

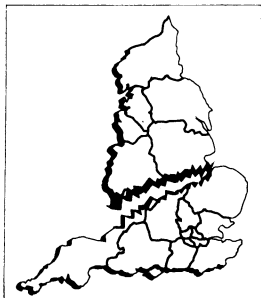
- 17 Mann RE, Smart RG, Rush BR. Are decreases in liver cirrhosis rates a result of increased treatment for alcoholism. *Br J Addict* 1988;**83**:683-8.
- 18 Anderson P. *Management of drinking problems*. Copenhagen: World Health Organisation Regional Office for Europe, 1991.
- 19 Drummond DC, Thorn B, Brown C, Edwards G, Mullan MJ. Specialist versus general practitioner treatment of problem drinkers. *Lancet* 1990;**336**:915-8.
- 20 Potamianes G, North WRC, Meade TW, Townsend J, Peters TJ. Randomised trial of community based centre versus conventional hospital management in treatment of alcoholism. *Lancet* 1986;**ii**:797-9.
- 21 Maynard A, Tether P, eds. *Preventing alcohol and tobacco problems*. Vol 1. Aldershot: Avebruy, 1990.
- 22 Osterberg E. *Alcohol policy measures and the consumption of alcoholic beverages in*

*Finland, 1950-1975*. Helsinki: Finnish Foundations for Alcohol Studies, 1980.

- 23 Giesbrecht N, ed. *Research, action and the community: experiences in the prevention of alcohol and other drug problems*. Washington, DC: US Government Printing Office, 1989.

24 Gliksmann L, Thomson M, Moffatt K, Douglas K, Smythe C, Caverson R. *The impact of a promotional campaign on a community's intention to comply with a policy to manage alcohol in its municipally owned recreational facilities*. Toronto: Addiction Research Foundation, 1987. (Internal document 82.)

- 25 Anderson P. Primary care physicians and alcohol. *J R Soc Med* (in press).
- 26 Central Policy Review Staff. *Alcohol policies, 1979*. Stockholm: Sociologiska Institutionen, 1982.



## Role of diabetes

K G M M Alberti

*The Health of the Nation*<sup>1</sup> is ostensibly a consultative document, but in the past such documents have been taken on as established policy all too rapidly. The document is none the less to be welcomed as it shows, firstly, a welcome move from administrative and financial priorities to real health issues and, secondly, a clear indication that prevention is to be targeted rather than disease. Sixteen key areas of interest have been chosen. The sting in the tail, however, is that only a few of these will be targeted initially. The criteria for final selection are, sadly, likely to be largely financial as well as health oriented, and payment for any new ventures will inevitably be at the expense of other aspects of health care or come out of so called "cost improvements." Below I present the case for and against including diabetes in the final list and discuss suggested targets and the strategy needed to achieve those targets.

### Should diabetes be included?

The main criteria for selecting key areas are that the area should be a major cause of avoidable ill health, that effective interventions should be possible, and that it should be possible to set objectives and targets and monitor progress. Diabetes meets all these criteria.

The known prevalence of diabetes is about 0.3% for insulin dependent diabetes and 0.7% for non-insulin dependent diabetes.<sup>2</sup> A known prevalence of about 1% does not at first seem important when compared with other targeted conditions such as ischaemic heart disease and cancer. But 1% is undoubtedly an underestimate. It has been estimated that for every known person with non-insulin dependent diabetes there is another undiagnosed. Hence the real figure is closer to 2%, or 1 million diabetic people in England and Wales. With the increase in screening programmes in primary health care more of these unknown cases will inevitably be picked up. The numbers magnify in certain high risk groups.<sup>3</sup> For example, the prevalence of non-insulin dependent diabetes increases with age: 5-10% of those over 70 years will have the disorder. With the increase in the proportion of elderly people in the population the total prevalence of diabetes will also increase. Similarly certain immigrant groups such as Afro-Caribbeans and Asian Indians have overall prevalences of 5-10%.<sup>4</sup> Those with hypertension, heart disease, dyslipidaemia, and obesity are also more likely to have diabetes.

