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Preliminary results of primary screening for breast cancer with the Mama Program [1]

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In the European region, breast cancer accounts for 24 per cent of all cancer deaths in women, which indicates the need for intensive research concerning its epidemiology, prevention, early detection and treatment. According to the World Health Organization "Health for All by the Year 2000" strategy for the European region, mortality from cancer in populations under 65 ought to be reduced by at least 15 per cent [1].

At present, in the majority of cases breast cancer lesions are first discovered by the women themselves, by an accidental observation of an anomaly in the breast. Thus, at the stage of discovery the majority of breast cancer lesions have already reached the invasive stage, with a tumour over 2 cm in diameter and involvement of the axillary nodes [2]. Late discovery is often followed by a delay in self-referral, before an expert physician finally makes the diagnosis. This problem occurs particularly in patients with a low social status [3]. In a number of cases, diagnosis and treatment are delayed by the non-specialist physician to whom women report in the first place [4].

A localized stage at the time of diagnosis and treatment correlates with longer survival and reduced mortality from breast cancer [5]. Those who belong to a high social class have a better chance of survival than those of low status [6].

Breast cancer screening

Diagnostic mammographic examination (3 projections) is today the most effective technical method in the early detection of breast cancer [7]. Three types of primary screening strategies are being developed to select the screening-positive cases from female populations for diagnostic mammographic examination: 1) Screening mammography (1–2 projections), 2) Breast Physical Examination and 3) Breast Self-Examination. The aim of these screening procedures is to discover tumours of 1.5 cm in diameter or less at a local stage, when the prognosis is still good in almost all cases [8].

With strategy 1) breast cancer mortality in women aged over 50 was reduced [9,10]. For strategy 2) results are not yet available. With strategy 3), as used in Finland in the Mama Program Screening, mortality was reduced significantly in all age groups. This will be the subject of discussion in this paper.

According to the World Health Organization, screening mammographic examination aimed at selecting the screening-positive cases is not an appropriate way of meeting the needs of large segments of the world population, because of the high cost. Experience has shown that physicians are unlikely to perform breast examinations on a sufficiently regular basis for this approach to be adopted as a means of breast cancer screening. Therefore, attention has been focussed on programs based on the selection of screening-positive cases by breast self-examination, BSE [11].

BSE Screening requirement

For the selection of screening-positive cases using breast self-examination programs, two requirements have to be met: 1) women must be able to identify changes corresponding to small lesions – preferably 1.5 cm in diameter or less, and 2) communication strategies aimed at influencing compliance must be developed, including attraction, comprehension, personal relevance and decision-making related to carrying out the screening test(s). In BSE-based screening the actual test is carried out by the women themselves and consists of two steps: first, regular BSE for the selection of screening-positive cases and secondly, self-referral for diagnostic mammographic examination.

BSE program strategies

Up to the early 1970s most women with breast cancer discovered changes in their breasts by accidental touching and looking, and self-referral was delayed because of uncertainty and fear. This process has been referred to as BSE by some authors, and this has given rise to pessimism concerning the use of BSE for early detection. The tumours discovered by accidental touching and

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looking are mostly larger than 2 cm, and often connected with axillary spread [5,12–14].
BSE programs of the traditional type consist of teaching women in groups or individually by one-way communication. The message includes the BSE technique and an exhortation to see a physician if anomalies in the breasts are detected. Messages of this type, disseminated by mass media or brochures, have caused uncertainty and fear because of lack of individual attention. The mean size of tumours discovered by more or less regular BSE has been over 2 cm [15,16].
Mass media information has an impact on the knowledge and attitudes of the population, and can increase awareness of special problems that need to be solved, but their influence on health practice is small. Only a fraction of women who tried BSE once subsequently practised it repeatedly [17,18]. Considering this fact, mass communication efforts should be directed mainly towards influencing attitudes, and used for increasing knowledge and an awareness of the necessity for more comprehensive interventions, but not for the BSE program itself [19].

