nitrate or aspirin or atenolol or statin or digoxin	89 (81 to 98)	261 (15.5)	32 (26 to 38)	1 in 3.1	10 (4)

*100/positive predictive value.

96% (89/93) of cases of ischaemic heart disease (table). In the remaining four cases the patients were not coded or prescribed any of the selected drugs.

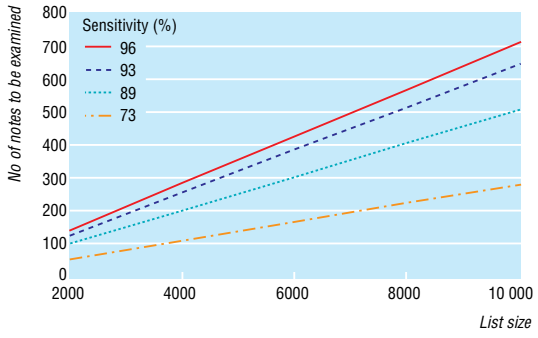
A search without Read codes based on nitrates or aspirin had a sensitivity of 82%. This increased to 89% with the addition of atenolol, digoxin, and statins.

The last column in the table shows the number of cases missed by each strategy and the number of practices in which patients were missed. There was no evidence that one or two practices were having undue influence on the results.

The figure shows the number of notes that need to be reviewed after a search of the computerised records for a given sensitivity and practice list size. The relevant calculations are available on the *BMJ*'s website.

Discussion

A typical primary care group with a population of 100 000 would expect to have 3360 patients with ischaemic heart disease.[5 7] We can extrapolate from our results that 900 of these patients may be missed by searching for G3 or nitrate method. By adding a further four drugs to the search (aspirin, atenolol, digoxin, and statins) an additional 750 patients would be identified. These patients are likely to be receiving a lower standard of care, and because of the low numbers needed to treat for secondary prevention of ischaemic heart disease, they represent an important treatment opportunity.[8–10] A G3 Read code detects all current and past cases of ischaemic heart disease. A computerised search using G3 automatically captures all lower codes such as G30 for myocardial infarction and G33 for angina. Further cases may be detected by searching for coded coronary artery operations such as bypass surgery or angioplasty. These cardiac procedures come under Read code 79. For ease of use we kept the search methods as simple as possible. In our sample the two patients who were coded for cardiac operations but were not coded G3 were both taking one of the index drugs, but this might not always be the case.



Numbers of notes that need to be reviewed to identify patients with ischaemic heart disease with search strategies of different sensitivities according to list size. Practice populations are assumed to have national mean age distribution and disease prevalence

The nitrate search can be made more specific by searching for "two or more" prescriptions of nitrates, although this will lower the search sensitivity. Aspirin was the most powerful drug to add to the G3 or nitrate search. Aspirin is cheaper to buy over the counter than on prescription for patients who pay prescription charges, and therefore patients who purchase their own aspirin may not show up unless the practice uses a code such as "takes own aspirin" or adds aspirin to the repeat prescribing list even if it is not issued. It is not known how many practices do this, but only three of the 11 practices in our study had such a policy. Practices in affluent areas that do not flag up patients taking their own aspirin are likely to miss more cases than practices that do or that are based in more deprived areas.

We cannot be certain whether the coding and prescribing policies of the practices studied in Battersea can be generalised to the rest of the country. Prescribing for cardiac conditions is likely to be fairly uniform across the country, but there may be variations in coding between practices. We found no evidence that one or two practices had atypical behaviour, and the confidence intervals have been adjusted to allow for variations in recording between practices. The results of the searches using atenolol, digoxin, or statin may not be generalisable as they depend on a very few cases. Our work was done on EMIS computer systems only. Some other systems have less developed search capabilities.

