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實 EVIDENCE 証

Hospital Authority Head Office
Medical Services Development Division

Clinical Effectiveness Unit
Issue No. 13, 2001

From the Editor.....

'實 EVIDENCE 証' issue No.11 examined the impact of breast screening (self, clinical and mammographic) on breast cancer mortality, using data from clinical trials including randomised controlled trials (RCTs). Intense and very interesting discussions and debate followed, contributed by dedicated practitioners, respected senior leaders in our profession, and erudite academia. These discussions and response from the editorial board are available in the e-Forum of our e-KG < http://ekg > .

To take '實 EVIDENCE 証' closer to local context to guide actions and policies for improving care to Chinese women in Hong Kong, we want to know the effectiveness of the intervention (breast screening) in real life setting on a service wide basis, and ideally, using data generated from Chinese women. Short of, though not lost sight of, the ideal, we have in '實 EVIDENCE 証' No.13 summarised the experience from 3 European countries (Finland, Sweden and England & Wales) on the empirical effect of population based service mammographic screening in breast cancer deaths.

In what ways will this external evidence guide local practice? We have invited Professor Ma Ho-kei to comment from the clinician's perspective and Professor AJ Hedley's team to comment from the epidemiological and public health perspective. They contributed excellent opinion and articles that help to close this issue on an academic and yet pragmatic 'Forte'.

..... bidding farewell

It has been my privilege to be the self appointed Editor of '實 EVIDENCE 証' for the past 24 months, starting with the first issue in June 1999. We were encouraged to continue after our March 2000 review and since had concentrated on more thematic issues covering carotid interventions, transfusion thresholds, surfactant use in neonates, stroke management, and of course, on breast cancer screening. Some have been further built upon by relevant professional bodies and Coordinating Committees (COCs) and are now published as guidelines and protocols, and a multicentre RCT, the FISS-tris was started subsequently (and consequently as well).

All these would not have been possible or ever started and certainly not reaching its present standard, if not for the excellent and hard work of Siew Peng, Liu and Simon from our Clinical Effectiveness Unit, all the clinical colleagues who have generously contributed time, efforts and expertise in providing panel advice, and of course, the unfailing support of readers and users of '實 EVIDENCE 証' who have seen us through these challenging first 24 months. I have personally witnessed the continuous improvement in content quality and appraisal standard, the impact on initiating follow-up actions and changing knowledge and attitude on some important issues in our practice.

'實 EVIDENCE 証' work will continue under the leadership of a new editor.

I pray that you can all share in the joy and peace from further promoting the best use of available evidence in caring for our patients and lastly.....

may I wish you all peace, love, health and prosperity!

Dickson Chang
*Editor, '實 **EVIDENCE** 証'*
June99 – June01

Experience from 3 European countries on empirical effectiveness of population-based service mammographic screening in reducing breast cancer deaths

1. Finland's experience

Comparison of breast cancer mortality from 1987 to 1992 between cohorts of women invited to join the national screening program at 1987-9 and of controls (matched for age and residence) who were not invited during that same period showed that population-based service mammographic screening achieved similar reduction in cancer-related mortality as reported in earlier randomised trials. Rate ratio of standardized refined mortality^ was 0.76 (95%CI 0.53 to 1.09). The authors estimated that 20 breast cancer deaths were prevented in the study period, i.e., one death prevented per 10,000 screens.

^ *Refined mortality* excludes deaths from breast cancers diagnosed prior to the first screening round.

Screening strategy

- Screening was introduced gradually to women aged 50-59 and continued up to age of 64
- Organizers sent invitation letters to cohorts of women (by year of birth) with appointment and screening procedure information
- No reminders if no show up
- Screen by two view mammography every two yearly
- Two radiologists read mammographies
- Women with a positive result received appointment for confirmation study

Summary of study features and outcomes:

Table 1.1 Involvement of cohorts and breast cancer related outcomes during 1987-92