The basis for comprehensive BSE programs

If women are trained to discover breast lesions by inspection and palpation on the basis of established principles of psychophysics and signal detection, they are able to discover minimal lesions in simulated and human breasts [20,21]. Using manufactured silicone models, lumps of 0.3 cm in diameter were discovered [22]. It has been shown that lump detection with known lesions ranging from 0.25 to 3.0 cm in diameter was raised from a 25% detection rate to 50% after a 30 minute training session [23]. Observations were made that tumour size and nodal involvement differed in women who did practise and those who did not practise BSE in favour of those wo did [24–28]. A cohort study using data from the Vermont Registry showed fewer deaths due to breast cancer among patients who reported that they practised BSE (14%) than among patients who did not (26%), and within a 5 year period the survival rate was 75% versus 59% [29].
Communication strategies in comprehensive BSE screening programs, aimed at selecting the screening-positive cases for diagnostic mammographic examination, imply the transfer of partial responsibility to the women themselves. This is in line with the current approach of establishing interrelations between healthy populations and health care services. Thus, it seems evident that strategies involving personal communication between health professionals and the population are more effective when it comes to influencing attitudes and health behaviour [30,31]. In a one hour face-to-face teaching session for a group of women Crosson et al. [32] included a lecture, a film on BSE technique and a demonstration using the Betsi Breast Model. One year later, 48% out of the exposed group reported that they were practising BSE while only 27% of the control group did so.

Background to the development of the Mama Program Screening, MPS

Prior to the Mama program study in Finland in 1972 interviews with Finnish women showed that although practically 100% had received information about the BSE technique by mass communication with brochures, only about 2% carried out BSE on a monthly basis. Most of the breast tumours found were more than 2 cm in diameter on first detection with clinical palpation [33].
In BSE-based screening there is a second step, in addition to the regular practice of BSE, which has to be carried out in order to achieve an early diagnosis, is prompt self-referral for an expert breast examination if any anomalies in the breast are discovered. It is important to develop comprehensive programs that include strategies aimed both at regular BSE and at prompt self-referral leading to a multiphasic screening test.
According to the author's experiences as a radiologist, women are indeed able to get to know their breasts when healthy, and to identify anomalies, as well as to self-refer without delay. Experiences with cancer education have shown that face-to-face communication is effective when it comes to motivating and encouraging individuals to adopt a certain health behaviour.

The Mama Program Screening entity

The name Mama Program Screening (MPS) was formed by the first two letters of the names of those women's organizations in Finland Marttaliitto and Finlands svenska Marthaförbund that took the initiative to carry out a study with a program design developed by the author. The comprehensive and continuous MPS, with the multidisciplinary approach, was carried out in close contact with already-existing organizations and routine activities of public health care.
The three main features of the MPS are:

- The key message is communicated face-to-face by health professionals to the female population at an initial information session either in groups or individually. It is aimed at motivating women to take up a certain health behaviour by submitting themselves to the screening test(s): a) monthly BSE according to a given scheme, b) prompt self-referral to a named breast expert in case of breast anomalies. The message contains information on the continuous program, the normal

breast pattern at different ages, self-detectable symptoms of non-malignant and malignant anomalies, the careful BSE technique using inspection and palpation, the need for monthly BSE performance, and explanations of the function of the specially designed Mama calendar for reminder and surveillance purposes.
- A continuous surveillance system is established with personal Mama calendars. The purpose of the calendar is a) to remind the woman of the BSE technique, b) to remind her to practise it regularly once a month, c) to facilitate registration of the BSE date and of changes in the breasts discovered by BSE, d) to provide information on where to self-refer if abnormalities are discovered and e) to serve as a means of feed back for follow-up and further communication purposes.
- A self-referral strategy is arranged by the local program organizers within the public health care system in the area. It is intended for those women who discover changes, or are uncertain about their findings (the screening-positive cases). The address of the clinic for diagnostic mammographic examination is entered into the Mama calendar of each woman at the initial information meeting.

The women who are exposed to the MPS carry out the screening test(s) by complying with regular BSE, aimed at selecting the screening-positive cases. The women who have identified themselves as screening-positive cases carry out the self-referral which is followed by diagnostic procedures.