### LONG TERM COMPLICATIONS

The striking feature of diabetes is the risk of developing long term complications: nephropathy, retinopathy, and neuropathy together with macroangiopathy. Overt nephropathy develops 10 to 20 years after the onset of insulin dependent diabetes<sup>5</sup> and five to 15 years after the onset of non-insulin dependent diabetes, the shorter time in the second type probably

reflecting the delay in diagnosing non-insulin dependent diabetes in many people. Clinical nephropathy develops in only about a fifth of those with insulin dependent diabetes and fewer of those with non-insulin dependent diabetes, although incipient nephropathy, reflected by microalbuminuria, is more common.<sup>6,7</sup> The importance of the nephropathy lies in the progress to end stage renal failure and the consequent need for continuous ambulatory peritoneal dialysis or renal transplantation, or both. Diabetes is now one of the major causes of renal failure, particularly in younger subjects.<sup>8</sup> This results in a large social, personal, and economic burden.

Retinopathy eventually develops in most patients with diabetes of both forms. In most patients, however, only background retinopathy develops, which generally does not impair vision. Proliferative retinopathy, particularly in insulin dependent diabetes can cause blindness, and it makes diabetes the commonest cause of blindness in people under the age of 60 in Britain.<sup>9</sup> Patients with non-insulin dependent diabetes are particularly prone to develop maculopathy, again with serious impact on vision. There is also an increased risk of cataract.

Neuropathy, both somatic and autonomic, also occurs in diabetic patients. This has particular effects on legs and feet. Sensation is diminished, and this can lead to ulceration and, generally in combination with peripheral vascular disease, gangrene and the need for amputation. Finally, macrovascular disease in the form of ischaemic heart disease, stroke, and peripheral vascular disease is two to five times more common in diabetic patients than in the general population and, indeed, is the main cause of premature death in diabetes.<sup>10</sup>

### ACUTE COMPLICATIONS

Diabetic patients may also have acute complications. Diabetic ketoacidosis is an important cause of death in diabetic subjects aged under 50<sup>11</sup> and mortality rises sharply with age.<sup>12</sup> Hypoglycaemia is also common, particularly in insulin dependent diabetes. Mild hypoglycaemia occurs with monotonous regularity, on average one episode every two weeks, whereas episodes requiring admission to hospital occur at a rate of 0.1 admission per patient year.<sup>13</sup> Even mild chronic hypoglycaemia may cause subtle neurological damage. Recently there has been emphasis on young patients dying of nocturnal hypoglycaemia—the "dead in bed" syndrome—which is rare but important as it occurs in young people.<sup>14</sup> In addition, hypoglycaemia is almost certainly much commoner than previously thought in non-insulin dependent diabetic patients taking sulphonylureas and contributes to confusional states in elderly people. Poorly controlled diabetes also increases susceptibility to infection.

Diabetes of both types is thus an important cause of morbidity and death. The economic costs of diabetes

Department of Medicine,  
University of Newcastle  
upon Tyne, Newcastle  
upon Tyne NE2 4HH  
K G M M Alberti, FRCP,  
professor of medicine

BMJ 1991;303:769-72

are about 5% of total NHS expenditure.<sup>1</sup> This excludes the costs to families of helping look after their diabetic relatives and the costs to the country of lost productivity. The key question is therefore whether diabetes represents a major cause of avoidable ill health.

#### POSSIBILITIES FOR PREVENTING DIABETES

Can ill health from diabetes be prevented? This can be considered on three fronts: primary prevention (Can diabetes itself be prevented?); secondary prevention (Even if diabetes occurs can the consequences be prevented?); and tertiary prevention (When the complications occur can morbidity and death from these be avoided?).

*The Health of the Nation* is remarkably vague on these issues, and indeed gives little attention to primary prevention. Insulin dependent diabetes is predominantly an autoimmune disease, and current work suggests that remission can be induced in some patients with drugs such as cyclosporin if they are started within six weeks of clinical presentation.<sup>15</sup> More specific drugs are needed, but when these are developed genuine preventive approaches can be tried by identifying patients during the long prodromal period of the disorder. Prevention of non-insulin dependent diabetes is probably more important in overall public health terms. As mentioned in the consultative document the condition is associated with obesity. Equally important is its strong association with physical inactivity.<sup>16 17</sup> Both of these are theoretically amenable to changes in lifestyle. In the long term more emphasis must be given to primary prevention as the only truly effective way to deal with the disorder.

