

scribed two at a time) had become the compound analgesic of first choice. It is arguable that this could do more harm than the dextropropoxyphene it has replaced since codeine is well known to cause constipation, and this may be particularly dangerous in surgical wards. Of special concern is that this tendency to use the compound analgesics, in particular Codral Forte, became even more pronounced with longer follow-up.

We achieved our aim of reducing the use of Digesic within the hospital but created other problems. Our results show that prescribing restrictions are not the answer to the misuse and overuse of drugs. If they are introduced they should be carefully monitored by methods more subtle than the hospital pharmacy audit. At best they will only provide a short-term solution, and only by a continuous programme of active education of medical students and practising doctors will prescribing habits be improved.

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(Accepted 21 July 1980)

Hospital Topics

Hospital work load produced by breast-cancer screening programme run by trained non-medical staff

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Summary and conclusions

In a feasibility study of mass population screening for breast cancer by annual clinical examination and mammography the findings of non-medical staff (nurses and radiographers) were used to estimate the hospital work load generated by such a programme. Among 2490 women who attended for the first time by invitation the rate of referral for a surgical opinion based on the findings of the non-medical staff was 7.9% and the biopsy rate 2.5%. In the second and third years referral rates fell to 4.3% and 2.7% respectively and the biopsy rates to 1.1% and 1.4%.

The rates of referral and biopsy among 1203 women who referred themselves for screening were higher, but many self-referred women were symptomatic; those without symptoms had rates of referral and biopsy similar to those of the invited women.

Extrapolation of these findings to a population of

200 000 in a typical health district showed that the hospital work load would be high in the first year of screening with 44 outpatient referrals per week and 14 biopsies. By the third year, however, only seven referrals and four biopsies a week could be expected. The work load would be reduced by a third if screening were confined to women over the age of 50.

Introduction

The results of previous studies suggest that screening for cancer of the breast by annual clinical examination and mammography leads to detection of the disease at an early stage and consequently to improved survival.¹

With present resources of medical manpower it would be impossible to offer a screening service to all women at risk unless examinations were carried out by trained non-medical staff. Such a service would require access to a hospital outpatient clinic to which patients with abnormalities could be referred for consultation and treatment. This might increase the surgical work load significantly and the size of the increase might be a major factor in determining the feasibility of providing a screening service.

In previous studies the rate of biopsy has ranged from 0.38%² to 9.8%³ and the rate of detection of cancer from 1.5 per 1000² to 24.6 per 1000.⁴ Our aim was to evaluate the surgical work load produced by a screening service run by non-medical staff in terms of the rates of referral for consultation and biopsy.

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Methods

A screening clinic was established in January 1973. Nurses and radiographers were trained to examine breasts and read mammograms.⁵ All women over 40 registered with two group practices were invited to attend for annual screening examinations. In addition, many women referred themselves and were examined in the same way as those who were invited. Certain differences between invited and self-referred women were apparent,⁶ and the two groups were analysed separately.

Initially each patient was examined twice, once by medical and once by non-medical staff, but once it became clear that the performances of the medical and non-medical teams were similar⁵ the screening clinic was run entirely by non-medical staff, who referred patients in whom abnormalities were detected for a surgical opinion.

The work load produced was assessed by considering the findings of the non-medical team during the whole period of study. The number of women referred for a surgical opinion, the number who required a biopsy, and the results of histological examination were recorded and extrapolated to a population of 200 000 people in a typical health district in the north west of England. The distribution of women by age group in such a population was obtained from the 1971 census of the North-west Region. The estimated number of women who would attend was calculated on the percentage response to invitation at the breast screening clinic.⁶

Results

Invited women—Of the 2490 women who attended in response to invitation, 196 (7.9%) were thought by the non-medical staff to have an abnormality that required a surgical opinion. The surgeon thought 62 (2.5%) of them needed a biopsy: 15 (0.6%) proved to have malignancies. Of the 1575 women who attended for a second examination, 67 (4.3%) were referred for an opinion, 17 (1.1%) required a biopsy, and two (0.13%) had cancer. At their third visit 31 (2.7%) of the 1156 women were referred for a surgical opinion, 16 (1.4%) underwent biopsy, and three (0.26%) had cancer. At each visit the rates of referral and biopsy were related inversely to age (table I).

