CHAPTER 2

LITERATURE REVIEW

In this chapter, literature review is organized and divided into 7 parts as follow:

2.1 Incidence and Mortality of Breast Cancer

2.2 Risk Factors of Breast Cancer

2.3 Patient Characteristics that Influence the Utilization of Mammography Screening

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2.1 Incidence and Mortality of Breast Cancer

In Thailand, breast cancer changed from the third most frequent cancer of women in 1990 after cervix and lung cancer to the second in 1993, after cervical cancer. There is confirmed by an annual report of National Cancer Institute in 1996 found that 33.1% of 1440 women-patient with cervix cancer, followed by 31.5% of breast cancer. The estimated incidence rate in 1993 of breast cancer was 16.3 per 100,000 women which ishigher than the estimated incidence rate in 1990 (13.5 per 100,000 women) Incidence rates are highest in Bangkok (20.6 per 100,000 women), followed by Chiang Mai (15.2 per 100,000 women), Lampang (15.0 per 100,000 women), Songkhla (11.5 per 100,000 women), and Khon Kaen (8.6 per 100,000). Age-specific incidence rates show a rise to maximum around age 50, and decline in older ages. Most cases are detected at a relatively advanced stage. (Chindavijak and Martin 1999)

In the USA, breast cancer is the leading type of cancer in women. An estimated 180,200 cases were newly diagnosed in 1997, and breast cancer is the second leading cause of cancer death, with an estimated 43,900 deaths in the same year (American Cancer Society, 1997 quoted in Michielutte, 1999). In 1999, an estimated 175,000 women will be diagnosed with breast cancer, and 43,300 will die from the disease. Breast cancer is

responsible for approximately 30 % of all new cases of cancer among women and accounts for 17 % of all deaths due to cancer. About 76% of new diagnoses of breast cancer are in women aged 50 and older. The incidence of breast cancer increased 25.3% (whites: 26.2%; blacks: 36.7%) from 1973 through 1996. Most of the increase occurred during 1973-1991; during 1992-1996, the overall incidence was stable. Miller (1993) found that both incidence and mortality from breast cancer was increase rapidly after 40 years of age, and the largest increase in both incidence and mortality occurs as women reach 60 years of age. Rie (1994) found that incidence and mortality from breast carcinoma per 100,000 women are, respectively, 162 and 30 in women in their 40s, 251 and 63 in women in their 50s, and 450 and 140 in women age over 65 years. In 1999, he found that from 1973 through 1996, the age-adjusted mortality rate from invasive breast cancer for all women declined from 26.9 to 24.3 per 100,000 women.

A study on the increase in breast cancer incidence in relation to mammography use in Western Washington State found that the incidence rate increased by 31% between the periods 1974-1978 and 1986-1987 (White et al., 1995).

Four studies (Kerlikowske et al. 1993 and 1996, Kopans et al.1996, and Linver et al. 1997 quoted in Rosenquist and Lindfors 1998) found that the effectiveness of screening was measured as added years of life that resulted from the reduction in mortality due to the use of screening mammography. So, age-related differences in the probability of malignancy for biopsies of non-palpable, mammographically detected lesions were utilized (Table 2.1).

Table 2.1 Probability of Malignancy for Biopsy of Non-Palpable, Mammographically Detected Lesions, by Decade.

Age (yrs)	Probability of Malignancy
40-49	0.22
50-59	0.32
60-69	0.44
70-79	0.52

Source: Rosenquist and Lindfors, 1998, Screening mammography beginning at age 40 years.

The mortality of breast cancer reduced with annual and biennial mammography screening in different years of age as shown in Table 2.2.

Table 2.2 The mortality of breast cancer reduced among screened women by age group

Frequency of screening	Percentage of mortality of breast cancer reduced by age group (years)			
	40-49	50-59	60-69	70-79
Annual screening	36%	46%	44%	44%
Biennial screening	13%	39%	39%	39%

Source: Rosenquist and Lindfors, 1998, Screening mammography beginning at age 40 years.