	Year of birth	Intended screening schedule 1987-92	Invited to screen at 1987-9		Not invited – Control▷
			Screened	Not screened	
Cohorts invited to join the national screening program at 1987-9	1928	87, 89, 91	12770	2442	0
	1930	88, 90, 92	11370	1607	0
	1932	87, 89, 91	10536	1805	0
	1934	88, 90, 92	9837	1176	0
	1938	88, 90, 92	13924	2017	0
	1928	87, 89, 91	12770	2442	0
Cohorts primarily used for control	1927	None	1341*	250*	12812
	1929	91^	3029*	524*	13332
	1933	91^	2444*	415*	11297
	1935	90, 92^	5306*	1034*	13011
	1939	90, 92^	5796*	2234*	18410
Total number of participants			76389	13504	68862
Person years of follow up			349679	51125	299228
New cases of breast cancer			774	133	677
Refined breast cancer-related deaths			49	15	63

The 1931 and 1937 cohorts were excluded for analysis, as it contributed few person years and with short follow-up. The 1936 cohort was excluded to achieve balance in age between the two arms.

^ It was assumed that late screening of the control cohorts (1929, 1933, 1935 and 1939) would not substantially affect the deaths from breast cancer by the end of 1992.

* Some of the public health services did not completely follow the recommended program schedule.

Table 1.2 Rate ratio of standardized refined mortality of breast cancer in 1987-92, compared to Control▷

		Invited to screen at 1987-9		
		Screened	Not screened	Total (95%CI)
Year of birth (cohort)	1927-30	0.91	2.03	0.94 (0.56 to 1.61)
	1932-9	0.49	1.05	**0.56 (0.33 to 0.95)**
	Total	0.67	1.42	0.76 (0.53 to 1.09)
Year of follow up	1-2	0.73	3.14	1.08 (0.41 to 3.03)
	3-4	0.58	0.69	0.59 (0.35 to 0.99)
	5-6	0.87	2.83	1.06 (0.56 to 2.03)

Subgroup analysis shows (i) effect of screening on mortality did not appear until the third and fourth year of follow up and then was lost (presumably because controls were also gradually being screened), and (ii) benefit was negligible for women aged over 57 years at first screening.

[Source: Hakama M, Pukkala E, Heikkila M, Kallio M. Effectiveness of the public health policy for breast cancer screening in Finland: population based cohort study. BMJ 1997 Mar 22;314(7084):864-7.]

[*Editorial note*: It is noteworthy that

i) Linking of the Finnish Cancer Registry (which keeps track of population identification, invitation and follow-up of participants in the breast screening program) to the National Population Registry, national registration of deaths, and cancer registrations enabled in-depth analysis to be performed.

ii) The average annual breast cancer incidence of the cohorts (age 50-64) was 166 per 100,000 women.

iii) The overall uptake (attendance rate) of the screening program was 85%.]

2. Sweden's experience

a. Women aged 50-69

In 1990, population based mammographic screening was implemented in two counties of northern Sweden for women aged 40-74. When compared to unscreened population in the adjacent two counties, there was a discernable reduction in the 'excess mortality' rate[T] in the screened population after 3-4 years for women aged 50-69.

[T] *Excess mortality rate*, is a useful concept in cancer epidemiology, and is defined as the death rate in the general population due to the excess risk imposed by a specific disease. (See original article and "Lenner P. The excess mortality rate. A useful concept in cancer epidemiology. Acta Oncologica 1990;29:573-6" for elaboration.)

Table 2.1 Summary of study features and outcomes

		Screened counties	Control counties
Number of women aged 40-74 at 31 Dec 1994		109478	78429
Annual age adjusted incidence rate of invasive breast cancer for women aged 40-74 (/100,000)	Years1980-89 (average)	148	166
	Year 1990	275	154
	Year 1991	248	176
	Year 1992	201	193
	Year 1993	182	206
	Year 1994	189	229
	Year 1995	237	188
Year of screening started		1990	1995/1996
Average interval of screening		20 months	
Uptake of the 1st / 2nd / 3rd rounds of screening		89% / 84% / 84%	
Annual breast cancer excess mortality rate among subjects aged 50-69 (/100,000) [⊆]	Year 1990	7.3	4.1
	Year 1991	9.1	9.2
	Year 1992	22.3	13.6
	Year 1993	**16.4**	**23.7**
	Year 1994	**24.0**	**36.9**
	Year 1995	**17.0**	**51.1**
Relative risk estimates of cumulative breast cancer excess mortality from 1990-95 over the control population	Women aged[···] 40-49	0.83; 95%CI 0.46 to 1.50	
	Women aged[···] 50-69	**0.67; 95%CI 0.46 to 0.99**	
	Women aged[···] 70-74	0.83; 95%CI 0.34 to 1.98	
	Overall	0.72; 95%CI 0.53 to 0.99	