Material and Methods

The Finnish Mama Program Screening project and study

From 1973 to 1975 an MPS project was carried out in Finland on the initiative and among the members of two women's organizations; "Marttaliitto" and "Finlands svenska Marthaförbund". The members of these organizations represent a cross-section of the general female population, including all ages over 15, all levels of education and all social classes. Until 1992 a study was carried out to explore whether the MPS message and arrangements had an effect on acceptance, attendance and compliance, and whether compliance with the screening test(s) in the MPS could achieve early detection of breast cancer and a reduction in mortality from breast cancer. Further it was explored whether the MPS strategy could be applied as a simple, inexpensive and safe basic public health policy for mass screening of general female populations.
In the project, the infrastructure of the women's organizations was used to reach members with the MPS message. The key message to the women exposed to the MPS was initially delivered by specially trained MPS-affiliated health professionals, who at the initial meeting used a specially designed teaching kit. Some women, for practical reasons, received the initial information from non-professional women's organization leaders who also used the specially designed material. An MPS videotape was delivered by the national TV network, in which the author gave the initial message and reminders. Radio and the press contributed by broadcasting information about the MPS that had started all over the country. Every woman who had initially been exposed to the program received the MPS calendar, questionnaires and opinion polls for filling in, with spaces for name, birth date and address. This material had to be returned after the project's duration of two years.
The diagnostic mammographic examinations for the self-referrers were carried out as part of their daily routine by 20 radiologists working on a voluntary basis in all counties on the mainland of Finland.
The compliance study was carried out in several steps in the women's organizations with 56177 women who attend in groups that were chosen by the organization boards. Comparable reference populations were drawn from the general female population in cooperation with the Finnish Cancer Registry.

Results

Compliance-study

Out of the 56177 exposed women organization members 54.9% returned their calendars filled in prospectively with BSE-dates during the 24 months project. According to the BSE-dates documented by the women the vast majority of them had performed BSE once a month. This demonstrates a change in compliance with BSE performance, which had been about 2% previous to the MPS. The opinion polls showed that the majority of women complied with feelings of attention, awareness, personal relevance and security, instead of fear and uncertainty as had been the case prior to the program.
Interviews with self-referring women showed that the majority of patients felt secure because of the possibility that theirs was an early case. The women said that they had learned to know how their breasts looked and felt by systematic inspection and palpation after the second or third BSE performance.
Interviews were carried out by mail with patients whose breast cancer had been discovered by MPS, five years after the diagnosis. Half of the patients responded. They claimed that they had felt secure.

Tab. 1. Women's preference of information channel used for the MPS message delivery.

Information channel used for the MPS message		• Health professionals • Key-persons • TV-spot • Radio + press	• Health professionals • Key-persons • Radio + press	• Key-persons • TV-spot • Radio + press	• Key-persons • Radio + press
Preference					
Face-to-face	Health professionals	47.6	47.6		
	Key-persons	8.7	17.5	16.7	27.6
Mass media	TV-spot	26.8		47.7	
	Continuous radio- and press information	15.3	33.3	25.7	57.6
	Brochures to large audience	1.6	1.6	3.9	4.9
Unknown				6.0	9.9
Total (N = 1779)		100 (N = 426)	100 (N = 63)	100 (N = 1029)	100 (N = 261)

Population: Sub-sample D.

As to women's preference for information channels in order to achieve compliance with BSE it became evident that, among women who had access to professional information by personal instruction, TV spots, radio, the press, reminders by volunteers, and brochures, 47.6% thought that personal communication with health professionals was best, 26.8% thought that the TV spot with the author acting was best, 15.3% believed in radio and the press, 8.7% believed in volunteer women's organization leaders, and only 1.6% believed in conventional brochures. If the message was sent without the help of health professionals, 47.7% believed in the TV-spot, and if the TV-spot was not seen 57.6% believed in radio and the press.

The opinion poll included a question concerning the role of the Mama calendar as a new tool aimed at serving as a stimulus for continuous BSE performance. Out of the complying women who had received information about the special role of the calendar, 81% thought that the calendar was of great importance for their continued activity.

An evaluation of the personal background factors in BSE compliers showed that regular BSE was carried out similarly by young and old women. Women with higher education were more active than those with little education. Differences in occupation did not influence the result.

Tab. 2. Compliance to monthly BSE in relation to age, education and occupation.

