

A cervical cytology campaign using a computerised age-sex register

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Summary

The computerised age-sex register of the population attending a small health centre was used to generate invitations to women aged from 25 to 64 years to attend for a cervical smear. The campaign took place over about three months and was accompanied by appropriate publicity measures.

Replies were received from 80·7 per cent of those to whom invitations were sent. Of those who replied, 11·5 per cent refused the test and of those who accepted 7·6 per cent failed to attend. The cost of the campaign was about £2,280, or £2.71 for each of the 842 smears taken. Of the publicity measures used, posters appeared to be more effective than evening paper publicity or handbills.

Just over 70 per cent of the women in the target population had a cervical smear during the campaign or in the preceding three years. It is not possible from the available data to assess whether this coverage rate justifies the costs of the campaign.

In 1969 only 15 per cent of a sample of practices had age and sex registers (Irvine and Jefferys, 1971), though with increasing recognition of their value it is likely that this proportion has by now increased. Registers are generally kept in a book or on cards, but there are several potential advantages of age and sex registers stored in a form which can be fed into a computer (Wofinden, 1971). One such advantage is the ease with which it is possible to generate lists and addressed labels for use in issuing invitations to attend for screening examinations.

All Bristol's health centres have age-sex registers. Originally compiled manually on cards, the data on the registers of seven health centres have now been transferred to punched cards and stored on magnetic tape. The files are regularly updated, and uses to which the data have been put include periodic routine print-outs of practice lists, special print-outs of particular age and sex groups, family listings, and issuing appointments in measles vaccination campaigns.

This report describes a pilot study of the use of a computerised age-sex register in an intensive campaign to promote acceptance of cervical cytology examinations.

Patients and methods

Stockwood Health Centre houses eight general practitioners in three partnerships caring for about 9,000 patients. There are two main types of housing in the area. Immediately around the health centre are modern privately-owned three-bedroomed houses occupied for the most part by young families from social classes 2 and 3, non-manual. A little further away are older corporation-owned houses occupied predominantly by middle-aged members of social class 3, manual.

The general practitioners at Stockwood agreed to their health centre being used as a base for an experimental attempt to increase cervical cytology acceptance rates by using an age-sex register to identify individuals in the target population who could then be sent a personal invitation or appointment. A working party to plan the exercise was formed, and the objectives were agreed as follows:

- (1) to offer a cervical cytology examination to all women aged from 25 to 64 years who were registered with the health centre doctors and who had not had a cervical cytology examination during the preceding three years,

- (2) to examine all who accepted,
- (3) to complete the exercise within three months of issuing the first invitations.

Because of the pilot nature of the exercise, the objectives did not include a statement of the proportion of eligible women which it was desired to screen. Information on the achieved acceptance rates would be of value in planning subsequent campaigns in which more precise objectives would be defined.

In February 1972 a print-out of the required portion of the age-sex register, divided by practice and into the age groups 25 to 34 years and 35 to 64 years, was obtained and sent to the health centre. There the health visiting and clerical staff amended the list by incorporating changes (additions, deletions, and changes of name or address) which were known to have taken place since the computer file was last updated. They also sought and corrected any other obvious errors in the print-out. The computer also provided three addressed labels for each patient.

Each woman whose name was on the revised list was then sent:

- (a) a letter of invitation, signed by the senior partner of the group of doctors with whom she was registered,
- (b) an informative leaflet,
- (c) a form on which to indicate whether she had had a test in the last three years, and if not whether she wished an appointment to be made for the test to be done either at the health centre by a doctor, or at her home by a midwife, or whether she would first like to discuss the matter with a health visitor,
- (d) a stamped addressed envelope for the return of the form to the health centre.

If no reply had been received after three weeks, a reminder letter and another copy of the form were sent.