In Japan, the prevalence of cancer has increased rapidly since the 1950s, and cancer is currently the number one cause of death (Kuroishi et al. 1992 and Hirose et al. 1992 quoted in Bennett 1998). So, Japanese medicine emphasized early detection, based on government – subsidized screening programs (Oshima, 1994 quoted in Bennett 1998).

2.2 Risk Factors of Breast Cancer

The well known risk factor for breast cancer include family history, early menarche, late age at first birth, late age of menopause, low parity, and ionizing radiation. Fibrocystic disease with epithelial proliferation may progress to invasive breast cancer (Chindavijak and Martin 1999).

In 1999, Nidus Information Services stated that, for women who have some risk factors, it may be justifiable to have yearly mammography screening at an early age (30-35) and recommended many factors that are known to increase the risk of development of breast cancer as follows:

- A few genetic markers have been linked to development of breast cancer
- History of breast cancer in a first-degree relative

- History of breast cancer in the same patient, in the opposite breast
- Onset of menstruation in early ages
- Late onset of menopause
- Radiation exposure
- Heavy alcohol consumption
- High-fat diet
- Obesity
- First pregnancy after the age of 30
- Very tall women

The American Cancer Society (1989) stated that high-risk factors divided into 2 parts including: Primary, there is a mother or sister who had breast cancer, particularly at an early age. And secondary, there are beginning menstruation at an early age, late age at menopause, lengthy exposure to cyclical estrogen, and having never had children or had first child late in life.

In 1993, Colditz et al.and Slattery et al. found that about 10 % of all women with breast cancer have a family history of the disease in a first-degree relative. The relative risk of breast cancer was assumed to be 2.4 in the high risk group.

In 1995, Vincent et al.(1995) also confirmed that biologic risk factors include breast cancer in a sister of mother, precancerous breast biopsy, early onset of menses, late menopause, nulliparity, and first pregnancy after 30.

2.3 Patients Characteristics that Influence the Utilization of Mammography Screening

Many studies, which clearly examine the impact of sociodemiographic status, insurance coverage, payment mechanism and strongest recommendations on mammography utilization, are shown as follows:

Vincent et al.(1991) found that the strongest factors associated with utilization of mammography was clinical examinations and laboratory tests. The effect was a 70%

increase in the rate of past year mammogram, associated with annual clinical breast examinations. A routine medical checkup within the past year raised the mammogram utilization rate to 45.9%, suggesting that routine physical examinations often include a breast examination. Demographic factors include age over 50, higher education, and high socioeconomic status.

In the US, Mosliwitz (1986) and Smith et al. (1992) found that the women with health insurance had mammography screening more than women with no insurance. Because of changes in the health-care delivery system from paying out-of- pocket expense to third party payment for mammography screening. This leads to increased rates of mammography use (Rutledge 1988; Mayer 1992; and Johnson 1988 quoted in Bush and Langer 1998). Many women with insurance still do not take advantage of mammography benefits. Many factors- such as the cost of the procedure, infrequent contact with a health care professional, fear, the belief that the mammography screening is not necessary. Education background, income, and race influence whether a woman will have a mamogram.(Zapka et al.1989; Urban et al.1994; Rutledge et al. 1988; Mayer et al.1992; Hedegaard et al. 1996; Stein et al. 1991; and Lewin-Epstein 1991 quoted in Bush and Langer 1998) Older black women had a low utilization of mammography screening. (Preston et al. 1997)

Another factor that affects the use of mammography is physician gender. Women are more likely to receive mammography if they see a female, rather than a male physician. (Lurie et al. 1993 quoted in Anderson et al. 1997) In general, minority and low-income females have lower mammography rates (Ettner, 1996 quoted in Bush and Langer 1998). In 1994, Osteen et al. found that the increased use of mammography has resulted in a shift toward the diagnoses of earlier stage disease and greater than 50% of the breast cancer diagnosed are stage I.