Practices or primary care groups can estimate the number of notes that will need to be reviewed from the figure by selecting a search strategy from those shown in the table. If cases with a G3 Read code are excluded on the basis that they are already identified, albeit with a margin of error, the number of notes that need to be reviewed will be reduced by about 25%. The yield then falls to about one in six notes reviewed. Successful

What is already known on this topic

Primary care groups are required to identify all patients with ischaemic heart disease and ensure they receive appropriate treatment

Search strategies based on the G3 Read code for ischaemic heart disease and prescriptions of nitrates are commonly used to identify patients

What this study adds

Search strategies based on the G3 Read code and nitrate prescriptions may miss up to 30% of patients with ischaemic heart disease

Adding four drugs to the search strategy (aspirin, atenolol, digoxin, and statins) can increase sensitivity to over 90%

Practices that have not used Read coding can identify about 90% of patients with ischaemic heart disease by using records of repeat prescribing alone

Practices can estimate the work required to identify patients with ischaemic heart disease from the study's data

identification of these patients will enable the construction of practice or primary care group disease registers and help meet the objectives of the national service framework for coronary heart disease.

Advice on the implementation of the method is available on the Battersea Research Group's website www.doh.gov.uk/brg/conduit3.html

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Competing interests: The Battersea Research Group, which employs JG, has received funds from Merck Sharp and Dohme, Parke-Davis, Novartis, and Pfizer to carry out an audit of ischaemic heart disease in 1997. All these companies make lipid lowering drugs used in the management of ischaemic heart disease.

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A memorable patient

The power of prayer

Mr N was a humble, lowly paid insurance agent, 45 years of age, who decided to consult me for severe spasmodic torticollis of more than two years' duration. The dystonic twisted posture of his neck had become so bad that he could only "look at the world on his right side." As a result, driving had become impossible. In his struggle to keep his job he had to walk along the streets of Bombay to meet his clients, and the permanently dug up roads made walking more miserable for him. He had seen his family doctor, osteopaths, orthopaedic surgeons, and physiotherapists, had many scans, tried many medications, collars, and even considered suicide. That was the time when someone advised that he needed to see a neurologist.

Now, as any neurologist knows, spasmodic torticollis is the bane of a neurologist, a most unrewarding condition to treat; after a few visits, both neurologist and patient end up equally depressed. I gave him the usual advice, including *x* rays, muscle relaxants, anxiolytics, more physical therapy, neuroleptics, new medications, dopamine antagonists, more scans, biofeedback techniques, and so on. I dared not refer him to a psychiatrist as he had already cursed another doctor for having suggested it. My attempts at amateur psychotherapy failed, and eventually things went from bad to worse. It was at this point that I mentioned to him botulinum toxin injection therapy—with trepidation—knowing that the astronomical cost and follow up programmes would be unsuitable for him. "A major recent advance in treatment," I told him. After I had set out the lengthy schedules of the programmes he stood up rather worriedly and said that he would think about it.

A few months later Mr N appeared in my office, and I was unable to recognise him at first. He had come to ask if I would like to take out some life insurance. He was smiling, the torticollis had vanished, and he was truly a changed man. I asked him about his reincarnation, and this was his story.

After he left me, he had visited Puttaparthi, a village on the outskirts of Bangalore in Karnatak State. This village was famous for the presence of the ashram of Sathya Sai Baba, a sage who had performed miracles and was known far and wide for his prayer meetings, telepathy, and clairvoyance. It was to one of the prayer meetings that Mr N had gone in utter despair. Sai Baba would usually walk through the large throng of his devotees, touch many of them, and conduct mass prayers with them. He put his hand on Mr N's head saying that with God's blessing his worries would be soon over. After spending a week at Puttaparthi ashram, Mr N rapidly improved and reached home feeling well and normal.

M D Manikal *consultant neurologist, Alkhobar, Kingdom of Saudi Arabia*

We welcome articles of up to 600 words on topics such as *A memorable patient, A paper that changed my practice, My most unfortunate mistake*, or any other piece conveying instruction, pathos, or humour. If possible the article should be supplied on a disk. Permission is needed from the patient or a relative if an identifiable patient is referred to.