The issuing of invitations was preceded and accompanied by a health education campaign aimed principally at increasing the acceptance rate. It was not primarily intended to supply knowledge about the natural history or prevention of cervical cancer, or to change attitudes towards preventive medicine. Posters, leaflets, and mass-media publicity led up to a public meeting timed to take place shortly after invitations would have been received. The meeting was followed by further publicity designed to increase the rate of response to the invitation.

For those who accepted invitations, clinic sessions were arranged and appointments sent out about two weeks in advance. Appointments were offered to 25 patients for each 2½ hour session. In general, the family doctors screened their patients aged 35 to 64 years, and local authority doctors screened those aged 25 to 34 years. After being screened, each patient was given a hand-out explaining what had been done, informing her that she would be notified if further investigation was required, and inviting those who wished to do so to call at the health centre to check on the result three or four weeks after the test.

Results

Response to invitations

Of the 2,168 names on the print-out, 85 (3.9 per cent) were eliminated on scrutiny. The invitations sent to a further 109 women (five per cent) were returned as undeliverable, and one invitation was sent to a woman whose year of birth was learnt to be wrongly recorded and who thus did not fall into the target age group. Despite careful updating, it thus seems that at least nine per cent of the entries in this part of the age-sex register were inaccurate. It is also probable that some of the 291 women who did not reply to either letter of invitation did not receive them.

The results in table 1 refer to the 2,082 invitations which were sent to women between the ages of 25 and 64 years. The greatest proportion of undelivered invitations (6.8 per cent) occurred in the 25 to 34 year-old age group, which is presumably part of the most mobile section of the population. In contrast, only 1.9 per cent of the invitations sent to women aged 55 to 64 years were returned as undeliverable: this difference is significant ($P < 0.01$). There was a trend among those who were presumed to have received an invitation for a decreasing proportion of responses to the first letter with increasing age. Replies were received to the first letter from 62.8 per cent of those aged 25 to 34 years who were presumed to have received them, compared with 51.4 per cent of women aged 55 to 64 years ($P < 0.001$).

TABLE 1
RESPONSE TO INVITATIONS BY WOMEN IN DIFFERENT 10-YEAR AGE GROUPS

<i>Age group</i>	<i>Invitations sent (100%)</i>	<i>Returned undelivered</i>	<i>Replied to first invitation</i>	<i>Replied to second invitation</i>	<i>No reply received</i>
25-34	966	66 (6.8)	565 (58.5)	219 (22.7)	116 (12.0)
35-44	556	22 (4.0)	323 (58.1)	133 (23.9)	78 (14.0)
45-54	352	17 (4.8)	176 (50.0)	101 (28.7)	58 (16.5)
55-64	208	4 (1.9)	105 (50.5)	60 (28.8)	39 (18.8)
Total	2082	109 (5.2)	1169 (56.1)	513 (24.6)	291 (14.0)

Figures in brackets are percentages

Thirty women, seven or eight from each ten-year age group, requested an interview with a health visitor before making a decision. One of these failed to attend for her appointment, 23 elected to have the test done, five were ineligible because they had had a recent test or a hysterectomy, and only one refused.

TABLE 2
COMPARISON OF RESPONSES TO FIRST AND SECOND INVITATIONS

<i>Reply</i>	<i>Responded to first invitation</i>	<i>Responded to second invitation</i>	<i>Total</i>
Ineligible for test	429 (36.7)	147 (28.7)	576 (34.3)
Test refused	74 (6.3)	120 (23.4)	194 (11.5)
<i>Test requested by doctor</i>	603 (51.4)	213 (41.6)	816 (48.5)
<i>by midwife</i>	63 (5.4)	32 (6.2)	95 (5.7)
Total (100%)	1169	512	1681

Figures in brackets are percentages

The patient who failed to attend for her appointment with a health visitor is excluded from this table.

