

Diabetic patients who do not have diabetes: investigation of register of diabetic patients in general practice

P Patchett, D Roberts

Make sure that patients entered on a general practice diabetic register do have diabetes

The care of patients with non-insulin dependent diabetes mellitus is often considered the responsibility of general practitioners.^{1,3} Organising such care usually entails setting up a diabetic register, standardising care,⁴ and then performing an audit.⁵ While auditing our diabetic care we noted that some patients' serial glycosylated haemoglobin (HbA_{1c}) concentrations were all normal or nearly so. We decided to investigate whether these patients actually had diabetes.

Patients and methods

Our practice serves an isolated community of 8770 patients. A diabetic register was established in 1983. Although no formal criteria were used for entry, most patients had results from a blood glucose test (random, fasting, or postprandial) or an oral glucose tolerance test. A written management protocol was agreed in 1987; this included checking HbA_{1c} concentrations in all patients every three months.

An audit of diabetic care was performed in October 1992. Patients with normal or near normal serial HbA_{1c} concentrations were noted and their records examined. Those with no clear clinical evidence of diabetes and consistently normal serial concentrations of HbA_{1c} had an oral glucose tolerance test in which blood glucose concentrations were measured after a 10 hour fast and then two hours after drinking 75 g anhydrous glucose. Two patients who were taking oral hypoglycaemic drugs had their treatment withdrawn one month

before testing. Patients were classified as having normal glucose tolerance, impaired glucose tolerance, or diabetes mellitus according to World Health Organisation criteria (table I).⁶

Results

Audit showed that we had 112 patients on our diabetic register. Twenty six patients had had normal or nearly normal HbA_{1c} concentrations in the preceding six months. In 16 of these HbA_{1c} concentrations had been high on previous occasions; the remaining 10 patients were selected for oral glucose challenge. Eight of them had had normal serial HbA_{1c} concentrations (with occasional exceptions) over five years; the two others had had normal serial HbA_{1c} concentrations but had become our patients comparatively recently.

Examination of the general practice records showed that none of the 10 patients had had the classic clinical symptoms of diabetes (thirst, polyuria, polydipsia, or pruritus vulvae) at the time of diagnosis. In one patient diabetes was confirmed after glucose challenge. Table II shows the results in the nine other patients.

Discussion

Audits of diabetic care have focused on assessing process and outcome measures.⁵ An audit of referrals to a hospital outpatient department showed that the diagnosis was sometimes incorrect and poorly based.⁷ Our local biochemistry laboratory retains serial HbA_{1c} results in all patients, and our practice is not alone in having a notable proportion of patients with consistently normal results (P Broughton, personal communication). In addition, HbA_{1c} concentrations may be raised in conditions other than diabetes,⁸ so our register may include more non-diabetic patients. We found one such patient whose HbA_{1c} concentration had never been checked because he did not believe himself to be diabetic. We suggest that the accuracy of diabetic registers should be investigated.

The coefficient of variation of blood glucose concentrations two hours after glucose challenge has been estimated at being between 20% and 35% over 12 months.⁹ We therefore advise follow up and repeat glucose challenge after a year in all patients repeatedly classified as having impaired glucose tolerance. The nature of impaired glucose tolerance has been debated; it clearly carries little risk of microvascular disease, though a few patients later develop diabetes.⁹

A diagnosis of diabetes has psychological and financial implications for patients. Added to this, three of our patients were exposed to the potential dangers of oral hypoglycaemic treatment. The primary health care team's resources and time are also implicated.

A diagnosis of diabetes requires care, particularly in the absence of clinical symptoms. A normal glucose tolerance may be adversely affected by starvation and other metabolic states, infections, gastric surgery, and some drugs, most commonly thiazides and steroids.¹⁰ Such common factors mean that a "normal range" for random blood glucose concentrations has little meaning, and values above the range are certainly not

Waterloo House Surgery,
Millom, Cumbria
LA18 4DE
P Patchett, general
practitioner
D Roberts, practice nurse

Correspondence to:
Dr Patchett.