	75.1% (N = 1,654)
Age	%
≤ 29	72.8
30–44	80.0
45–59	75.9
60–74	66.9
≥ 75	38.1
Education	
Primary school	75.0
Secondary school	78.9
College + University	85.7
Occupation/activity	
Employed	76.9
Housewife	76.4

Population: Compliers of sub-sample D (Total compliers 2,205).

Clinical study

In the exposed population of 56177 women in the course of 24 months 1128 screening positive cases were self-reported and 125 of these were true positive cases (90 + 35). This shows that about one out of ten screening-positives are true positive cases, which indicates that the MPS procedure has a high specificity. However, women were initially told that they could also refer to their own doctors, so there may have been more self-referrers and more breast cancers than were registered by the project-affiliated physicians. Consequently, in the absence of exact data of true positive cases in the study population the sensitivity of the MPS will remain unknown.

When comparing tumour sizes found in the MPS cases with those of accidentally-discovered tumours in a non-exposed reference group (diagnosed and treated at the same hospital) it could be shown that

Tab. 3. Tumor size in relation to symptom discovery.

	Study group 1973		Reference group 1972	
	Systematic search for symptoms in MPS 19 patients		Accidental discovery in the absence of an early detection program 233 patients	
Tumor size by clinical palpation	N	%	N	%
0–10 mm	6	31.6	7	3.0
11–20 mm	3	15.8	36	15.5
≥21 mm	9	47.4	166	71.2
Paget	1	5.2	24	10.3
Total	19	100	233	100

Population: Sample C.

Tab. 4. Breast cancer mortality by number of years from enrollment.

Years from enrollment	All ages		
	Obs.	Exp.	Ratio
3	2	5.3	0.37
4	3	7.3	0.41
5	3	9.0	0.33
6	3	10.4	0.29
7	10	11.6	0.86
8	13	12.8	1.02
9	16	13.8	1.16
10	6	14.7	0.41
11	13	15.5	0.84
12	10	16.3	0.61
13	16	17.1	0.94
Total	95	133.9	0.71

31.6% of the MPS patients had tumours of size 0–10 mm, while in the reference group there were only 3% of this size.

Study on incidence and mortality from breast cancer in compliers

For the incidence and mortality studies, every individual whose data are analyzed is a BSE-complier known by birth date, education and occupation. Women who had symptoms at the time they attended the initial information session, and those women with prevalent detectable breast cancer, were excluded from the study.

The study findings relate to women in whom breast cancer had not been diagnosed within the first two years after initial exposure to the program. For this specific study, individuals were followed up from the beginning of month 25 after initial exposure to the end of year 13 after exposure.

All 28 807 of the compliers had filled in complete ID codes and their data could be used for the study. Their mortality experience can be compared with that of appropriate non-exposed reference populations. The data of the complying women were computerized at the University of Toronto and the tape was linked to the Finnish Cancer Registry data so that information could be obtained from non-exposed reference populations on diagnosis of breast cancer, death from any cause, and breast cancer as the cause of death between 1973 and 1986. The observed incidence data were compared with those expected from the national incidence rates for breast cancer in the corresponding age groups. The method used for the selection of healthy women from the group undergoing screening, i.e. for the exclusion of prevalent cases at the beginning of the follow-up was that of Morrison et al. According to age education and occupation in both groups it was expected that the rate of incidence of breast cancer would be similar in the absence of the MPS. The national survival rates were applied to the expected number of observed incidence data to compute the expected breast cancer mortality in the corresponding age groups[34].

The breast cancers detected among the 28 807 MPS-complying women with complete ID-codes by "year after exposure" and "age at exposure", compared to the numbers in the group of non-exposed women, howed that the cumulated rates over years 3 through 13 were greater than expected in the MPS exposed population compared with the non-exposed reference population, and for all ages combined the incidence ratio was 1.2.

The mortality study included the 28 807 MPS-complying women whose person-year experience was used for the follow-up from 1973 to 1986. Out of the women followed up over a 13 year time period, 2680 or 9% were known to have died by the end of 1986. Among 472 breast cancer cases 125 (26,5%) had died; of these, 95 were primary deaths from breast cancer.