[⊆] The estimated annual breast cancer excess mortality rate did not differ between screened and control counties for women of ages 40-49 and 70-74 during the study period 1990-5. For women aged 50-69, the screened population started to show lower mortality rate from 1993 (i.e. after 3-4 years). By 1995, this became statistically significant (the 95% confidence intervals separated).

[···] Age strata were defined according to age at diagnosis of breast cancer. This avoids dilution of data from cases of breast cancers diagnosed before screening (1990) and reduces bias favouring the younger groups as some

breast cancer death would occur much later. It might however, introduce lead time bias as screening detects cancer at an earlier stage.

[Source: Lenner P, Jonsson H. Excess mortality rate from breast cancer in relation to mammography screening in northern Sweden. J Med Screening 1997;4:6-9.]

[*Editorial note*: It is noteworthy that

i) An unconventional methodology for defining age cohorts and estimating mortality was used.

ii) The average annual breast cancer incidence of the cohort (age 40-74) was 191-222 per 100,000 women.

iii) The uptake of the screening program was 84-89%.]

b. Women aged 40-49

Sweden started to introduce population based mammographic screening in 1986 and completed implementation in all counties in 1997. The lower age limit for invitation was 40 years in about half of the counties and 50 years in the rest. This provides an opportunity to study the impact of screening on women aged 40-49 years by comparing outcomes in the two groups. The numbers of such females were 202,152 and 237,279 respectively in these two areas in 1988. Comparing the refined breast cancer mortality between the study (invited to screen) and control population over the period 1986-1996 (mean follow-up of 8 years) and using the 1976-1986 data to adjust for geographical differences, the relative risk of breast cancer death in relation to invitation to service screening was estimated at 0.91 (95%CI 0.72-1.15).

[Source: Jonsson H, Törnberg S, Nyström L, Lenner P. Service screening with mammography in Sweden: evaluation of effects of screening on breast cancer mortality in age group 40-49 years. Acta Oncol 2000;39(5):617-23.]

c. Experience from two counties: Kopparberg (now called Dalarna) and Östegötland

Breast cancer was diagnosed in 6,807 women ages 20-69 years during 1968 to 1996 in the two counties. The screening history of each woman was determined from medical records. By comparing breast cancer mortality resulting from incident cancers diagnosed during each of the following periods: 1968-77 (no screening); 1978-87 (58% of women aged 40-74 years were randomised to screen, uptake 85%[A]); and 1988-96 (service screening offered to all women aged 40-69 years, average uptake 85%), there is a 63% reduction in risk of breast cancer mortality among women aged 40-69 years who **actually** underwent service screening.

[A] The control group was invited to screen at between 1984-86 when the trial closed.

Table 2.2 Relative risk of breast cancer mortality of women ages 40-69 years in the two later periods compared with those in 1968-77

Age (at the time of diagnosis of breast cancer)	Year 1978-87 (95%CI)	Year 1988-96 (95%CI)
Women aged 20-39, not screened	1.10 (0.57 to 2.10)	0.81 (0.39 to 1.67)
Women aged 40-69, not screened	1.17 (0.99 to 1.38)	1.19 (0.91 to 1.56)
Women aged 40-69, invited to screen	0.57 (0.46 to 0.70)	0.52 (0.43 to 0.63)
Women aged 40-69, screened	0.43 (0.34 to 0.55)	0.37 (0.30 to 0.46)
All women aged 40-69[M]	0.79 (0.68 to 0.92)	0.50 (0.41 to 0.60)
All women aged 40-69 (adjusted for selection bias)	0.57 (0.46 to 0.70)	0.52 (0.43 to 0.63)

[M] About 50% and 85% of the cohort in the 2 counties were screened during the periods of 1987-87 and 1988-96 respectively.

