Randomised comparison of percutaneous endoscopic gastrostomy and nasogastric tube feeding in patients with persisting neurological dysphagia

R H R Park, M C Allison, J Lang, E Spence, A J Morris, B J Z Danesh, R I Russell, P R Mills

Abstract

Objective—To compare percutaneous endoscopic gastrostomy and nasogastric tube feeding in patients with persisting neurological dysphagia.

Design—Randomised 28 day study of inpatients requiring long term enteral nutrition.

Setting—Three Glasgow teaching hospitals.

Subjects—40 patients with dysphagia for at least four weeks secondary to neurological disorders: 20 patients (10 women) were randomised to nasogastric feeding and 20 (eight women) to endoscopic gastrostomy.

Main outcome measures—Treatment failure (blocked or displaced tubes on three or more occasions or refusal to continue treatment); duration of feeding; intake of liquid diets; complications; nutritional status at end of trial.

Results—One patient in each group died before starting feeding. Treatment failure occurred in 18 of the 19 nasogastric patients and in none of the gastrostomy group. The mean (SE) duration of feeding for the nasogastric group was 5·2 (1·5) days. No complications occurred in the nasogastric group but three (16%) of the gastrostomy group developed minor problems (aspiration pneumonia (two patients) wound infection (one)). Gastrostomy patients received a significantly greater proportion of their prescribed feed (93% (2%)) compared with the nasogastric group, (55% (4%); $p<0·001$) and also gained significantly more weight after seven days of feeding (1·4 (0·5) kg *v* 0·6 (0·1) kg; $p<0·05$). Analyses at days 14, 21, and 28 were not possible due to the small numbers remaining in the nasogastric group.

Conclusion—Percutaneous endoscopic gastrostomy tube feeding is a safe and effective method of providing long term enteral nutrition to patients with neurological dysphagia and offers important advantages over nasogastric tube feeding.

Introduction

Enteral nutrition with fine bore nasogastric tubes has been used successfully for many years to provide long term nutritional support for patients with dysphagia due to neurological disorders. Elderly patients, however, do not always tolerate nasogastric feeding and self extubation is common. One study found that as many as 23% of nasogastric tubes were unintentionally removed within 24 hours of starting feeding.[1] Ciocon *et al* found that early self extubation occurred in two thirds of elderly patients fed by tube.[2] Nasogastric tubes are least well tolerated by patients with stroke, who may require frequent reintubations and close nursing surveillance.[3] Reintubation is distressing for the patients and their attendants. Furthermore, long term nasogastric feeding is unaesthetic and the tubes often block. The extra nursing time and occasional need for radiography when replacing tubes all add to the cost of nasogastric tube feeding.

Although surgical gastrostomy is an alternative to nasogastric feeding many clinicians have been reluctant to use this method for fear of associated complications[4] and the need for general anaesthesia (up to 25% of cases).[5] In 1981 Ponsky and Gauderer reported their alternative technique of percutaneous endoscopic gastrostomy.[6] This technique has the following advantages over surgical gastrostomy: avoidance of surgery in a frail elderly population, shorter procedure time, use of intravenous sedation rather than general anaesthesia, flexibility, no theatre time, and lower cost.[7,8] A recent prospective study, however, found a similar complication rate for both techniques, and the cost advantage of endoscopic gastrostomy was reduced if the tube required replacing.[9]

Percutaneous endoscopic gastrostomy feeding is widely used in North America. Large studies have reported over 95% success rates for insertion, procedure times of 15-30 minutes, excellent tolerance by patients, (who are often at high risk from surgical procedures), low morbidity (about 6-16%), and a very low procedure related mortality (0-1%).[10-13] However, in Britain most patients with neurological or oropharyngeal dysphagia are still managed as well as possible with nasogastric feeding. Possible advantages of wide bore endoscopic gastrostomy tubes are reduced patient discomfort, reduced risk of displacement or blockage, and the ability to administer bolus feeds. Moreover, the tubes are concealed beneath the patients' clothing and are thus cosmetically acceptable and less likely to interfere with rehabilitation. We conducted a randomised trial of nasogastric versus endoscopic gastrostomy feeding in patients with neurological dysphagia to compare the efficacy of nutritional support, complication rates, patient acceptability, and quality of life with both feeding methods.