The difference between the observed total of 95 and the expected number of 133.9 is statistically significant ($p < 0.001$), with an O/E ratio of 0.71 (95% confidence interval 0.57–0.87). The observed to expected ratio of deaths was 0.64 for those under 50 years and 0.74 for those 50 years and older. Half of the deficit in breast cancer deaths occurred in years 3 to 6 after exposure to the MPS.

Observed to expected figures for mortality due to all causes were low at the beginning of the follow-up, but reached and maintained a level of about 0.7 at about year 5. The ratio of cumulated rates of deaths were also less than 1.0 for all ages except for those of 70 years and more.

The apparent effect of the MPS process in reducing mortality from breast cancer was similar for different age groups. The findings suggest that the MPS may be as effective in younger as in older women,

which is different from the effect of direct screening mammographic examination, which shows little evidence of a benefit in women under the age of 50, at least during the first ten years after initiating the screening.

Public health care policy

In 1975, after the end of the MPS project, the MPS was introduced as a basic screening program supported by the National Board of Health on a voluntary basis in Finland. Approximately 100000 women per year were exposed to it by several hundred nurses who had been trained by the author to introduce the MPS as part of their daily routine and their contacts with women in the breast cancer age-range. They use a special MPS teaching kit developed by the author, including a manual and the MPS-videotape. The women use MPS calendars in the same way as in the MPS project. National women's organizations have supported the MPS execution by founding a special society, the ProMama Society, aimed at distributing the program and at motivating women to accept the program's facilities. The cost of information for one women in the MPS is about FMK 10. This means that for every new MPS breast cancer case costs of about FMK 10–15000 arise, if the program is carried out among voluntary groups of women.

Discussion

The Mama Program is a new BSE-centered breast cancer screening strategy. It was initiated by the women's organizations Marttaliitto and Finlands svenska Marthaförbund and carried out within the infrastructure of their organization.
In a historical cohort study carried out in Finland the results were favourable with respect to the effect on compliance with the screening test, tumour size and mortality from breast cancer in MPS-complying women.
A replication of the MPS program strategy is now being carried out as a controlled randomized study by the World Health Organization and research centers in St. Petersburg and Moscow[35].
It is obvious that women and their organizations play an important role in initiating and supporting the program.

Summary

In 1972 a comprehensive BSE screening strategy for the early detection of breast cancer, the "Mama Program Screening" (MPS), was developed in Finland by the author on the initiative of women's organizations. The program consists of a) initial information about the facilities of the program and BSE-performance, b) prospective surveillance of the BSE-behaviour of complying women, who use a specially designed Mama calendar for regular notes on their BSE behaviour and c) a pre-organized system for women with self-identified anomalies in the breasts to self-refer to physicians in public health care. From 1973 to 1975 an MPS project was carried out in Finland with 56000 exposed women. Compliance to BSE-performance of once a month increased from 2% prior to the enrolment to 55%, and resulted in 2% of self-referrers. In the compliers, mortality from breast cancer was reduced overall by 29%, the screening being effective in all age groups, also in those under 50 years. The MPS was easy and inexpensive to implement in existing public health care systems with the information material developed for the study and with physicians in PHC facilities.

Résumé

Résultats préliminaires d'un programme de dépistage précoce pour le cancer du sein: Mama program Screening (MPS)
Depuis 1972, l'auteur a développé en Finlande un programme de dépistage précoce pour le cancer du sein (Mama program Screening ou MPS) à l'initiative des organisations de femmes. Le MPS comporte les parties suivantes: a) information initiale sur l'ensemble du programme, instruction de l'auto-examen du sein, b) contrôle du comportement des femmes qui pratiquent l'auto-examen selon un calendrier spécialement conçu, c) un système permettant aux femmes qui, au cours de l'auto-examen, ont découvert des anomalies, d'aller vers un médecin. Entre 1973 et 1975, un projet de MPS a été réalisé en Finlande avec la participation de 56000 femmes. La compliance concernant l'auto-examen des seins allait de 2% avant le projet à 54%, et seulement 2% avaient besoin de s'adresser au médecin. Dans ce groupe-ci la mortalité totale a été diminuée de 29%, également chez les femmes de moins de 50 ans. En utilisant le matériel d'information développé pour cette étude, le «Mama Program Screening» ou «MPS» a été introduit dans les services de Santé Publique déjà existants, d'une manière facile et à peu de frais.