BMJ 1994;308:1225-6

TABLE I—WHO diagnostic criteria for normal and impaired glucose tolerance and for diabetes mellitus. Values are plasma glucose concentrations (mmol/l) after an oral glucose tolerance test*

	Fasting	Postprandial (2h)
Glucose tolerance:		
Normal	<7.8	<7.8
Impaired	<7.8	7.8-11.1
Diabetes mellitus	>7.8	>11.1

*For whole blood glucose concentrations subtract 1.1.

TABLE II—Details of nine patients on diabetic register who were found not to be diabetic

Case No	Age (years)	Mean HbA _{1c} (%) (normal range 6.6-7.4)	Glucose tolerance	Test results or symptoms before entry to register*	Treatment given	Time since diagnosis (years)
1	61	7.4	Normal	OGTT: 11.7 at 30 min, 7.3 at 2 h	Diet	7
2	61	6.4	Impaired	High random blood glucose (result not in notes)	Drug	2
3	73	6.6	Impaired	High random blood glucose taking thiazides (result not in notes)	Diet	4
4	68	5.7	Impaired	Random blood glucose 11.8 taking thiazides	Diet	5
5	72	5.8	Normal	Random blood glucose 11.2	Diet	5
6	41	7.5	Impaired	OGTT: fasting 5.3, 10.8 at 2 h	Diet	23
7	72	6.7	Normal	OGTT: 10.8 at 1 h, 4.9 at 2 h	Drug	13
8	46	6.4	Normal	OGTT: 11.7 at 1h 6.1 at 2 h	Diet	6
9	71	7.2	Impaired	Glycosuria (results not in notes)	Drugs then diet	26

OGTT = oral glucose tolerance test (glucose challenge).
*Values are plasma glucose concentrations (mmol/l).

diagnostic of diabetes. Fasting estimations rely on patients' compliance. The formal oral glucose tolerance test has been criticised as "grossly overused in the clinical setting."¹¹ Nevertheless, we recommend that an oral glucose tolerance test be used to confirm or refute a suspected diagnosis of diabetes in patients without symptoms. Diagnostic thresholds depend on whether whole blood or plasma glucose concentrations are being measured.¹⁰

In recent years many practices have compiled registers for several chronic diseases. We suggest that other registers may be similarly flawed, as has been shown for registers of hypertensive patients.¹² Protocols for management of all chronic diseases should include formal criteria for entry to an appropriate register.

- 1 Nabarro J. Diabetes and the general practitioner. *J R Coll Gen Pract* 1987;37:389.
- 2 Kipenski M. How effective is systematic care of diabetic patients? A study in one general practice. *Br J Gen Pract* 1992;42:508-11.

- 3 Hurwitz B, Goodman C, Yudkin J. Prompting the care of non-insulin dependent diabetic patients in an inner city area: one model of community care. *BMJ* 1993;306:624-30.
- 4 Gibbins RL, Saunders J. How to develop diabetic care in general practice. *BMJ* 1988;297:187-9.
- 5 Kemple TJ, Hayter SR. An audit of diabetes in general practice. *BMJ* 1991;302:451-3.
- 6 Harris M, Hadden WC, Knowles WC, Bennett PH. International criteria for the diagnosis of diabetes and impaired glucose tolerance. *Diabetes Care* 1985;8:562-7.
- 7 O'Donnell MJ, Rowe BR, Barnett AH. New referrals to a diabetic clinic. *Diabetic Med* 1988;5:494-6.
- 8 Robertson DA, Tunbridge FKE, John WG, Home PD, Alberti KGMM. Diagnostic confusion in diabetes with persistence of fetal haemoglobin. *BMJ* 1992;305:635-7.
- 9 Yudkin J, Alberti KG, McLarty DG, Swai A. Impaired glucose tolerance. *BMJ* 1990;301:397-402.
- 10 Marble D, Krall LP, Bradley RF, Christlieb PR, Soeldner JS, eds. Diagnosis and classification of diabetes mellitus and the nondiabetic meliturias. In: *Joslin's diabetes mellitus*. 12th ed. Philadelphia: Lea and Febiger, 1985: 339-40.
- 11 Harris MI, Zimmet P. The classification of diabetes mellitus and other categories of glucose intolerance. In: Alberti KG, De Fronzo, Keen H, Zimmet P, eds. *International textbook of diabetes mellitus*. Vol 1. Chichester: Wiley, 1992:3-18.
- 12 O'Brien E, O'Malley K. Overdiagnosing hypertension. *BMJ* 1988;297:1211.