Patients and methods

PATIENTS

Patients were eligible for the study if they met the following criteria: longstanding (≥four weeks) dysphagia due to neurological disease; stable medical condition with likely survival of at least one month; ability to communicate verbally or in writing; and presence of a normal gastrointestinal tract. We excluded patients with dementia; mechanical lesions causing obstruction of the oesophagus or stomach; active intra-abdominal inflammation including inflammatory bowel disease or pancreatitis; history of partial gastrectomy, reflux oesophagitis, or intestinal obstruction; and presence of ascites, notable hepatomegaly, severe obesity, coagulopathy, untreated aspiration pneumonia, and major systemic disease including malignancy and respiratory, liver, or renal failure. All patients gave written or verbal consent and the study was approved by the ethics committees of the participating hospitals

Patients were often referred to our units for consideration for primary percutaneous endoscopic gastrostomy feeding during the study. We emphasised to patients, relatives, and referring doctors that many of the potential advantages of gastrostomy tube feeding were untested against the standard method of nasogastric tube feeding and that they should not agree to

Gastroenterology Units, Western and Royal Infirmaries and Stobhill Hospital, Glasgow
R H R Park, *senior registrar*
M C Allison, *senior registrar*
J Lang, *senior dietitian*
E Spence, *research sister*
A J Morris, *registrar*
B J Z Danesh, *consultant gastroenterologist*
R I Russell, *consultant gastroenterologist*
P R Mills, *consultant gastroenterologist*

Correspondence to: Dr P R Mills, Gartnavel General Hospital, Glasgow G12 0YN.

BMJ 1992;**304**:1406-9

participate in the trial if they had any reservations about either method. Several patients opted for primary gastrostomy tube feeding outside the study.

STUDY DESIGN

We used numbered sealed envelopes to randomly allocate patients to receive enteral nutrition for 28 days with either a fine bore nasogastric tube or a gastrostomy tube. Nasogastric tubes (Abbott Flexitube, polyurethane, 850 mm length, 1·5 mm internal diameter, Maidenhead, United Kingdom) were placed in a standard fashion and their position checked by aspirating gastric contents, or by radiography if necessary. The gastrostomy tubes (Ponsky-Gauderer silicone 20 Fr tube, Bard International Products, Crawley, United Kingdom) were inserted as described by Ponsky and Gauderer.[6] Routine antibiotic prophylaxis (cefuroxime 750 mg intramuscularly) was given one hour before the procedure. Feeding was started the next day if bowel sounds were present.

The enteral liquid diets were infused over 24 hours with a volumetric pump (Flexiflo, Abbott Laboratories). On day 1 the patients received 50 ml/hour, which was increased in two stages up to a maximum of 100 ml/hour by day 3. The volumes of feed were tailored to the patients' need. Patients were always fed with their heads raised and the gastrostomy tubes were aspirated every eight hours to check for delayed gastric emptying (>150 ml of feed aspirated). The amount remaining in the feed reservoir was recorded each day. Patients were allowed to drink clear fluids during the study but were requested to avoid additional oral diet. Treatment failure was defined as failure to position the nasogastric or gastrostomy tube, displacement or blockage of the tube on three or more occasions, or refusal of patient to continue. Patients were given the opportunity to switch to the other feeding method on withdrawal from the trial.

ASSESSMENT OF TREATMENT EFFICACY

The principal outcome measures were the number of treatment failures in each group and the amount of feed received expressed as the percentage of the prescribed total. If treatment failed the daily amount of feed administered to the point of failure was recorded. We recorded anthropometric data, including weight, mid-arm muscle circumference, and triceps skinfold thickness; haemoglobin, serum albumin, and serum transferrin concentrations; lymphocyte count; and 24 hour urinary nitrogen excretion before the trial and weekly during the trial. Complications were recorded and patients or their relatives completed a questionnaire on patient acceptability of tube feeding (terrible, fair, good, very good, or excellent).

STATISTICAL ANALYSIS

Results were expressed as mean (SE). We used Student's *t* test to analyse the results and p values less than 0·05 were regarded as significant. A sample size of 40 patients was selected to detect a two sided difference between the success of gastrostomy feeding at 90% and nasogastric feeding at 40% with a power of 0·9 and significance of 0·05. Assignment to the two feeding methods was preselected by random number generator with the Epistat Statistical Package (Round Rock, Texas, United States) and the resulting allocation sealed in sequentially numbered envelopes.