TABLE I—Rate of referral, biopsy, and cancer detection according to age group in first, second, and third years of screening programme. Results are numbers (percentages) of patients

Age	First year				Second year				Third year			
	No of women	Referred	Biopsied	Cancer	No of women	Referred	Biopsied	Cancer	No of women	Referred	Biopsied	Cancer
40-49	645	68 (10.5)	22 (3.4)	1 (0.15)	227	13 (5.7)	4 (1.8)		205	11 (5.4)	6 (2.9)	
-59	976	72 (7.4)	25 (2.6)	7 (0.71)	609	30 (4.9)	7 (1.2)		451	11 (2.4)	5 (1.1)	
-69	700	40 (5.7)	9 (1.3)	3 (0.4)	611	20 (3.3)	6 (0.98)	2 (0.33)	374	8 (2.1)	5 (1.3)	1 (0.27)
≥70	169	16 (9.5)	6 (3.5)	4 (2.4)	128	4 (3.1)			126	1 (0.8)		
Total	2490	196 (7.9)	62 (2.5)	15 (0.6)	1575	67 (4.3)	17 (1.1)	2 (0.13)	1156	31 (2.7)	16 (1.4)	3 (0.26)

TABLE II—Rate of referral, biopsy, and cancer detection in women who referred themselves for screening. Results are numbers (percentages) of patients

Age	All self-referred women				Self-referred women without symptoms			
	No	Referred	Biopsy	Cancer	No	Referred	Biopsy	Cancer
40-49	664	94 (14.2)	36 (5.4)	3 (0.45)	429	42 (9.7)	14 (3.3)	1 (0.23)
-59	441	32 (7.3)	14 (3.2)	3 (0.68)	337	22 (6.5)	8 (2.4)	
-69	88	7 (8.0)	3 (3.4)	2 (2.3)	70	4 (6.7)	1 (1.4)	1 (1.4)
≥70	10				6			
Total	1203	133 (11.1)	53 (4.4)	8 (0.67)	842	68 (8.1)	23 (2.7)	2 (0.24)

Women who referred themselves for screening—A total of 1784 women attended at their own request. The 581 who were under 40 were not radiographed routinely, and only the remaining 1203 were compared with the invited women. Of these 1203 women, 133 (11.1%) were referred for a surgical opinion, 53 (4.4%) required a biopsy, and eight (0.67%) were found to have cancer. Again the rate of referral and biopsy and the rate of detection of cancer varied with age (table II).

Women with and without symptoms—Three hundred and sixty-one (30%) of the self-referred women admitted to having symptoms related to their breasts. This incidence was substantially greater than

that in the 2490 invited women who attended initially, of whom only 269 (11%) had breast symptoms. When the 842 self-referred women who were free from symptoms were considered separately the incidences of referral (8.1%) and biopsy (2.7%) were similar to those in the invited women (table II). Eight of the 15 cancers found in the 2490 invited women and six of the eight found in the 1203 women who referred themselves had produced symptoms. The incidence of cancer in asymptomatic invited women (0.32%) was similar to that in asymptomatic self-referred women (0.24%). The incidence of cancer in women with symptoms was 3% for invited women and 1.7% for self-referred women.

Work load for a typical health district—Extrapolation of the data for invited women to a typical health district showed that in the first year about 28 662 women would attend for screening, of whom 2264 would be referred for a surgical opinion and 716 would require a biopsy. About 172 cancers would be detected (table III). In the

TABLE III—Estimated work load in one health district of 200 000 people in first, second, and third years of a breast-cancer screening programme for all women over 40. Results are numbers (percentages) of patients

	Estimated No of attenders	No referred	No of biopsies	No of cancers
First year	28 662	2264 (7.9)	716 (2.5)	172 (0.6)
Second year	18 630	782 (4.2)	205 (1.1)	24 (0.13)
Third year	13 419	349 (2.6)	188 (1.4)	33 (0.25)

second year, the estimated work load would be less because only 65% of the invited women accepted a second invitation and the incidence of referral and biopsy was considerably lower. About 18 630 would be expected to attend, of whom 782 would be referred for an opinion and 205 would require a biopsy. Approximately 24 cancers would be detected. In the third year the work load would again be lower. About 13 419 would be expected to attend, of whom 349 would be referred for an opinion and 188 would require a biopsy. About 33 cancers would be detected.

Discussion

The impact of a breast-cancer screening programme on the surgical, radiological, and pathological work load of a typical district general hospital serving a community of about 200 000 people would be considerable. In the first year 44 patients would be referred from the screening centre to surgical out-patient clinics each week and 14 of these would require a biopsy. The relatively large number of patients referred reflects

the care of non-medical screeners, who miss very few important lesions.⁵

The rate of biopsy in the invited women was much lower than that in several other studies, but in most of these the participants were selected in some way. Some studies have dealt solely with self-referred women,⁷⁻¹⁰ while others have examined only women at high risk or have included such women in the screened population.^{3, 4, 11} The only valid comparison is with the study carried out by the Health Insurance Plan (HIP), of Greater New York, in which the biopsy rate was similar to our own.