Survival analysis by screening and invitation status (see survival curves in original article) suggest that cancers diagnosed among the screening attendees were of better prognosis, even allowing for a 3-4 year lead time in the screen-detected cancers.

[Source: Tabar L, Vitak B, Tony HH, Yen MF, Duffy SW Smith RA. Beyond randomized controlled trials: organized mammographic screening substantially reduces breast carcinoma mortality. Cancer 2001 May 1;91(9):1724-31.]

[Editorial note: It is noteworthy that

i) The benefit observed, even taking the whole cohort as the baseline (intention-to-treat analysis), is much greater than those observed in RCTs.

ii) No significant change in breast cancer mortality was observed over the three time periods in women who did not undergo screening. This is at odds with other evidence that shows survival benefit with advancement in breast cancer treatment in the 80s.]

3. England and Wales' experience

Population based mammographic screening was gradually introduced in England and Wales since 1988. Women aged 50-64 are invited for screening every three years. To assess the impact of screening on breast cancer mortality in women aged 55-69 years over the period 1990-8, an age cohort model was constructed using mortality data of 1971-89 to predict breast cancer mortality for 1990-8. By comparing the observed mortality in different age groups with those predicted by the model, the authors estimated that screening could contribute 3.2% reduction in mortality during 1992-4 and 6.4% reduction during 1997-9. The rest of the improvement observed (14.9% reduction in mortality) was attributed to advance in treatment and other factors, such as earlier presentation outside the screening program, etc. The authors believed that "The effect of screening on national statistics has been slower to take effect compared with randomised controlled trials partly because many deaths from breast cancer in the 1990s will be in women diagnosed before any invitation to screening."

Table 3.1 Modelled and observed annual breast cancer mortality (per 100,000)

Assumption	Age group (years)	Breast cancer mortality (average of 1992-4)				Breast cancer mortality (average of 1997-9)			
		Modelled	Observed	Difference		Modelled	Observed	Difference	
Mortality in these groups affected by factors other than screening	50-54	70.0	65.7	-6.1%		68.1	56.5	-17.0%	
	70-74	145.5	134.8	-7.4%	-5.6%	147.5	122.8	-16.7%	-14.9%[π]
	75-79	166.4	160.9	-3.3%		173.3	151.1	-12.8%	
Mortality in these groups affected by above factors & screening	55-59	88.9	82.6	-7.1%		86.9	68.6	-21.1%	
	60-64	109.1	99.5	-8.8%	-8.8%	105.2	85.4	-18.8%	-21.3%
	65-69	127.7	114.3	-10.5%		126.4	96.1	-24.0%	
Difference between 2 groups				3.2%				6.4%	

[π] After 1995, mortality in the 70-74 years age group would have been partly affected by screening. They were therefore excluded for comparison

[Source: Blanks RG, Moss SM, McGahan CE, Quinn MJ, Babb PJ. Effect of NHS breast screening programme on mortality from breast cancer in England and Wales, 1990-8: comparison of observed with predicted mortality. BMJ 2000 Sep 16;321(7262):665-9.]

[*Editorial note*: It is noteworthy that

(i) The first round of screening was not completed until 1995.

(ii) The national mortality statistics does not tell whether a breast cancer was diagnosed before of after the first round of screening.

(iii) It was assumed that (a) screening, treatment improvement or other factors did not have substantial impact on mortality before 1990, (b) women in the age group 50-54 years were minimally affected by screening.

(iv) According to the UK's Department of Health's bulletin "Breast Screening Programme, England: 1998-99" <http://www.doh.gov.uk/public/sb0007.htm> (a) coverage of the screening programme in England was 66.4% at 31 March 1998, (b) the breast cancer detection rate in 1998-9 was 580 per 100,000 women screened, of which 20.4% were non-invasive or micro-invasive cancers.]

From Prof Ma Ho Kei……

I have read the draft of the article to be published on 1 July 2001 and have no comments. The article is really summary/extracts of data from 3 reports. I have also read Patrick J. article published in the Hong Kong Medical Journal. The results of breast cancer screening are not only dependent on the age group screened etc. but also on the interval between mammography, what view is taken and how many views etc. In UK, mammography is only done once in 5 years and the default rate must be very high. I would be most surprised if it shows any benefit. I hope with all the comments etc. the Government will organize an expert group to formulate a sensible policy regarding breast cancer screening for HK women and also set up and monitor the standard of practice.