Results

Forty patients entered the study, of whom 20 were randomly allocated to receive nasogastric tube feeding and 20 to gastrostomy tube feeding. The mean (SE) age of the gastrostomy group was lower than that of the nasogastric group (56 (4·8) *v* 65 (2·9) years) but the difference was not significant (table I). One patient in each group died after randomisation but before intubation and feeding could be started (one of myocardial infarction, the other of respiratory arrest). Results are confined to the 38 patients who lived to participate in the study.

Table II shows the reasons for failure of treatment. Treatment failure occurred in 18 (95%) of the 19 patients in the nasogastric group but none in the gastrostomy group. All patients in whom nasogastric tube feeding failed elected to switch to gastrostomy tube feeding, which was again successful in all cases.

The liquid diet Ensure (Abbott Laboratories) was used for all patients except for one man in the gastrostomy group who had a history of possible chronic pancreatitis and was given Peptamen (Clintec Nutrition, Slough, United Kingdom). All patients in the gastrostomy group completed 28 days of feeding compared with only one patient in the nasogastric group. The mean (SE) duration of feeding for the nasogastric group was 5·2 (1·5) days (table III). Although both groups had similar prescribed intakes of liquid diets, the nasogastric group received a significantly lower percentage of their prescribed feed than the gastrostomy group (55% (4%) *v* 93% (2%); p<0·001).

There were no complications during the short period of feeding in the nasogastric group, but three patients in the gastrostomy group developed minor complications related to the feeding. Two patients had aspiration pneumonia and one a wound infection. All three settled well with appropriate antibiotic treatment. Two patients had delayed gastric emptying during the first three to four days of feeding, one of whom subsequently developed aspiration pneumonia despite slowing of the infusion rate.

TABLE I—*Demographic details of patients randomised to receive nasogastric or percutaneous endoscopic gastrostomy tube feeding*

	Nasogastric group	Gastrostomy group
Gender (F/M)	10/10	8/12
Mean (SE) age (years)	65 (2·9)	56 (4·8)
Diagnosis:		
Cerebrovascular disease	11	7
Motor neurone disease	7	9
Cerebral palsy	1	4
Parkinson's disease	1	

TABLE II—*Reasons for failure of treatment in patients randomised to nasogastric or percutaneous endoscopic gastrostomy tube feeding*

	Nasogastric group (n=19)	Gastrostomy group (n=19)
Failure to position tube	2	0
Displaced tube (three times)	12	0
Displaced tube (twice), blocked tube (once)	2	0
Patient's refusal to continue	2	0
Total	18	0

TABLE III—*Duration of feeding and intake of liquid diets in patients randomised to receive nasogastric or percutaneous endoscopic gastrostomy tube feeding. Results are given as mean (SE) unless stated otherwise*

	Nasogastric group (n=17)	Gastrostomy group (n=19)
No of days' feeding completed:		
<7	10	0
7-14	6	0
28	1	19
Duration of feeding (days)	5·2 (1·5)	28 (0)*
Prescribed daily intake (MJ)	7·54 (0·57)	6·8 (0·48)
Actual daily intake (MJ)	4·12 (0·63)	6·35 (0·45)
Intake as % of prescribed total	55 (4)	93 (2)*

* p<0·001 Compared with nasogastric group.

TABLE IV—*Anthropometric results for patients randomised to receive nasogastric or percutaneous endoscopic gastrostomy tube feeding*

	Nasogastric group			Gastrostomy group		
	Week 0	Week 1	Week 4	Week 0	Week 1	Week 4
Weight:						
No of patients	15	7	1	19	13	18
Mean (SE) measurement (kg)	50·4 (2·5)	48·0 (3·6)	59·0	44·0 (3·1)	46·4 (3·1)	47·5 (3·3)
Mean (SE) change from week 0 (kg)		0·6 (0·1)	4		1·4 (0·5)*	3·4 (0·6)
Mid-arm muscle circumference:						
No of patients	14	6	1	18	12	18
Mean (SE) measurement (cm)	22·5 (0·5)	21·3 (1·6)	27·0	21·8 (0·9)	22·7 (1·1)	23·1 (0·9)
Mean (SE) change from week 0 (cm)		0·3 (0·3)	2·5		0·6 (0·3)	1·3 (0·5)
Triceps skinfold thickness:						
No of patients	14	6	1	18	12	18
Mean (SE) measurement (mm)	10·2 (0·9)	10·6 (1·5)	16·0	8·2 (0·9)	8·9 (1·1)	8·7 (0·8)
Mean (SE) change from week 0 (mm)		0·05 (0·3)	2·5		0·2 (0·3)	0·5 (0·3)

* $p<0·05$ Compared with nasogastric group.