The rate of detection of cancer at the first visit (0.6%) appears high when compared with that achieved by the HIP study (0.27%), but eight of the 15 women found to have cancer were aware of symptoms. In the community we studied the invitation probably stimulated women to seek advice about a known abnormality.¹² The rate of detection of cancer in asymptomatic invited women (0.32%) was comparable with that in New York and may be a more accurate assessment of the achievements of screening.

The work load generated by screening women aged 40-49 was particularly high. Of the 196 invited women who were referred for a surgical opinion, 68 (35%) were in this age group, and 22 (36%) of the 62 biopsies were performed on them. The incidence of benign abnormality was high in women aged 40-49 years and only one cancer was found. The results of the HIP study suggest that the benefit from screening exists only in women over 50, and a screening programme limited initially to them might be a practical solution to the problem of work load: the average district general hospital would have to provide 29 consultations and nine biopsies each week during the first year of the programme.

In the second year the rate of referral was almost halved and the rate of biopsy more than halved. If all women over 40 are invited to be screened, the surgeons of the average district general hospital will need to provide 15 consultations and three or four biopsies each week in the second year. If screening is limited to the over 50s, they will need to provide about 12 consultations a week and two or three biopsies.

In the third and, presumably, subsequent years the work load would be four to seven consultations and two to four biopsies each week, depending on the age groups screened. This additional work load seems to be feasible.

In self-referred women the work load is greater, mainly because they tend to use the screening clinic to obtain an opinion about symptoms for which they should seek help from their own doctor. We assume that a national breast-cancer screening programme would be concerned with screening in the true sense of the word, rather than replacing the normal channels of referral.

We thank the Department of Health and Social Security for their generous grant which made this work possible and for their helpful advice and support throughout the project. We are grateful to the staff of the regional computer centre for their help, to Dr Blumfield, Dr McShane, and their colleagues in general practice, the nurses, radiographers, and secretaries in the breast clinic, and Miss Maureen Edwards for secretarial help.

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(Accepted 12 June 1980)

Are there any contraindications to giving the triple antigen intradermally?

Intradermal injections require greater skill, which makes this route unpopular except by jet injection. This technique is used in some developing countries, where it simplifies mass immunisation and uses less vaccine (one-fifth of the dose). Infective skin disease would be one contraindication. Apart from this, caution is advisable, unless the vaccine has been formulated for intradermal injection and shown to be acceptable by this route. In particular, vaccine containing adjuvant (for instance, alum) would be more likely to cause local reactions, particularly of a granulomatous nature, possibly leading to keloid formation. In one trial adsorbed triple vaccine produced less certain immune responses than plain vaccine, possibly because of frothing and variation in the amounts injected.¹

¹ Stansfield JP, Bracken PM, Waddell KM, Gall D. Diphtheria-tetanus-pertussis immunisation by intradermal jet injection. *Br Med J* 1972;ii:197-9.

A 30-year-old woman has noticed involuntary spasms in many of her muscles. Her father died from Huntington's chorea. Is she likely to develop the disease, and what tests could be performed to confirm whether these spasms are an early warning of the disease?

Huntington's chorea genetically follows a pattern of a mendelian dominant trait. It sounds as if this woman is developing this condition. It is classically associated with involuntary movements of a bizarre

nature, progressive dementia, and taking up odd postures. In descendants of families who have not yet developed the choreiform movements the use of levodopa at about 3 g a day will produce chorea in those who are at the moment asymptomatic. In a patient who has already developed involuntary spasms it would be unwise to do this. I think she should see a consultant neurologist who is familiar with this disease.

Can tetracycline be given safely to pregnant women and children for the treatment of intestinal non-systemic infections, such as vibriosis and amoebiosis, by combining it with calcium or iron salts (in milk or food) to prevent systemic absorption?

Tetracyclines readily form chelates with divalent and trivalent ions, and since these complexes are usually insoluble absorption of tetracycline from the gastrointestinal tract is impaired. It is unlikely, however, that these chelated forms enter the bacterial cell and exert their bacteriostatic effects by an action on bacterial ribosomes, since the latter action may be due to chelation of bacterial ribosomal magnesium, which prevents exchange of amino-acids from tRNA to the peptide chain. In general tetracyclines should be avoided in pregnancy and in treating children. Although chelation with calcium or iron will impair absorption and cause less risk of staining of teeth and bones, the resulting chelated tetracycline is likely to be ineffective therapeutically.