Currently secondary prevention represents the main method of attack. Certainly the acute complications are avoidable, largely through education. Avoiding the long term complications is more difficult. The green paper baldly states that "blood glucose must be controlled and maintained within normal levels." This is oversimplistic. Although much indirect evidence supports the view that such an approach will prevent the development of the specific complications, the results of two long term trials currently under way, the

diabetes control and complications trial in insulin dependent diabetes<sup>18</sup> and the United Kingdom prospective diabetes study in non-insulin dependent diabetes,<sup>19</sup> are required to provide definitive proof. It is not known, for example, precisely what the threshold of blood glucose concentration is; normoglycaemia may not be necessary. It is also not known why some people never develop the complications despite poor glycaemic control. Moreover, there is no good evidence that glycaemic control is related to the main killer in diabetes, macrovascular disease. To prevent macrovascular disease efforts are needed to attack the known risk factors such as smoking, hypertension, dyslipidaemia, obesity, and physical inactivity that often accompany diabetes, particularly the non-insulin dependent form.<sup>20</sup>

Despite these caveats it should be emphasised that effective interventions are available. For non-insulin dependent diabetes diet forms the cornerstone of therapy, with a "healthy diet" aimed at maintaining a normal body mass index being the ideal. Exercise is also valuable when possible. Drugs such as sulphonylureas and metformin are also helpful when diet fails and insulin is of course also available. In insulin dependent diabetes insulin is indispensable. It is effective in that near normoglycaemia can be obtained, particularly with multiple daily injections, which have been eased by the availability of injection pens. None the less, absolute normalisation of metabolism is rarely achieved, partly because of the non-physiological injection route and partly because of the variability of absorption of insulin and imperfections of available insulins.<sup>21</sup> All these treatments are greatly aided by self monitoring of blood glucose concentration. In general, certainly by comparison with many other disorders, effective intervention is available for most patients, although further developments are needed.

Tertiary prevention is also relevant and possible. Sight threatening retinopathy can be treated effectively with laser therapy. The progress of nephropathy to end stage renal failure can be slowed by meticulous attention to control of blood pressure and a low protein diet. Neuropathy is more problematical, but it has been shown that amputation rates can be decreased considerably through good chiropody and education.<sup>22</sup> Less has been achieved for stroke and myocardial infarctions, although measures applicable to non-diabetic patients, such as stopping smoking and treatment of dyslipidaemia and hypertension, will be just as important if not more important in the diabetic person.

Overall the balance is undoubtedly in favour of diabetes being included as a key area. It is a clearly defined condition with serious long term sequelae which have a major impact on up to 1 million people and, inevitably, their friends and families as well as being a high cost to the NHS. In addition, by contrast with almost every other suggested key area care of diabetic patients is discrete, definable, and organised. There is an active patient organisation with more than 140 000 members (the British Diabetic Association). Every district has a diabetes service, and all but 17 have a specialist diabetologist. Diabetes liaison nurses are widespread and minimum requirements for care have been established.<sup>23</sup> Diabetes has been targeted by general practice as a major area of interest, and WHO Europe is leading a campaign to diminish the adverse health impact of diabetes. The Royal College of Physicians is coordinating the production of management protocols and, together with the diabetic association and the King's Fund, is examining audit and outcome measures. The Department of Health has already funded a study into the cost effectiveness of different methods of screening for retinopathy.<sup>24</sup> There is thus already considerable activity and a powerful

Sarah says  
"I have diabetes but I eat the  
healthiest and most exciting  
food - now my whole family  
has joined me!"  
Why don't you join Sarah's  
family too?

Calculate your BMI

The British Diabetic Association publishes a wide and informative selection of books and leaflets on healthy eating for people with diabetes and their families.

For further information visit our Diet Information Service  
British Diabetic Association  
10 Queen Anne Street  
London W1M 0BD  
Tel: 071 3231581 Fax: 071 637 3646

*The British Diabetic Association recognises the importance of education in preventing complications*

infrastructure is in place; this should allow the easy transition of diabetes into a key area for action under the government's strategy.

### Setting targets

Targets are obviously needed. One set was produced in 1989 at a meeting organised by WHO Europe and the European region of the International Diabetes Federation: the St Vincent Declaration.<sup>25</sup> Some of these are quoted in the consultative document (box). They suffer in part by being stated as proportional rather than absolute changes. None the less, these are reasonable aims. The consultative document, however, states that we do not have the baseline information, so that it is not possible to monitor the targets. This is a typical negative approach. It should be possible to establish rather quickly the numbers of diabetic patients going blind; requiring laser therapy; developing end stage renal failure; or having amputations, strokes, peripheral vascular disease, and heart attacks in targeted health regions if not in the whole country.