Before the trial the mean (SE) weight for the nasogastric group was higher than that of the gastrostomy group (50·4 (2·5) *v* 44·0 (3·1) kg), but this difference was not significant. After the first week the gastrostomy group had gained significantly more weight (1·4 (0·5) kg) than the nasogastric group (0·6 (0·1) kg; $p<0·05$) (table IV). This was the result of the greater dietary intake of the gastrostomy group during this period. After the first week the numbers in the nasogastric group were too small for statistical comparisons. The mean (SE) increase in weight during the study for patients in the gastrostomy group was 3·4 (0·6) kg. Before the trial results for mid-arm muscle circumference and triceps skinfold thickness tests were similar for both groups. During the study there was a slight increase in both parameters. Statistical comparison was again impractical because of the small numbers in the nasogastric group.

Concentrations of haemoglobin, serum albumin, and transferrin; lymphocyte count; and 24 hour urinary nitrogen excretion were similar in each group before entry to the trial. Serum albumin and transferrin concentrations increased in the gastrostomy group from 35 to 38 g/l and 2·3 to 2·6 g/l respectively at four weeks. Statistical analyses were impractical because of the small numbers in the nasogastric group after the first week of the trial.

The single patient who completed four weeks of nasogastric feeding opted for gastrostomy tube feeding at completion of the study. She stated that the nasogastric tube feeding was cosmetically unacceptable. Two other patients refused to continue with feeding by the nasogastric route during the trial.

The 38 patients were followed up for a median of 184 (range 30-390) days. All patients received gastrostomy tube feeding after completion or withdrawal from the trial. Patients ranked their acceptability of gastrostomy tube feeding as excellent (16 patients), very good (21), and fair (one). The gastrostomy tube was removed in three stroke patients whose swallowing had improved after a median duration of 58 days. Two patients required a change of gastrostomy tube at 280 and 325 days.

Discussion

We have shown that percutaneous endoscopic gastrostomy tube feeding is superior to nasogastric tube feeding for the enteral nutritional support of patients with persisting dysphagia resulting from neurological disease. There were no treatment failures in the gastrostomy group, whereas only one patient in the nasogastric group completed four weeks of feeding. The gastrostomy patients received a significantly greater proportion of the prescribed feed and after one week had significantly greater weight gain than the nasogastric patients. The greater weight gain in the gastrostomy group was attributable to the greater dietary intake during uninterrupted feeding.

Treatment failures in the nasogastric group occurred after a mean of 5·2 days, and two thirds of these failures were caused by tube dislodgment. These findings agree with previous studies showing displacement rates of 25-67%, most of which are accounted for by self extubation.[1 2 14] Other complications associated with nasogastric feeding include nasal irritation, oesophagitis, metabolic abnormalities, aspiration pneumonia, pulmonary intubation, and traumatic pneumothorax.[13]

Our complete success in insertion of gastrostomy tubes compares favourably with the average success rate of 95% in American studies.[15 16] Recognised complications of gastrostomy tube feeding include gastric perforation, gastric haemorrhage, gastrocolic fistula, infection of stoma site, and aspiration pneumonia.[10] During our study three patients in the gastrostomy group developed complications. One patient developed a stoma site infection which would have been classified as minor by criteria in other studies.[4 8] The other two patients developed aspiration pneumonia which responded to standard treatment. Our morbidity of 16% with gastrostomy was in keeping with that in other studies.[4 8 9 11 12 17] Patients with neurological dysphagia, many of whom are unable to swallow their own saliva, are prone to aspiration pneumonia. The two patients who had aspiration pneumonia during our trial had recovered from similar episodes several weeks before the study. Our study has confirmed earlier reports that gastrostomy tube feeding does not protect against aspiration pneumonia.[2 17-19] Cogen and Weinryb found that a history of aspiration pneumonia was the only risk factor associated with subsequent episodes during gastrostomy feeding; age, mental status, type of liquid diet, or infusion time did not affect the risk of aspiration pneumonia.[19]

In conclusion, this study has shown that percutaneous endoscopic gastrostomy tube feeding is a safe, effective, and acceptable method of providing long term enteral nutrition in neurological patients and offers important advantages over standard nasogastric tube feeding. Candidates for gastrostomy tube feeding should need enteral nutrition for more than four to six weeks and have a prognosis which justifiås nutritional support. In this group of patients improvement in nutrition can enhance both the quality of life and rehabilitation.[20] In our opinion nasogastric tube feeding should be used for only short term nutritional support.