Table 2 shows as expected that a significantly greater proportion of those who failed to reply to the first letter of invitation but who replied to the second refused the test. Of the 740 eligible women who replied to the first invitation, 74 (ten per cent) refused the test, compared with 120 (32.9 per cent) of the 365 eligible women who replied to the second invitation ($P < 0.01$). Ineligibility and age are associated (table 3), but after standardisation

TABLE 3
RESPONDENTS IN DIFFERENT AGE GROUPS WHO WERE INELIGIBLE FOR THE TEST

<i>Age group</i>	<i>Total replies (100%)</i>	<i>Test done less than 3 years ago</i>	<i>Hysterectomy</i>	<i>Total ineligible</i>
25-34	784	289 (36.9)	12 (1.5)	301 (38.4)
35-44	456	144 (31.6)	16 (3.5)	160 (35.1)
45-54	277	64 (23.1)	21 (7.6)	85 (30.1)
55-64	165	13 (7.9)	17 (10.3)	30 (18.2)
Total	1682	510 (30.3)	66 (3.9)	576 (34.2)

Figures in brackets are percentages

for age the proportion of ineligible women replying to the first rather than the second letter is still significantly greater than the proportion of eligible women ($P < 0.01$). Similarly, standardisation for eligibility does not eliminate the significant ($P < 0.05$) trend formore younger than older women to reply to the first rather than the second letter. It still appears to be worthwhile sending a reminder letter. The 804 second letters which were sent out yielded 245 acceptances to add to the 666 acceptances received from the first letter.

Test preferences and attendance

Of the 911 eligible women who requested a test, 95 (ten per cent) asked for it to be done at home by a midwife rather than at the health centre by a doctor. A significantly ($P < 0.01$) high proportion of these women was included in the group aged 45 to 64 years who responded to the second letter of invitation (table 4).

TABLE 4
TEST PREFERENCES BY WOMEN IN DIFFERENT AGE GROUPS ACCORDING TO WHETHER THE REPLIES WERE TO THE FIRST OR SECOND INVITATION

Age group	First letter replies			Second letter replies			Total		
	Test by doctor	Test by midwife	Total	Test by doctor	Test by midwife	Total	Test by doctor	Test by midwife	Total
25-34	285	32	317	100	9	109	385	41	426
35-44	179	16	195	64	8	72	243	24	267
45-54	88	10	98	34	10	44	122	20	142
55-64	51	5	56	15	5	20	66	10	76
Total	603	63	666	213	32	245	816	95	911

Of the 816 women who asked for an appointment at the health centre, 68 (8.3 per cent) failed to keep it. Non-attendance was not associated with age but it was with readiness to reply. Thirty-nine (6.5 per cent) of the 603 women who replied to the first letter asking for an appointment at the health centre failed to attend, compared with 29 (13.6 per cent) of the 213 women who replied similarly to the second letter ($P < 0.01$).

Findings

No evidence of dysplasia or neoplasia was found in any of the 842 smears taken. Non-specific inflammation was found in 211 (25.1 per cent), *Trichomonas vaginalis* in 31 (3.7 per cent), *Candida albicans* in 22 (2.6 per cent) and "viral inflammation" in one smear. Non-specific inflammation was more likely to be present in younger women and infection with *T. vaginalis* in older women, but in neither case did the difference quite reach statistical significance. *C. albicans* infection was present in 17 (4.4 per cent) of the 390 women aged from 25 to 34 years but in only five (0.1 per cent) of the 452 women aged from 35 to 64 years. This difference is significant ($P < 0.01$).

Evaluation of publicity

The publicity measures consisted of:

(a) 120 advance posters displayed at about 50 sites for ten days before the despatch of invitations, referring to the impending invitations and advertising a public meeting at which people would be told about the campaign and the test,

(b) 2,500 handbills which included a little information about the test, encouraged people to reply to the impending invitation, and advertised the public meeting,

(c) six insertions in the personal column of the evening paper, advertising the public meeting,

(d) the public meeting chaired by a well-known woman journalist, at which a film was shown, a talk given by the Principal Medical Officer for Maternal and Child Health, and questions raised and discussed,

(e) 120 posters replacing the advance poster after the public meeting, encouraging replies to and acceptance of the invitation.