The government also suggests some proxy targets (box). The target relating to free eye tests for diabetic patients is a little odd as most diabetic clinics already screen for retinopathy with a camera or by direct funduscopy. These proxies are a little woolly in concept and are in danger of confusing process with outcome, although good practice in process is likely to aid outcome. There are other possible short term targets which should be included such as numbers of admissions to hospital for diabetes related causes; average glycaemic control; and proportion of patients reviewed in hospital or general practice a minimum number of times a year.

Overall it would seem wise to adopt the St Vincent Declaration, which includes many other suggestions relating to education and training, in the first place and to capitalise on the rapid progress being made by the St Vincent Declaration working group in the production of protocols, guidelines, and, in particular, standard computerised records. The criterion of setting challenging but achievable targets that can be monitored though appropriate indicators can certainly be met for diabetes, although further work in the short term will be needed.

### Strategy for reaching the targets

The key to reaching the targets is improvement in the organisation of care. Much groundwork has already been done, and the minimum requirements for diabetes care in hospital based services have been published.<sup>23</sup>

Proposals for general practice based care are less clear, and there is a real danger that some patients will be kept in general practice and not receive optimal or even minimal care because of the new funding arrangements. Nevertheless, it should be possible for district diabetes committees, which already exist in many regions, to agree on establishing a district register, protocols, minimum standards, audit concepts, etc.

### Barriers to achievement

The major problem is finance. If more diabetic patients are found and those currently receiving little or no care start to receive appropriate care the patient load will increase by 50% or more. More staff will be required, particularly diabetes nurse specialists and dietitians for education. We are also well short of the previously stated target of one diabetologist per 100 000 population.<sup>23</sup> We will also need more chiropodists, better eye screening facilities, and more capacity to deal with renal failure and sight threatening retinopathy. Audit and measurement, recording, and assess-

### Targets suggested by government for diabetes

The government would welcome views on the feasibility of adopting the targets agreed in the St Vincent Declaration:

- To reduce new blindness due to diabetes by one third or more
- To reduce by one half the rate of limb amputation for diabetic gangrene
- To achieve a pregnancy outcome in diabetic women similar to that of non-diabetic women
- To reduce the numbers of people entering end stage diabetic renal failure by at least one third
- To cut morbidity and mortality from coronary heart disease in people with diabetes by vigorous programmes of risk factor reduction.

Additionally, it is known that certain service activities are likely to produce good health outcomes. Until the information becomes available to use the outcome measures in the St Vincent Declaration service activities could be measured as a proxy for health outcomes.

Examples are:

- The proportion of general practices within a family health services authority area that follow protocols agreed locally between hospital clinicians and primary care staff for providing services to people with diabetes
- The proportion of people with diabetes screened, within a given period, for the long term complications of diabetes
- The proportion of people with diabetes who have received a free NHS eye test in the preceding year. (This should eventually be superseded in time by a specific diabetic retinopathy screening programme for all those at high risk.)

ment of outcomes will also consume resources. In the long term there will be savings, but with current methods of health service funding only short term expenditure is taken into account. A real increase in available funds will be needed; already staff cuts have been threatened in hospital based services for financial reasons and on the spurious grounds that diabetes is a primary health care disorder.

Other problems exist. Diabetes registers are needed throughout the country and will take time to establish. District policies need to be agreed and decisions made about which patients should be cared for in which setting. Monitoring of general practice and hospital services will be needed to ensure that minimum standards are being met. None of these problems are insurmountable provided that resources are available, and this must be the biggest question mark.

### Conclusion

Diabetes is an excellent example of a chronic disorder for which preventive measures have an important role in long term outcome. It is an increasing problem, with at least 1 million people affected, and a major cause of blindness, renal failure, amputation, and premature cardiovascular disease. It fulfils all the criteria set down for inclusion as a key area. New resources will, however, be needed if the stated objectives are to be met.