We thank the Scottish Motor Neurone Disease Association for supporting this study and Bard Ltd for supplying the gastrostomy tubes. We also thank colleagues who referred patients and the nursing staff, dietitians, and speech therapists in the participating hospitals for their enthusiastic help.

1 Rees RGP, Payne-James JJ, King C, Silk DBA. Spontaneous transpyloric passage and performance of fine bore polyurethane feeding tubes: a controlled clinical trial. *J Parenter Enteral Nutr* 1988;**12**:469-72.
2 Ciocon JO, Silverstone FA, Graver M, Foley CJ. Tube feeding in elderly patients. *Arch Intern Med* 1988;**148**:429-33.
3 Finucance P, Aslan SM, Duncan D. Percutaneous endoscopic gastrostomy in elderly patients. *Postgrad Med J* 1991;**67**:371-3.
4 Gupta T, Maliakkal BJ, Peleman R, Ehrinpreis M, Weaver D, Luk GD. Complications of surgical and percutaneous endoscopic gastrostomy *Gastroenterology* 1989;**96**:A1905.
5 Wasiljew BK, Ujiki GT, Beal JM. Feeding gastrostomy: complications and mortality. *Am J Surg* 1982;**143**:194-5.
6 Ponsky JL, Gauderer MWL. Percutaneous endoscopic gastrostomy: a non-operative technique for feeding gastrostomy. *Gastrointest Endosc* 1981;**27**: 9-11.
7 Ruge J, Vasquez RM. An analysis of the advantages of Stamm and percutaneous endoscopic gastrostomy. *Surg Gynecol Obstet* 1986;**162**:13-6.
8 Jones M, Santanello SA, Falcone RE. Percutaneous endoscopic versus surgical gastrostomy. *J Parenter Enteral Nutr* 1990;**14**:533-4.
9 Steigmann GV, Goff JS, Silas D, Pearlman N, Sun J, Norton L. Endoscopic versus operative gastrostomy: final results of a prospective randomised trial. *Gastrointest Endosc* 1990;**36**:1-5.

10 Moran BJ, Taylor MB, Johnson CD. Percutaneous endoscopic gastrostomy. *Br J Surg* 1990;77:858-62.
11 Ponsky JL, Gauderer MWL, Stellato TA, Aszodi A. Percutaneous approaches to enteral alimentation. *Am J Surg* 1985;**149**:102-5.
12 Larson DE, Burton DD, Schroeder KW, DiMagno EP. Percutaneous endoscopic gastrostomy. Indications, success, complications, and mortality in 314 consecutive patients. *Castroenterology* 1987;**93**:48-52.
13 Benya R, Mobarhan S. Enteral alimentation: administration and complications. *J Am Coll Nutr* 1991;**10**:209-19.
14 Keohane PP, Attrill H, Jones BJM, Silk DBA. Limitations and drawbacks of fine bore nasogastric feeding tubes. *Clin Nutr* 1983;2:85.
15 Foutch PG, Woods CA, Talbert GA, Sanowski RA. A critical analysis of the Sacks-Vine gastrostomy tube: a review of 120 consecutive procedures. *Am J Gastroenterol* 1988;**83**:812-5.
16 Wolfsen HC, Kozarek RA, Ball TJ, Patterson DJ, Botoman VA, Ryan JA. Long-term survival in patients undergoing percutaneous endoscopic gastrostomy and jejunostomy. *Am J Gastroenterol* 1990;**85**:1120-2.
17 Hogan RB, DeMarco DC, Hamilton JK, Walker CO, Polter DE. Percutaneous endoscopic gastrostomy—to push or pull. *Gastrointest Endosc* 1986;**32**:253-8.
18 Kirby DF, Craig RM, Tsang T-K, Plotnick BH. Percutaneous endoscopic gastrostomies: a prospective evaluation and review of the literature. *J Parenter Enteral Nutr* 1986;**10**:155-9.
19 Cogen R, Weinryb J. Aspiration pneumonia in nursing home patients fed via gastrostomy tubes. *Am J Gastroenterol* 1989;**84**:1509-12.
20 Allison MC, Morris AJ, Park RHR, Mills PR. Percutaneous endoscopic gastrostomy tube feeding may improve outcome of late rehabilitation following stroke. *J R Soc Med* 1992;**85**:147-9.