A sample survey to estimate the relative effectiveness of the various items of publicity was carried out six weeks after the despatch of invitations and the public meeting. A five per cent systematic sample was taken of those to whom invitations had been sent and whose invitations had not been returned as undeliverable. An attempt was made to interview each of the 98 women in the sample, and to administer a short structured questionnaire. Most of the interviewing was done by a health assistant, with some help from the City's Assistant Health Education Officer. Eighty-five forms (87 per cent of the sample) were available for analysis. Of the 13 non-respondents, four were not living at the address listed, two were ill, and seven were not contacted.

Eighty-four women knew of the campaign. The doctor's letter of invitation was mentioned as a source of information about the campaign by 69 respondents (81 per cent). Other sources of information which were most often spontaneously remembered were the posters (53 women—62 per cent) and the evening paper publicity (27 women—32 per cent). Twenty-four women were aware of the campaign but did not know of the public meeting.

Ninety-four people attended the meeting, which was held on a very wet night. Those present were asked direct questions about their source of knowledge of the meeting, the poster and handbill being shown when the relevant questions were asked. Similar direct questioning was used in the sample survey to the 60 women who knew of the public meeting, and the results are compared in table 5. Again the advance poster was apparently the most successful item of publicity, being remembered by nearly twice as many women as remembered the evening paper publicity. Sight of the handbill was spontaneously remembered by only five women (six per cent) in the sample survey but, when prompted, it was remembered by 43 per cent of women who were included in the sample survey or who attended the meeting.

TABLE 5

SOURCES OF INFORMATION ABOUT THE PUBLIC MEETING REMEMBERED ON PROMPTING BY THOSE IN THE SAMPLE SURVEY WHO KNEW ABOUT IT AND BY ATTENDERS AT THE MEETING

<i>Sources of information</i>	<i>Sample survey</i>	<i>Attendees at meeting</i>	<i>Total</i>
Evening paper publicity	18 (30)	35 (37)	53 (34)
Advance poster	46 (77)	52 (55)	98 (64)
Handbill	27 (45)	39 (42)	66 (43)
Health centre staff	0	1 (1)	1 (1)
Friends, relatives	12 (20)	10 (11)	22 (14)
Total questioned	60	94	154

Figures in brackets are percentages

Costs

The cost of the campaign to the local authority was estimated at about £1,240 (table 6). This figure includes an estimate of the cost of the full-time members of the local authority staff who were involved in running the campaign. It does not include the cost of the time spent in planning the campaign, or the cost of the sample survey to evaluate the publicity measures, or any part of the cost of setting up and maintaining the age-sex register.

The general practitioners performed a total of 401 smears for women aged 35 years and over. If all these smears had qualified for payment in that no woman had had a smear taken in the preceding five years, the fees payable by the Executive Council to the general practitioners would have amounted to £407.

Figures given by Husain (1967) suggest that the laboratory costs in 1972 would be about 75 pence a smear, giving a total for the 842 smears examined of £632.

The total cost of the campaign and the collection and examination of the 842 smears thus comes to about £2,280, or £2.71 for each smear.

TABLE 6
ESTIMATED COST OF CAMPAIGN TO THE LOCAL AUTHORITY

Preparation and despatch of invitations, reminders and appointments; recording and coding results:		
Computer costs	£30	
Postage and stationery	£200	
Clerical work	£340	
		£570
Publicity measures		£80
Taking smears (staff and material costs)		£240
Time spent on campaign by full-time staff not directly concerned with taking smears:		
Central administrative and clerical	£150	
Health centre nursing and clerical	£200	£350
		£1240

Discussion

It is not easy to assess the extent to which even the limited objectives of this campaign were achieved. Invitations were sent to the recorded address of women in the target population, but it is not known how many women failed to receive an invitation because they had moved house while remaining on the general practitioners' lists. The available data thus do not allow an assessment of the extent to which the first of the stated objectives was achieved. All those who accepted were given an appointment for a test, but eight per cent of these failed to attend.