Emeritus Professor of Obstetrics & Gynaecology
University of Hong Kong
17 June 2001

From Prof GM Leung, Prof TH Lam ……

To screen or not to screen?

This is the dilemma facing patients, primary care doctors, radiologists, surgeons and public health practitioners in Hong Kong. Issue 11 of EVIDENCE gave us an overview of the eight primary trials evaluating screening mammography and precipitated an unprecedented overwhelming response. The present issue attempts to take the debate one step further, beyond the experimental confines of randomised controlled trials (RCTs), by bringing together the latest evidence based on community effectiveness studies from Finland, Sweden and England and Wales in the service setting.

By the authors' own admission, the Finnish results[1] are insignificant with the tail end of the 95% confidence interval reaching 1.09, indicating the possibility of excess deaths from screening. It was only after subgroup analyses that the apparent benefit in women between the ages of 50 and 56 emerged. Such selective post-hoc analyses are dubious at best in the context of the most rigorously monitored randomised trial, let alone in a practice-based cohort setting.

On the other hand, the Swedish Two-County community results[2] point to a staggering 63% relative risk reduction in breast cancer-related deaths from mammography, tripling the generally accepted estimate of about 20% derived from the eight original RCTs. However, closer examination leaves the reader with many serious queries about the study's methodology and interpretation. First, even the most zealous defenders of screening have yet to give a cogent explanation as to how a practice-based programme can demonstrate superior benefit over that obtained in all eight RCTs with a combined enrolment of half a million women, and the arguments of Tabar *et al*'s remain unconvincing. Second, the authors failed to detect any change in mortality for unscreened women from 1968 to 1996, implying that advances in surgery and adjuvant treatment over the 30-year period have made no difference to survival. This is clearly not true. Peto[3], and even Blanks[4], have argued that the substantial mortality reduction we see in Western countries "has come not from a single research breakthrough, but from the careful evaluation and adoption of many interventions, each responsible on its own for only a moderate reduction in breast-cancer mortality"[3]. We are more likely to be witnessing the results of systematically different management regimens for breast cancer among the screened and unscreened populations in Kopparberg and Ostegotland, leading to a possibly spurious observation reported by the authors.[5] Lastly, the study's use of the 20-39 age group as a control is problematic. We know that the therapeutic effect of adjuvant treatment may be very different in women aged 20-39 compared with those in the screened group older than 40 years. For instance, the effect of tamoxifen in older women may be larger than that for their younger counterparts, as many of the latter may be premenopausal and have oestrogen negative cancers, thus gaining less benefit from tamoxifen.[5]

Based on statistics for England and Wales, Blanks and colleagues[4] arrived at a more modest estimate of risk reduction of 6.4%, attributable to screening and earlier detection. Some have pointed out that even this may be an overestimate precisely because of the differential treatment response between younger and older women.[5] Some of the underlying assumptions in their age cohort model also require careful reappraisal. For example, the model relied on the unproven hypothesis that falls in mortality from breast cancer are due to the early detection of small tumours by mammography, but the Health Insurance Plan trial[6] and the Canadian trials[7] cast significant doubt on this assertion. Even if the authors' estimate of 6.4% is robust, when it is applied to Hong Kong with its much lower prevalence of disease at screening compared to Caucasian populations[8], the absolute population risk reduction is negligible and the number needed to screen would be over 40,000 mammographic examinations to save one from dying of breast cancer.

What does all this mean for Hong Kong? We have previously shown the danger of blindly adopting, without careful epidemiologic appraisal, evidence based on research in Western populations, as in the case of applying results from the eight primary breast screening trials to Hong Kong women.[8] The European community effectiveness studies compiled in this issue raise further questions about the wisdom of recommending screening mammography to the local population. As one observant respondent to Issue 11 commented, "the best way is for (the issue of screening) to be tested by controlled trials". There is such a trial ongoing in Singapore to evaluate the efficacy of mammography in Chinese women.[9] Until the results are published and scrutinised by the scientific community, health care professionals must maintain the ethical position of equipoise and counsel their patients accordingly, about both the theoretical benefits and potential hazards of mammographic screening. In parallel, more resources should instead be diverted to treatment programmes, which have been proven to produce around a 25% relative risk reduction of breast cancer-specific mortality across all age groups and stages.[10] It is time to turn our attention downstream to improving access and quality of breast cancer management, rather than devoting scarce resources to the secondary prevention of breast cancer through screening that is of questionable, marginal benefit and may bring more harm than good.