(Accepted 23 March 1992)

Trends in deliberate self poisoning and self injury in Oxford, 1976-90

Keith Hawton, Joan Fagg

Abstract

***Objective*—To review trends in deliberate self poisoning and self injury (attempted suicide) over 15 years (1976-90) on the basis of general hospital referrals.**

***Design*—Prospective data collection by computerised monitoring system.**

***Setting*—Teaching general hospital.**

***Subjects*—All patients aged 15 and over (n=9605) referred to the hospital after episodes (n=13 340) of deliberate self poisoning or self injury.**

***Main outcome measures*—Rates based on population of Oxford city; changes in substances used for self poisoning; history and repetition of attempts; and rates of admission to the hospital and of referral to the psychiatric service.**

***Results*—Attempted suicide rates for women declined during the late 1970s and early 1980s but increased again during the late 1980s. Those for men remained relatively steady throughout the period. Highest mean annual rates occurred in women aged 15-19 (711/100 000) and in 20-34 year old men (334/100 000). The proportion of overdoses with paracetamol increased from 14·3% (125/873) in 1976 to 42% (365/869) in 1990 (χ^2 for trend=481, $p<0·01$). Throughout the period the proportions of referred patients admitted to hospital and of those attempting suicide for the first time (over two thirds) did not decrease. Annual rates of repetition of attempts by women declined from 15·1% (257/1700) in 1976-8 to 11·9% (161/1356) in 1987-9 (χ^2 for trend=7·8, $p<0·01$). Lower repetition rates occurred in women admitted to hospital and referred to the psychiatric service (431/4585, 9·4%) than in those not referred (42/235, 17·9%; $\chi^2=17·2$, $p<0·0001$).**

***Conclusions*—Rates of attempted suicide declined in the 1970s and early 1980s, in women, but there are probably at least 100 000 hospital referrals a year in England and Wales because of this problem. Prevention of paracetamol self poisoning requires urgent attention, and psychosocial assessment should be conducted with as many of those who attempt suicide as possible.**

Introduction

Throughout the United Kingdom during the 1960s and early 1970s the number of hospital referrals for deliberate self poisoning and self injury (attempted suicide) rose greatly, especially in young women.[1-3] Deliberate self poisoning (overdose) became especially common, such that by the mid-1970s it was the most common reason for emergency medical admissions of women to hospital and the second most common such reason for men.[4] This paper reviews trends in referrals for attempted suicide to the general hospital in Oxford over the 15 years 1976-90 and is based on information collected in a computerised monitoring system.[5]

Method

We studied the attempts of people aged 15 and over referred to the general hospital in Oxford because of self poisoning or self injury. The general hospital receives all referred patients from Oxford city and the surrounding area. Patients referred after self poisoning or self injury are identified by the monitoring system, irrespective of whether they are referred to the emergency psychiatric service in the hospital. Those referred to the service (83·2%) received a detailed psychosocial assessment[4] by a specially trained psychiatric nurse, psychiatrist, or social worker, after which a data sheet was completed for entry to the computerised monitoring file. Through scrutiny of accident and emergency department records a limited amount of information was also available on patients referred to the hospital but not to the psychiatric service.

For those findings which are based on rates the data have been analysed for referrals from Oxford city only. This is because the rest of the hospital catchment area is ill defined. The population figures for Oxford city are midyear estimates and were provided by the Office of Population Censuses and Surveys. Age and sex specific rates per 100 000 population were calculated, with appropriate midyear population estimates as the denominators.

Results

REFERRALS TO GENERAL HOSPITAL

During the 15 year period (1976-90) 9605 people were referred to the general hospital as a result of 13 340 episodes of deliberate self poisoning or self injury. A total of 5961 patients (62·1%) were women.

The rates of attempted suicide for Oxford city residents declined in women between the late 1970s and 1985 but rose again later in the study period, whereas those for men remained relatively steady throughout (table). The highest rates in women were consistently in the 15-19 age group (mean annual rate 711/100 000) and in men generally in the 20-34 age group (mean annual rate 334/100 000).

Extrapolation from the age and sex specific rates of attempted suicide in Oxford city during 1989 and 1990 to the appropriate population data for England and Wales suggests that approximately 120 000 patients

University Department of Psychiatry, Warneford Hospital, Oxford OX3 7JX
Keith Hawton, *consultant psychiatrist and clinical lecturer*
Joan Fagg, *research assistant*

Correspondence to:
Dr Hawton.

BMJ 1992;**304**:1409-11