All but two per cent of tests were carried out within the specified three months of issuing the first invitation; 76 per cent were done within one month, and 95 per cent within two months. The eight per cent non-attendance rate and the final two per cent of tests carried out are measures of the failure to achieve the last two of the defined objectives: the two per cent of late tests is probably acceptable, but we think the eight per cent non-attendance rate is unacceptably high. A further appointment should have been offered to those who defaulted.

As well as having limited service objectives, the exercise was intended to provide information on response rates, acceptance rates, comparative effectiveness of the publicity measures, and costs, and to identify weaknesses in the programme which could be corrected in later projects.

Response rates and acceptance rates must be interpreted with caution because of doubts about the accuracy and completeness of the register and of patients' replies. In this connection, a check was made of the records of the 503 women who said they had had a cervical smear taken during the preceding three years. The records of 52 women could not be traced (41 of them had in the meantime left the doctors' lists), and of the 451 records available 382 (84.7 per cent) included a test report dated less than three years before the campaign, 23 (5.1 per cent) included a report dated more than three years before and 46 (10.2 per cent) did not include any cervical cytology report.

After exclusion of the women who were known not to have received invitations and those who had had a hysterectomy, 70.6 per cent of those who were sent invitations were thought to have had a cervical smear either during the campaign or during the preceding three years.

This coverage rate is an improvement on the rates of from 30 per cent to 50 per cent achieved some years ago in other postal campaigns (Macgregor and Baird, 1963; Way, Duran, Peberdy and Stefan, 1963; Ashworth, Davie, Goldie and Lenten, 1966; Hall and Warin, 1966), but it is less than the rates of between 80 per cent and 90 per cent reported from campaigns in which non-responders to written invitations were visited at home (Newmark, 1966; MacTaggart, Lyons and Richards, 1968; Saunders and Snaith, 1969; Scaife, 1972).

Comparisons such as this should take into account differences between the age and social class structure of the populations, but if the figures can be accepted on their face value then the problem can be over-simplified as follows. An acceptance rate of perhaps 50 per cent can be achieved by simple postal invitations. This rate can be increased to 70 per cent by means of a crash campaign with appropriate publicity, or to about 85 per cent if non-respondents are visited at home. To calculate the point at which the law of diminishing returns begins to operate unfavourably is a nice problem for economists, a problem which cannot be solved without a reasonably accurate estimate of the value to the community and the individual of each additional cervical smear performed. There is no evidence to permit such an estimate to be made (Cochrane, 1972), and it is thus also impossible to say whether this study's estimated cost per smear of £2.71 is outweighed by the benefits of carrying it out. This cost figure, for what it is worth, must remain as a yardstick with which the costs of other campaigns achieving similar acceptance rates can be compared.

Few major changes would be required in the organisation of future campaigns. Despite including an explanatory leaflet with the letter of invitation, there was an unexpectedly high demand for further explanation or advice. This demand must be met by ensuring the availability of a nurse at the health centre to answer enquiries, but it is probably unnecessary to offer appointments with a health visitor unless specifically requested. It is probable that the domiciliary service by midwives was used by many people who preferred the convenience or the guarantee that the test would be done by a woman. This service should be retained in future campaigns, but it should be made clear that it is intended only for those who find it difficult because of social or physical hardship to go to the health centre, and that a lady doctor is available if required.

The organisation and evaluation of a cervical cytology service, including the necessary arrangements for recall after the appropriate interval, will be very much easier when a national information system is established, preferably along the comprehensive lines suggested by Bodenham and Wellman (1972). In the absence of such an information system and of reasonable evidence of the effectiveness of cervical cytology in the prevention of invasive carcinoma, it is at least possible that the resources devoted to cervical cytology campaigns could be better spent in other ways.

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