A study of mammography utilization among farm women in 1996 by Carr et al. found that the utilization in rural populations was lower than in urban populations. Physician's recommendation for a screening mammogram and family history of breast cancer were found to be associated with ever having had a mammogram. Physician's recommendation was the most influential determinant of utilization.

In 1996, Seow et al. studied among women in Singapore, he found that the strongest factor that determine acceptability of mammography in an Asian population was the encouragement by her spouse or family member.

Blackman et al. (1999) found that for all 9 years (from 1989-1997), mammography use was lowest at the lowest level of annual household income and education and increased as income and education increased. Women without health-care insurance were consistently less likely than those with insurance to have received mammograms.

Bush and Langer (1998) found that having a regular health care provider was strongly associated with having had a mammogram within the past two years. An association was independent of age, income, education, ethnicity, and area of residence. Additionally, it has been shown being under a regular provider's care can increase the future probability of having a mammogram. It is very complicated to predict because having a regular health provider is often associated with higher income and better insurance coverage. Other factors may complement the effects of provider and insurance on mammography usage. For example, marital status (particularly being married) played an important role in the use of mammogram. A partner may, for instance, provide the encouragement to obtain a mammogram.

In January 1991, Medicare has reimbursed 80% of the cost of biennial screening mammograms for females who are older than 65 (Urban et al, 1994). It had some impact on mammography use although its effects were still limited. In 1997, Breen et al. stated that the mammography screening was more successful when educational promotion accompanied a financial benefit. In the same year, Preston et al. (1997) found that the use rates among women aged 65 years and older who were eligible for Medicare screening mammography reimbursement increased significantly from 14.6% in 1991 to 18.9% in 1992. The mammography use rates among black women 65 years and older were significantly lower than their white peers in 1991-1993.

From these studies, it seems clear that differences in patterns of mammography screening utilization by sociodemographic characteristics of patients (women) reflect both differences in economic status and in attitudes. The lower socioeconomic groups are least

to use mammography screening. The influence of the insurance coverage, routine medical checkup, race, age, education level etc, all of them are very strong effect to mammography utilization.

2.4 Provider Features that Influence the Utilization of Mammography Screening

There are many factors of provider features that affect mammography screening, e.g. the price of care (charge), physical access, institution policy, screening policy and manpower arrangements.

In 1988, Lucy studied on cash prices affecting health care and found that the cash prices had little impact on the demand for health care. Chernichovisky and Meesok (1985) suggested that utilization was based both on the relative costs of the services to the consumer and on the consumer's socio-economics status. They found that limited service availability, relatively high cash price and low household income reduce utilization, and concluded that the provision of zero-priced public services to the poor was an essential public policy for the country. Berman et al. (1989) also suggested that utilization differences between income groups and the range of treatment choices at different prices indicate that levying fees might prevent some groups from seeking government care. Another study from Akin et al. (1986) suggested that the influence of price was confounded by the informal use of sliding scales for private care, allowing lower charges for the poor, and by the association of higher prices with perceptions of better quality of care.

Poor physical access to health care generates costs additional to the price of care. There may be transport costs, if transport facilities are available and used, and there will be time costs, possibly including a loss of income resulting from the time taken to seek care. Other time costs (waiting and consultation times) represent an aspect of the quality of care offered by facilities. Igun (1979), reflecting the Nigerian experience, suggests that all the costs of care are assessed in choosing which provider to use. Certainly, poor access is often associated with lower use of care. Many studies have concluded that the lower socio-economic groups have least access to transport facilities and so will travel less far for care. Where access is

easier, it seems likely that all socio-economic groups will use services more (Chernichovsky an Meesok, 1985: Heller, 1982: Howare, 1976 quoted in Carrin 1994).

2.5 Cost for Mammography Screening

The financial burden of cancer in the United States can be devastating to patients and family members: in 1997 alone, it accounted for $35 billion in direct medical costs, $12 billion in indirect medical costs, and $57 billion in mortality costs. The costs of the various cancer insurance policies in US were similar, averaging about $100 to $350 annually (for family coverage) per year for policies purchased through employers (Charles et al., 1998). Costs for mammography screening, all results were expressed in U.S. dollars, and were rounded to the nearest $100. In 1998, Rosesquist et al. found that base cost of screening mammography is $55.

