Methods and results

Over two years patients routinely attending the diabetic outpatient clinic were asked to provide first morning urine samples from three consecutive days before each visit to the clinic. The urine samples were tested for bacteriuria by a nitrite test (BM-Tests, Boehringer Mannheim) and were excluded if the result was positive. Altogether 1391 patients provided two or three urine samples on each visit. The mean number of samples per patient was 3.49 (range 2-18). Albumin concentration was measured by immunoturbidimetry (coefficient of variation 5.1% over the working range between batches) and creatinine concentration by the kinetic Jaffé reaction (coefficient of variation 10% between batches).

For each patient the mean value and coefficient of variation for both the albumin concentration and the albumin:creatinine ratio were calculated from all the urine samples provided. The data were then grouped according to the mean value. For each group the mean coefficient of variation within the group was calculated as $\sqrt{(\sum CV_i^2)/n}$ where n is the number of patients and CV_i is the individual coefficient of variation.⁵

The mean coefficient of variation for each group of albumin concentrations ranged from 58 to 82% and showed no relation with the concentration (table). Expressing albumin as a ratio to creatinine did not

Variability in urinary albumin concentrations and albumin:creatinine ratios in diabetic patients

	No of patients	Mean coefficient of variation (%)
<i>Albumin concentration</i>		
Mean concentration (mg/l):		
<10	654	58
10-20	223	74
20-30	100	72
30-40	84	66
40-50	47	71
50-60	49	65
60-80	46	82
80-100	23	69
100-200	74	68
>200	91	60
<i>Albumin:creatinine ratio</i>		
Mean ratio:		
<1	482	41
1-2	278	61
2-3	122	69
3-4	73	80
4-5	52	64
5-6	46	60
6-8	59	68
8-10	43	71
10-20	93	61
>20	138	55

substantially reduce the variability. To assess the effect of age the patients were divided into those equal to or under 45 and those over 45. The mean coefficients of variation of patients in these groups were not significantly different. A subgroup of 23 patients with a range of mean albumin concentrations of 5-877 mg/l provided three urine samples at each of three visits during the study. There were no significant differences in the mean albumin concentrations between the first and second visits and the first and third visits.

Comment

We found greater variability in albumin concentrations and albumin:creatinine ratios under routine clinical conditions than has been found under study conditions. This has serious implications for the use of albumin excretion as a predictor of nephropathy or cardiovascular disease in individual patients, when a reliable value is necessary. Because of the wide variability indicated in this and other studies^{3,4} several samples would have to be analysed to obtain a reasonably accurate estimate of urinary albumin excretion, and this is not feasible in routine clinical practice.

If a patient provided three urine samples with a mean albumin concentration of 50 mg/l and a coefficient of variation of 60% (comparable to our findings) the 95% confidence interval would be 15.4 to 84.6 mg/l. For 10 samples the confidence interval would be 31 to 69 mg/l. To have 95% confidence that the mean value was within 10% of the true value would need 144 samples, and for the mean value to be within 5% would require 576 samples.

Clinicians must appreciate the wide variability in urinary albumin excretion if they are to avoid misclassifying patients.

We thank Mr Jim Gibbons for technical help, Ms Patricia Price for secretarial help and Dr A C McCuish and staff of the diabetes centre for their valuable assistance.

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Prevalence of procedures in childbirth

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The Commons Health Committee's recent report highlights the paucity of national information on maternity services.¹ Data from the hospital episodes system are inadequate. Despite increased research on interventions in childbirth^{2,3} the information needed to describe current practice and detect trends is lacking. I present such information.

Methods and results

Two postal surveys were carried out, in 1984, when the methodology was validated,⁴ and 1989. Ten areas

in England (registration districts or combinations of registration districts) were chosen in 1984, and 20 different areas in England and Wales (to achieve a wider geographical spread) were selected in 1989. The probability of choosing an area was proportional to the number of births in the area. Births registered during one month in each area were randomly sampled.

In 1984 mothers were sent questionnaires four months after giving birth; 1508 of 1920 (79%) responded. In 1989 mothers were sent questionnaires six months after giving birth; 1493 of 1977 (76%) responded. Women who had elective caesarean sections (before starting labour) were not asked about other procedures. Tests for differences between proportions and χ^2 tests were used in the analyses.

The proportion of caesarean sections increased between 1984 and 1989 (table). This rise was confined to non-elective caesarean sections (carried out after labour started). The proportions of women who had artificial rupture of the membranes before labour,

episiotomy, stitches, shaves, and enemas decreased. In 1989 shaves were associated with caesarean sections. When caesarean births were excluded the proportion of women shaved decreased from 552/1317 (42%) in 1984 to 21/1269 (2%) in 1989 ($p < 0.001$). The reduced prevalence of stitches was associated with the decrease in episiotomies and was not significant when episiotomies were excluded (436/798) (55%) in 1984 and 467/880 (53%) in 1989.)