Zusammenfassung

Screening Programm zur Früherkennung von Brustkrebs: Erste Resultate des Mama Program Screenings (MPS)
Im Jahre 1972 wurde in Finnland aufgrund einer Initiative von Frauenorganisationen von der Autorin ein Screening Programm zur Frühentdeckung von Brustkrebs entwickelt, das „Mama Program

Screening" (MPS). Das MPS besteht aus folgenden Teilen: a) erste Information über das Gesamtprogramm und die Brustselbstuntersuchung, b) einem eigens dafür entworfenen Mama-Kalender, der den teilnehmenden Frauen die Überwachung ihrer Brustselbstuntersuchungen erlaubt, c) ein System, in welchem die screening-positiven Fälle sich an einen Arzt im normalen Gesundheitswesen wenden können, falls sie Veränderungen in den Brüsten erkennen. Ein Projekt wurde 1973–1955 in Finnland mit 56000 Frauen durchgeführt. Danach stieg die Teilnahme an einer regelmässigen BSU von 2% vor der Exposition auf 54%; nurmehr etwa 2% aller Frauen brauchten den Arzt. In dieser Gruppe von Frauen reduzierte sich die Brustkrebssterblichkeit insgesamt in allen Altersgruppen um 29%, was auch für die Bevölkerung unter 50 Jahren gilt. Unter Anwendung des in der Studie angewandten Informationsmaterials konnte das Mama Programm mit wenigen Kosten in das normale Gesundheitswesen eingeführt werden.

References

1 World Health Organization. Targets for health for all. Targets in support of the European regional strategy for health for all. Copenhagen: Regional Office for Europe, 1985.

2 *Maharry JM.* Carcinoma of the breast in a community hospital: Who makes the diagnosis? Am J Obstet Gynecol 1980; *137*:207–211.

3 *Karjalainen S, Pukkala E.* Social class as a prognostic factor in breast cancer survival. Cancer 1990; *66*:819–826.

4 *Arner O, Bergström J, Franzen S, Granberg PO, Rutqvist LE, Theve NO, Wallgren A.* Delay in the diagnosis of breast cancer. Läkartidningen 1978; *75*:3299–3300.

5 *Saario IA, Leivonen MK, Tolppanen EM, Kalima TV, Appelqvist P, Salmo M.* Changes in the treatment and prognosis of breast cancer. Ann Chir Gynaecol 1986; *75*:254–259.

6 *Lipworth L, Abelin T, Connelly RR.* Socio-economic factors in the prognosis of cancer patients. J Chronic Dis 1970; *23*:105–115.

7 *Miller AB, Tsechkovski M.* Imaging Technologies in Breast Cancer Control. Summary of a WHO Meeting. Am J Roentgenol 1987; *148*:1093–1094.

8 *Duffy SW, Tabar L, Fagerberg G, Gad A, Gröntoft O, South MC, Day NE.* Breast screening, prognostic factors and survival – results from the Swedish two county study. Br J Cancer 1991; *64*:1133–1138.

9 *Shapiro S, Venet W, Strax P, Venet L, Roeser R.* Selection, follow-up, and analysis in the Health Insurance Plan Study: a randomized trial with breast cancer screening. Natl Cancer Inst Monogr 1985; *67*:65–74.

10 *Tabar L, Fagerberg CJ, Gad A, Balderoph, Holmberg LH, Gröntoft O, Ljungguist V.* Reduction in mortality from breast cancer after mass screening with mammography. Randomized trial from the breast cancer screening working group of the Swedish national board of health and welfare. Lancet 1985; *1*:829–832.

11 World Health Organization. Self-examination in the early detection of breast cancer: Memorandum from a WHO Meeting. Bull World Health Organ 1984; *62*:861–869.

12 *Heuser L, Spratt JS, Polk HC Jr.* Growth rates of primary breast cancers. Cancer 1979; *43*:1888–1894.