- 1 Secretary of State for Health. *The health of the nation*. London: HMSO, 1991. (Cm 1523.)
- 2 Neil HAW, Gatling W, Mather HM, Thompson AV, Thorogood M, Fowler GH, *et al*. The Oxford community diabetes study: evidence for an increase in the prevalence of known diabetes in Great Britain. *Diabetic Med* 1987;4:539-43.
- 3 Williams DRR. Hospital admissions of diabetic patients: information from Hospital Activity Analysis. *Diabetic Med* 1985;2:27-32.
- 4 Mather HM, Keen H. The Southall diabetes survey: prevalence of known diabetes in Asians and Europeans. *BMJ* 1985;291:1081-4.

- 5 Andersen AR, Christiansen JS, Andersen JK, Kreiner S, Deckert T. Diabetic nephropathy in type 1 (insulin-dependent) diabetes: an epidemiological study. *Diabetologia* 1983;25:496-501.
- 6 Mogensen CE. Diabetic renal involvement and disease in patients with insulin-dependent diabetes. In: Alberti KGMM, Krall LP, eds. *Diabetes annual*. 4th ed. Amsterdam: Elsevier, 1988:411-48.
- 7 Marshall SM, Alberti KGMM. Comparison of the prevalence and associated features of abnormal albumin excretion in insulin-dependent and non-insulin-dependent diabetes. *Q J Med* 1989;261:61-71.
- 8 Working Party Report. Renal failure in the UK: deficient provision of care in 1985. *Diabetic Med* 1988;5:79-84.
- 9 Cullinan TR. Diabetic retinopathy and visual disability. *Diabetologia* 1982;23:504-6.
- 10 Marks HH, Krall LP. Onset, course, prognosis and mortality in diabetes mellitus. In: Marbel A, White P, Bradley RF, Krall LP, eds. *Joslin's diabetes mellitus*. 11th ed. Philadelphia: Lea and Febiger, 1971:209-54.
- 11 Tunbridge WMG. Factors contributing to deaths of diabetics under fifty years of age. *Lancet* 1981;ii:569-72.
- 12 Gale EAM, Dornan TL, Tattersall RB. Severely uncontrolled diabetes in the over fifties. *Diabetologia* 1981;21:25-8.
- 13 Potter J, Clarke P, Gale EAM, Dave SH, Tattersall RB. Insulin-induced hypoglycaemia in an accident and emergency department: the tip of an iceberg. *BMJ* 1982;285:1180-2.
- 14 Campbell IW. Dead in bed syndrome: a new manifestation of nocturnal hypoglycaemia. *Diabetic Med* 1991;8:3-4.
- 15 Canadian-European Diabetes Study Group. Cyclosporin-induced remission of IDDM after early intervention: association of 1 year of cyclosporin treatment with enhanced insulin secretion. *Diabetes* 1988;37:1574-82.
- 16 Dowse GK, Zimmet PZ, Gareeboo H, Alberti KGMM, Tuomilehto J, Finch CF, et al. Abdominal obesity and physical inactivity are risk factors for both NIDDM and impaired glucose tolerance in Indian, Creole and Chinese Mauritians. *Diabetes Care* 1991;14:271-82.
- 17 Helmrich SP, Ragland DR, Leung RW, Paffenbarger RS. Physical activity and reduced occurrence of non-insulin-dependent diabetes mellitus. *N Engl J Med* 1991;325:147-52.
- 18 DCCT Research Group. Diabetes control and complications trial (DCCT): results of feasibility study. *Diabetes Care* 1987;10:1-19.
- 19 Multicentre Study Group. UK prospective study of therapies of maturity-onset diabetes. 1. Effect of diet, sulphonylurea, insulin or biguanide therapy on fasting plasma glucose and body weight over one year. *Diabetologia* 1983;24:404-11.
- 20 Reaven GM. Role of insulin resistance in human disease. *Diabetes* 1988;37:1595-607.
- 21 Home PD, Thow JC. Insulin therapy. In: Alberti KGMM, Krall LP, eds. *Diabetes annual*. 6th ed. Amsterdam: Elsevier (in press).
- 22 Miller LV, Godstein J. More efficient care of diabetic patients in a county-hospital setting. *N Engl J Med* 1972;286:1388-91.
- 23 Royal College of Physicians and British Diabetic Association. *The provision of medical care for adult diabetic patients in the United Kingdom (1984)*. London: Royal College of Physicians of London, 1985.
- 24 Sculpher MJ, Buxton MJ, Ferguson BA, Humphreys JE, Altman JFB, Spiegelhalter DJ, et al. A relative cost-effectiveness analysis of different methods of screening for diabetic retinopathy. *Diabetic Med* 1991;8:644-50.
- 25 World Health Organisation Europe and European Region of International Diabetes Federation. *The St Vincent Declaration*. Copenhagen: WHO Europe and the European Region of IDF, 1989.