Proportions of women in two surveys (1984 and 1989) who experienced interventions during childbirth (excluding those who gave inadequate replies). Figures are numbers (percentages) of women

Intervention	1984	1989
Caesarean section:		
Before onset of labour	151/1473 (10)	201/1491 (13)**
After onset of labour	70/1473 (5)	81/1485 (5)
Induction by drugs	81/1473 (5)	114/1485 (8)*†
Artificial rupture of membranes:	362/1411 (26)	354/1386 (26)
Before onset of labour		
After onset of labour	237/1419 (17)	155/1399 (11)***
Anaesthesia or analgesia:	667/1419 (47)	647/1399 (46)
Epidural anaesthesia		
Other	309/1416 (22)	281/1388 (20)
Episiotomy	858/1407 (61)	865/1382 (63)
Stitches	599/1399 (43)	493/1375 (36)***
Shave	1051/1418 (74)	976/1391 (70)*
Enema	634/1421 (45)	114/1386 (8)***
	548/1408 (39)	136/1378 (10)***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

†Includes 29 caesarean sections performed after trial of labour (such operations were not distinguished in 1984).

Primiparous women were twice as likely to have a non-elective caesarean section as multiparous women (50/635 (8%) *v* 31/837 (4%) in 1984, $p < 0.001$; 69/670 (10%) *v* 43/802 (5%) in 1989, $p < 0.001$). The proportion of primiparous women was similar in 1984 (646/1507 (43%) and 1989 (671/1480 (45%)). In 1989 primiparous women aged over 35 were more likely to have a non-elective caesarean section than those aged ≤ 35 (9/46 (20%) *v* 59/618 (10%), $p < 0.05$). In 1984 primiparous women over 35 were too few for analysis. The higher proportion of older primiparous women in 1989 does not fully explain the rise in the rate of non-elective caesarean sections since there was still a significant increase when they were excluded (77/1438 (5%) in 1984 *v* 102/1416 (7%) in 1989, $p < 0.05$).

The areas studied in 1989 varied widely in the proportion of women receiving enemas (1/66 (2%) to 32/74 (43%), $p < 0.001$), epidural anaesthesia (1/69 (1%) to 21/60, 35%), $p < 0.001$, artificial rupture of the membranes before labour (2/80 (3%) to 18/69 (26%),

$p < 0.01$), and induction by drugs (7/58 (12%) to 25/67 (37%), $p < 0.05$). Other procedures did not differ significantly between areas.

Women's marital status, housing tenure, level of education, and ethnic group differed significantly between areas; age, parity, and the proportions of preterm deliveries and low birthweight babies did not. Only ethnic group and educational level were associated with both area and procedures that varied by area. Asian women were more likely than others to have their membranes artificially ruptured before labour (8/38 (21%) *v* 141/1333 (11%), $p < 0.05$) and epidural anaesthesia (13/34 (38%) *v* 263/1326 (20%), $p < 0.01$). Mothers who had finished full time education before age 17 were more likely to have their membranes artificially ruptured before labour than more educated women (120/972 (12%) *v* 33/422 (8%), $p < 0.05$). Nevertheless, the differences between areas remained significant when these variables were controlled for.

Comment

These results, suggesting that obstetric practice is changing, reinforce the need for regular, complete, and accurate collection of national data. If the rate of non-elective caesarean sections is increasing there may be financial, medical, and social implications.⁵ Differences between areas in the rates of induction of labour, epidural anaesthesia, and enemas cannot be explained by differences between populations. They may reflect variations in medical opinion, consumer demand, and facilities and should be investigated further.

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ONE HUNDRED YEARS AGO

THE LEGAL DUTIES OF A MEDICAL PRACTITIONER.

In a brief address delivered before the Belfast Medical Students Association, Dr. Henry O'Neill gave a review of some of the leading points in which the membership of the medical profession involves legal responsibilities. The medical jurist must have a thorough knowledge of his profession. He must be able to understand difficult medicolegal questions and be prepared to make a wise selection of medical facts, and apply medical principles so as to enable a judge and jury to grasp the details of the case before them and arrive at a just verdict. The duty of a medical man in regard to dying declarations was next discussed, and he then went on to point out the rules to be observed in making a *post-mortem* examination when ordered to do so by a coroner, and the method to be followed in drawing up a report containing the results of such examination. The lecturer then gave a short account of the institution of the coroner's court, and referred to the other courts in which a medical man may be called upon to appear in a professional capacity; and, speaking, in

conclusion, of evidence, he said that all questions put to the medical witness should receive direct, concise, distinct, and audible answers in simple language, free from technicalities. He may give his opinion if required, and in all these matters the medical man must be true, act truly, and speak the truth in love.

(*BMJ* 1893;ii:141.)

FEMALE MEDICAL STUDENTS IN THE UNITED STATES.—The medical education of women has received a check in a very unexpected quarter. "The Faculty of the Colombian University in Washington" has determined to close the doors of their medical department against female students. The reasons given for this step are that the presence of women kept students of the sterner sex away, and the authorities of the Colombian University say that they have no desire to transform it into a female seminary. They somewhat inconsequently add that the teaching of men and women together is demoralising to both.

(*BMJ* 1893;ii:47.)