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11 June 2001

From Prof AJ Hedley .....

Screening for cancer: the need for a broader perspective

There are many issues to be considered in our debate on mammography screening. One major one is the way in which we interpret and use the outputs of randomised controlled trials. The interpretation, which is made, and the value which is placed on the result depends on your viewpoint as a clinician, patient or policy-maker. These views may be very different from each other.

For example[1] they may

- often focus on finding answers to narrow questions, not the bigger picture which may be more relevant to the information needs of the majority
- not support policy making or policy implementation
- neglect client and patient concerns
- damage the pocket of customers with no known benefit
- not result in information which can be easily used by consumers because trial results are equivocal, small, marginal effects which vary by age and other factors across the screened population
- be associated with disagreement, controversy among all the health professionals concerned, with those who wish to use the results to take a positive/optimistic view and those with no vested interest taking a more sceptical questioning view.

Overall there is a great deal of uncertainty associated with the results of a test, such as a randomised trial, and we often do not handle uncertainty very well.

In the context of the current debate about mammography screening we have pointed to another problem of interpreting and applying the results of trials. This is the validity of a trial carried out in one environment and applied in another where the baseline rates of disease are quite different. In the case of breast cancer in Hong Kong we are delivering services in a relatively low breast cancer incidence environment. This will predictably cause increased harm from false positives compared to the populations in which the trial was first done. Proposals for technological solutions, such as high resolution imaging, will not eliminate that relatively unfavourably gradient.

Screening, in the true sense of the word, is a medically initiated act in a well person, not a request for help from someone who is sick. Increasingly however the acceptance of an invitation to screen is determined or driven by the fear of the disease and bolstered by the unqualified promise that the screenee will benefit from the procedure. Women's fears of breast cancer are already disproportionate to the risk. Cumulative lifetime risks are lower than those for many other health problems, which do not hit the headlines in the same way and the causes for which are being neglected from a public health viewpoint.

We have chased the holy grail of screening, *"Early means better"*, for 40 years but many of the rewards remain elusive. One problem lies with the tests and the other with the health systems which we use to deliver them to those who are eligible. No test will achieve public health benefits unless you can achieve full coverage of the population at risk. We are nowhere near achieving that for any screening or treatment procedure except for childhood vaccinations. For example if we accept, for the sake of this debate, that cervical screening leads to a reduction in age specific mortality rates from cervical cancer, then we must also accept that we have failed to come anywhere near covering the women who might benefit — and as a result the impact on cervical mortality has been less than half what it might have been.[2] On the issue of evaluation and the impact of mammography screening on health policy it would be, say, seven years after we achieved a steady state screening programme *with complete coverage* before we could expect to see an impact of screening on mortality. What is the present coverage in the 50-69 year age group (the only group shown to benefit from screening) in Hong Kong? We have no idea, but for cervical cancer it is still less than 50%.

If Hong Kong's health care system is seriously interested in applying *any* screening tests, it needs to develop approaches to delivering tests, which will allow the public health benefits to be obtained and measured. At the present time we have no mechanism for measuring either what we are doing in terms of process, or achieving in terms of benefit or harm.

For breast cancer screening by mammography we start the quest for benefit with the overwhelming evidence that even with the very best possible outcome from mammography screening, according to the meta analysis of the Western trials, about 75% of screened women will not benefit from the procedure[3,4,5] and a substantial proportion will be potentially harmed by the consequences of a false positive. In addition there is much evidence to suggest that we should not be offering mammography screening to women under the age of 50[6] but that is recommended by some health care providers in the SAR.[7] A clear statement on the evidence for and against the possible benefits of screening women under the age of 50 should now be issued either by the Government or a representative consensus working group with the necessary expertise and credibility.