## Lesson of the Week

### Late complications of undetected urethral stricture after cardiac surgery in a child

M A Johnston, D A Hughes, A F Azmy

**Urethritis in a child after perioperative catheterisation may lead to urethral strictures, which may present late.**

Urethral strictures in children after cardiac surgery have been reported from this centre.<sup>1</sup> Urinary catheters are used in the perioperative period for monitoring urinary output. The incidence of stricture formation was estimated as 2.7%. Similar findings have been recorded in adults.<sup>2-4</sup> The children who developed strictures had symptoms of urethritis after removal of the catheter. Strictures were detected early and responded successfully to urethral dilatation or urethrotomy with no long term complications.<sup>1</sup>

Since the original report<sup>1</sup> we had seen no further cases until the following child presented with renal impairment.

#### Case report

A 13 year old boy presented to his general practitioner with a history of anorexia, vomiting, and weight loss. At the age of 4 years he had had a repair of a congenital ventricular septal defect and prolapsing aortic valve cusp. A urethral catheter had been inserted for monitoring urinary output and left in situ for three days postoperatively. The child had complained of dysuria and strangury after removal of the catheter. These symptoms had settled after a short course of antibiotics. Two months later he had had another episode of dysuria, which resolved spontaneously. He had not complained of any further urinary tract symptoms during his subsequent follow up at the cardiac clinic.

At consultation at the surgical outpatient clinic at our centre direct questioning of the patient elicited that he had difficulty in passing urine and that the urinary stream was poor. Examination showed a pale and lethargic child with a urinary bladder palpable to the level of the umbilicus. Results of investigations were a haemoglobin concentration of 103 g/l, blood urea concentration 23.3 mmol/l, plasma creatinine concentration 226 µmol/l, creatinine clearance 27 ml/min, and chromium EDTA clearance 22.0 ml/min. Renal ultrasonography showed a grossly distended bladder, bilateral hydronephrosis, and hydroureter. A micraturating cystogram showed a stricture of the

membranous urethra and dilatation of the posterior urethra. Cystoscopy confirmed the presence of a short stricture, which responded initially to urethral dilatations. After six months he was passing urine satisfactorily and chromium EDTA clearance was 65 ml/min. At nine months, however, the patient reluctantly declared further dysuria, loin pain, and poor urine stream. Creatinine clearance had fallen to 18 ml/min and renal ultrasonography showed a dilated renal tract. Because of the deterioration of renal function vesicostomy was performed. Renal function began to improve, and when last seen his creatinine clearance was 50 ml/min.

#### Comment

Urethral strictures after cardiac surgery occur mainly in adults but rarely in children. Poor tissue perfusion concomitant with serious congenital cardiac anomalies together with secondary urinary infection in the presence of a urethral catheter are significant contributory factors. Although the incidence of urethral strictures is small, if they go undetected they may lead to serious deterioration of renal function.

Our patient did not have urine flowmetry as he was in retention with overflow incontinence at the time of admission. Urine flowmetry is considered an important part of the management of voiding disorders. Flowmetry must be performed in any child with a voiding problem after catheterisation. The free flow curve gives good clues to the underlying problems. A normal free flow curve and no residual urine exclude a severe voiding abnormality. An intermittent curve due to an irregular or interrupted stream may occur in cases of voiding by abdominal straining or in cases of functional voiding disorders.<sup>5</sup> In cases of an abnormal free flow curve or when there is a large residual urine volume full urodynamic assessment should be performed.<sup>6</sup>

Young boys may be rather shy in mentioning symptoms related to their genitals. This child, despite having great difficulty on micturition, did not mention the problem to his parents or to his general practitioner

Department of Paediatric Surgery and Nephrology, Royal Hospital for Sick Children, Glasgow G3 8SJ  
M A Johnston, FRCS, surgical registrar  
D A Hughes, MRCP, senior registrar in paediatric nephrology  
A F Azmy, FRCS, consultant paediatric surgeon

Correspondence to: Mr Azmy.

BMJ 1991;303:772-3