(Accepted 25 January 1994)

Aluminium does not show reliably in radiographs. Clinical suspicion should institute further appropriate investigations

Departments of Surgery and Radiology, Middlesbrough General Hospital, Middlesbrough, Cleveland TS5 5AZ
D M Bradburn, surgical registrar
H F Carr, house surgeon
I Renwick, consultant radiologist

BMJ 1994;308:1226

Radiographs and aluminium: a pitfall for the unwary

D M Bradburn, H F Carr, I Renwick

Ingestion of radio-opaque foreign bodies is common. We highlight the need for a careful radiological examination and endoscopy if symptoms of obstruction persist.

Case report

A 70 year old man presented to the local hospital while on holiday, having accidentally swallowed part of the metallic tab of a soft drinks can. He complained of retrosternal discomfort and pain on swallowing. Plain radiographs of the chest and neck showed no foreign body and he was consequently discharged.

On returning home he consulted his general practitioner, who referred him to another accident and emergency department, where plain radiographs again showed no abnormality. After four months of persistent retrosternal discomfort and progressive dysphagia he was referred for endoscopy, which showed a malignant looking ulcer 22 cm from the incisors. Biopsy showed no evidence of malignancy, and five further endoscopies over the subsequent three months confirmed a progressive, clinically malignant, stricture, although results on biopsy, oesophageal brushing, and needle cytology did not show any malignancy. A barium swallow examination showed the typical shouldered appearance of a malignant stricture (figure), and computed tomography showed a mass consistent with an oesophageal carcinoma. A small linear opacity was noted in the stricture in one image only, but this was thought to be indistinguishable from oral contrast medium.

In view of his progressive dysphagia a three stage oesophagogastronomy was performed. There was a hard thickening in the oesophagus, with a surrounding soft swelling and two adjacent lymph nodes. Subsequent pathological examination of the specimen showed an oesophageal diverticulum containing part of a tab of a soft drinks can. There was no evidence of malignancy.



Radiograph of patient after barium swallow examination showing appearance consistent with oesophageal carcinoma

Discussion

Patients commonly attend accident and emergency departments because they have swallowed a foreign body, but the problems they experience are few as most objects pass through the gastrointestinal tract without incident.¹ Impaction in the oesophagus is, however, serious and may result in perforation and even death if missed. Items of food are the commonest foreign bodies in adults, while shiny objects, such as coins, are commoner in children.¹ Tabs of soft drink cans are unusual foreign bodies, having been reported in children² but not, to our knowledge, in adults.

Oesophageal impaction may be suspected clinically from dysphagia and retrosternal discomfort, and initial management should include inspection of the oropharynx and radiography of the neck and chest if the foreign body is thought to be radio-opaque. A delay in diagnosis may result in an abscess, strictures, perforation, or even death, and our case shows that normal results in a chest radiograph cannot be considered adequate to exclude oesophageal impaction of an aluminium foreign body.^{3,4} Aluminium has a low radiodensity, but this fact was not widely known in a straw poll among our colleagues.

The minimal thickness of steel detectable in vivo is 0.12 mm, and aluminium is 10 times less absorptive. The average thickness of an aluminium ring pull is 0.35 mm, so it is unlikely to be detected in a face on projection. Anteroposterior and lateral projections have therefore been advocated.³ If symptoms persist but no foreign body has been identified endoscopy should be a mandatory part of the investigation.

- 1 Spitz L. Management of ingested foreign bodies in children. *BMJ* 1971;iv: 469-72.
- 2 Burrington JD. Aluminium "pop tops." A hazard to child health. *JAMA* 1976;235:2614-7.
- 3 Levick RK, Spitz L, Robinson A. The "invisible" can top. *Br J Radiol* 1977;50:594-6.
- 4 Top of the pops [editorial]. *Lancet* 1976;iii:353.

(Accepted 30 November 1993)

Correspondence to: Dr D M Bradburn, Department of Surgery, Medical School, Newcastle upon Tyne NE2 4HH.