If the Western trials results on women aged 50-69 were achieved in routine practice in Hong Kong then because of the age distribution of breast cancer deaths we can estimate that this would only prevent 8% of all breast cancer deaths in the SAR per year. At the present time there is no chance that we could come anywhere near that goal, but because of the lower prevalence of cancer at screening here we must accept that the levels of harm (eg from false positives), on the debit side of the equation, will be higher. But an even more important issue is what are we doing to improve management and outcomes for the 92% of women who cannot be helped by screening.

This latter point deserves much greater scrutiny and investigation in any further development to improve the care for breast cancer in Hong Kong. One problem is how we can obtain this information on outcomes in a reliable and comprehensive fashion. This requires first a change in attitude on the part of the health professions. Screening is inherently a harmful procedure[8] and it should be strictly regulated and monitored rather than sold on the open market as a necessary and attractive commodity. It should be mandatory to complete standard records on each screening procedure completed and link them to any future screen, in other words create a virtual register. However achieving that in a mixed medical economy is difficult if not impossible. Screening should be evaluated at the population level from all perspectives, including *process* as well as *outcome* in terms of its clinical effects and its overall impact on public health and the well being of those who participate. That requires a decision analysis, behavioural medicine and economic appraisal and not simply the counting of heads and throughput.

What are the reasons (such as beliefs) why Hong Kong women accept mammography screening? In Belgium 87% do so because they believe that it would increase their chance of a cure if they had breast cancer.[9] If no benefit existed about half would not accept it. What would be the proportion in Hong Kong? And what would be the proportion among the 75% who would not benefit in terms of survival, if they thought that they had a 50:50 chance of a false positive by continuing in a screening programme?[10] A further problem is how we actually define benefit in terms of screening. Blanks et al find a "best estimate" of 6.4% reduction in mortality attributable to screening (with a range of 5.4%-11.8%). The remainder of the improvement was due to earlier presentation *outside of screening* and *improved treatments*.[3]

There are still many questions to be answered about the health related quality of life for those who do gain increased survival. From a consumer's perspective those with cancer who make no gain from screening experience a marked shortening of their life free from cancer and its treatment.[1]

What does the future hold in the short term? If we increase coverage of mammography screening we can expect the *recorded* incidence of breast cancer to increase, with a new pattern of staging and histological types. The number of cancer *deaths avoided*, even if survival stays the same, will apparently increase but so will *overall mortality* estimated in this way. However, the true measure of impact, age specific mortality rates, will not decline for many years, even if the intervention is effective. Furthermore the Western trials show that most women will die with their cancer at exactly the same time of their life as they would have done if they had not had the mammogram. If the reported, albeit disputed, impact on mortality of breast cancer in the UK and other Western countries is due to screening then we are looking at a long lead time before we would see the benefits from the introduction of mammography screening.[11] From all the data available to us we could only expect to see an improvement in mortality, where it occurs, in women aged 55-69. (The Western trials of

women recruited age 50 onwards showed little or no effect in the first four years). That would reduce deaths by, say, 25% in about 25% of total deaths, ie about 6% overall. But the litmus test, the impact on quality of life, will remain unmeasured until we incorporate such measures into all post treatment management and follow-up regimens.

In a recent BMJ leader, Nystrom[12] stated that in both Finland and England and Wales current data indicates that in practice a *screening programme* can have an effect on mortality which is similar to that found in randomised trials, but he also urged caution and further studies. The key words in his statement are *"screening programme"*. It is precisely what we do not have in Hong Kong and there are enormous obstacles to achieving this in our mixed medical economy. However without it we are very unlikely to achieve whatever public health benefits might be available from mammography screening, and in any case we will not be able to measure them reliably.

The purpose of mammography screening is to prevent cancer deaths in women. There are about 6000 cancer deaths per year in Hong Kong. Of these an increasing number (currently about 600) are attributable to tobacco and a further 370 are caused by breast cancer. If only relatively few highly selected low risk women are being screened regularly, out of all those eligible then the number of deaths avoided will be low and the costs of each even higher than the estimates. If our overall aim *is* to prevent cancer in women and the cost of preventing one breast cancer death by mammography is about $5 million (assuming complete coverage and a steady state screening programme) then we should be asking whether this is the best way to spend scarce health dollars on attempts to prevent a death from cancer.

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