The cost per woman screened in various countries were as follows: in Spain $30 (Plans et al. 1996), in Japan 500 yen or $ 4.59 (Bennette, 1998), in Norway 75.4 pounds (Norum, 1999) and in France 374 FF (Wait, 1996).

In conclusion, the cost of mammography screening is different in each country. In Thailand, no study on cost of mammography screening before. So, if data are collected, both on cost and effectiveness of screening with precision and reliability before reaching any conclusions on cost-effectiveness, it will be very useful for the development of a coherent and equitable policy on screening, which is justified, both in economic terms and for the public health.

2.6 The Relevance between the Use and the Cost Recovery of Health Care Technology

Considering the relevance between the use of mammography and the cost recovery of this machine is very important as the organization should be concerned about its goals. With a budget constraint, an economic analysis should be done to illustrate the choices to society so as to can achieve efficiency and equity in medical care. Especially in the public sector, the welfare criteria should concern the effects on equity. So, in order to set

a charge for mammogram it is necessary to know what they cost and who use this service. Since, the hospital wishes to assume responsibility for certain specific categories of costs, it is necessary to know the structure of the costs of mammograms in detail in order to determine who should or can pay for what. Once the costs are known, the hospital will then have to choose the cost recovery system it considers appropriate and set the charges needed to attain the objectives that have been determined. Therefore, the characteristics of users in this hospital should be concern in order to reach the health system objectives of efficiency, equity, and cost containment.

2.7 Cost Recovery and Break Even Analysis

The objectives of cost recovery are intended to:

- Raise revenue for health care by imposing user charges for public health services that used to be provided free of charge.
- Improve the coverage and quality of care by increasing resources for the health sector.
- Enhance equity in the provision of health care by targeting spending toward services for the poor and other vulnerable groups.
- Improve service utilization patterns and control frivolous demand.

The cost recovery was analyzed to evaluate the efficiency and equity of access in that service which is the ratio of the revenue and the cost. If the result of cost recovery ratio equals 1, this means that the revenue of hospital can cover the cost. At this point, revenue equals cost, the hospital earns zero profit. If the result of cost recover ratio is less than 1, this means that the revenue of hospital cannot cover the cost. At this point, the revenue is less than the cost, the hospital loss profit. If the result of cost recovery ratio is more than1, this means that the hospital got the revenue from the patients more than its investment. At this point, the hospital earns profit.

In determining the costs and cost structure, the hospital will have some important elements to help to decide on a system of cost recovery and to set charges. A system of cost recovery that is to be fair and effective as well as capable of nationwide implementation requires adequate knowledge of the characteristics of the supply and demand for providing that service.

Carrin and Evlo (1995) studied the cost recovery system, they found that flat rate and prepayment system of charges can meet the objective of equity (i.e. the patients with the same need should have the same access to care) than a system of itemized charges.

Tangcharoensathien et al. (1994) studied the cost recovery and break even point of Extra Corporeal Shock Wave Lithotripters (ESWL) found that at Ramatipbodi Hospital was the highest total cost recovery ratio at 1.52, followed by the Veterans Hospital at 0.88. The average cost recovery ratio of other hospitals in Bangkok was about 0.14-0.38, the hospitals in the northeastern region was about 0.20-0.31, and the lowest of total cost recovery ratio was in the Central Hospital in Bangkok at 0.14. The number of the patient at break even point was higher than the actual number of patients that they provided the services.

In 1999, Harnvoravongchai et al. studied on cost recovery and break even point of Magnetic Resonance Imaging (MRI) found that the average cost recovery in public hospital was 0.41, in private hospital 0.49, and private center 0.71. In the whole pictures, the hospitals could not recover the cost that they invested to provide this services. The average number of patients at break even point was 2,489 cases/year of 207 cases/month.