13 *Mant D, Vessey MP, Neil A, McPherson K, Jones L.* Breast self-examination and breast cancer stage at diagnosis. Br J Cancer 1987; *55*:207–211.

14 *Baum M.* Will breast self-examination save lives? BMJ 1982; *284*:142–143.

15 *Holliday HW, Roebuck EJ, Doyle PJ, Blamey RW, Elston CW, Chamberlain J, Moss S.* Initial results from a programme of breast self-examination. Clin Oncol 1983; *9*:11–16.

16 *Philip J, Harris WG, Flaherty C, Joslin CA, Rustage JH, Wijesinghe DP.* Breast self-examination: clinical results from a population-based prospective study. Br J Cancer 1984; *50*:7–12.

17 Gallup Organization, Inc. Gallup Poll. Women's attitudes regarding breast cancer. Prindeton, N.J., 1974.

18 *Lieberman S.* A study of the effectiveness of alternative breast cancer public education programs. New York NY: Lieberman Research Inc., 1977.

19 *Kegeles SS, Grady KE.* Behavioural Dimensions. In: Cancer Epidemiology and Prevention. Eds: Schottenfeld D, Fraumeni JF. Philadelphia: WB Saunders, 1982; 1049–1063.

20 *Adams CK, Hall DC, Pennypacker HS, Goldstein MK, Hench LL, Madden MC, Stein GH, Catania AC.* Lump detection in simulated human breasts. Percept Psychophys 1976; *20*:163–167.

21 *Hall DC, Goldstein MK, Stein GH.* Progress in manual breast examination. Cancer 1977; *40*:364–370.

22 *Pennypacker HS, Bloom HS, Criswell EL, Neelakantan P, Goldstein MK, Stein GH.* Toward an effective technology of instruction in breast self-examination. Int J Ment Health 1982; *32*:251–260.

23 *Hall DC, Adams CK, Stein GH, Stephenson HS, Goldstein MK, Pennypacker HS.* Improved detection of human breast lesions following experimental training. Cancer 1980; *46*:408–414.

24 *Senie RT, Rosen PP, Lesser ML, Kinne DW.* Breast self-examination and medical examination related to breast cancer stage. Am J Public Health 1981; *71*:583–590.

25 *Feldman JG, Carter AC, Nicastri AD, Hosat ST.* Breast self-examination, relationship to stage of breast cancer at diagnosis. Cancer 1981; *47*:2740–2745.

26 *Forster RS Jr, Lang SP, Costanza MC, Worden JK, Haines CR, Vates JW.* Breat self-examination practices and breast cancer stage. N Engl J Med 1978; *299*:265–270.

27 *Greenwald P, Nasca PC, Lawrence CE, Horton J, McGarrah RP, Gabriele T, Carlton K.* Estimated effect of breast self-examination and routine physician examinations on breast cancer mortality. N Engl J Med 1978; *299*:271–273.

28 *Howe HL.* Breast self-examination: An application of the theory of innovation adoption. Doctoral dissertation. State University of New York at Buffalo, 1979.

29 *Foster RS Jr, Costanza MC.* Breast self-examination practices and breast cancer survival. Cancer 1984; *53*:999–1005.

30 *Wakefield J.* Cancer and Public Education. London: Pitman Medical Publishing Co. Ltd, 1962; 64–65.

31 *Calnan M.* Women's beliefs and feelings about breast cancer and its control. Health Educ J 1985; *2*:75–78.

32 *Crosson KE, Nessel AE, Engstrom PF.* Health education research in preventive oncology: A study of factors influencing practice of breast self-examination. Proceedings of the Second Annual Meeting of American Society of Preventive Oncology. Raven Press Publications, New York 1978.

33 *Gästrin G.* New Technique for increasing the efficiency of self-examination in early diagnosis of breast cancer. Br Med J 1976; *2*:745–746.

34 *Morrison AS, Brisson J, Khalid N.* Breast Cancer Incidence and Mortality in the Breast Cancer Detection Demonstration Project. Journ Natl Canc Inst 1988; *80*:1540–1547.

35 *Semiglazov VF, Moiseenko VM. Breast self-examination for the early detection of breast cancer: a USSR/WHO controlled trial in Leningrad. Bull WHO 65*:391–396.

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