




Research Paper

Significantly Increased Medical Expenditure on Breast Cancer Failing to Bring Down Its Mortality and Incidence Rate

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Abstract

Background: The direct impact of medical expenses on breast cancer incidence and mortality rate has not been sufficiently addressed. The purpose of this study is to investigate the potential correlation between the incidence and mortality rate of breast cancer and the medical expenses in Taiwan.

Materials and Methods: Breast cancer cases were identified from the National Health Insurance Research Database (NHIRD) with corresponding to International Classification of Diseases, and the Ninth Revision (ICD-9) code 174, 1740-1749, 175, 1750 and 1759 from January 1999 to December 2006. Age-specific incidences were estimated by population data obtained from the Department of Statistics, Ministry of the Interior. Medical expenses, including outpatient and inpatient services, were also retrieved from the NHIRD.

Results: The incidence increased from 20.06 per 100,000 in 1999 to 30.34 per 100,000 in 2006; the total expenses increased from 1,449,333,521 in 1999 to 4,350,400,592 Taiwan dollars in 2006. The age-standardized mortality rate for female breast cancer remained essentially unchanged, while the age-standardized incidence increased steadily (except 2002-2003). Among the top 20 coexisting ICD-9 codes for expenses, four are directly on cancers, while 16 are on other diseases or symptoms, which are not necessarily caused by breast cancer.

Conclusions: Significantly increased medical expenditure on breast cancer failed to bring down its mortality and incidence rate. The finding has implications for healthcare policy planners in proposing strategies for breast cancer control and allocating the resources.

Key words: incidence, medical expense, breast cancer, Taiwan.

Introduction

More than one million women diagnosed with breast cancer every year are estimated (1,2). In Taiwan, breast cancer has been the most common female cancer and the fourth cause of female cancer death since 2003 (3).

Breast cancer has been causing a health concern in women worldwide not only for its increasing incidence but also for the expense of treatment. Economic evaluation of breast cancer treatment is very valuable for providing information to healthcare policy planners, physicians, patients and others to assess the situation and allocate resources to cancer control strategies, understanding the quantity of breast cancer burden and the quality of treatment (4,5). Published evaluations of costs for breast cancer treatment during the past varied substantially in perspective, methodology and patient populations (6,7). To the best of our knowledge, the potential correlation between the medical expenses and breast cancer incidence and mortality rate has not been sufficiently addressed. Thus, our current study attempted to assess the impact of medical expenses on breast cancer incidence and mortality rate in Taiwan.

Patients and Methods

The National Health Insurance (NHI) service was implemented in Taiwan since 1995, and Cancer Registration was inaugurated since 1979. National Health Insurance (NHI) covers comprehensive medical care, including health prevention, clinical care, hospitalization, and social rehabilitation. Medical expenses, including outpatient and inpatient services, were also retrieved from the NHI database.

The National Health Insurance Research Database (NHIRD) is a large computerized database which is derived from the system by the Bureau of NHI and supported by the National Health Research Institute (NHRI). The NHIRD is supplied to the scientists in

Taiwan for aims of research. Before the database is released to each researcher, all the data in the NHIRD individual identification information, including patient ID, medical institutions, and care providers, are encrypted. Therefore, the approval of Institutional Review Board was waived for the study.

In Taiwan, the increased trend of breast cancer burden was noticed as a public health issue and the annual incidences of cancer have been published formally by Bureau of Health Promotion every year. In our study, the national cancer registry system (<https://cris.bhp.doh.gov.tw/pagepub/Home.aspx>) is also a data source.

Breast cancer cases were identified from the National Health Insurance Research Database (NHIRD) with corresponding to International Classification of Diseases, and the Ninth Revision (ICD-9) code 174, 1740-1749 (Malignant neoplasm of female breast), 175, 1750 and 1759 (Malignant neoplasm of male breast) from January 1999 to December 2006. Age-specific incidences were estimated by population data obtained from the Department of Statistics, Ministry of the Interior.

Calculations were carried out using SPSS 15.0 and Microsoft Excel 2003.

Results

Annual incidences of breast cancer were detailed in Table 1. During 1999-2006, the annual incidence ranged from 40.86 to 61.10 and from 0.20 to 0.42 per 100,000 for females and males, respectively. The combined incidences increase from 20.06 per 100,000 in 1999 to 30.34 per 100,000 in 2006.

Age-specific incidences (per 100,000/year) of female breast cancer were listed in Table 2 and Figure 1. Peak incidence mostly fell on age 45-59 years during 1999 to 2006. The increase in breast cancer incidence did not occur on women aged less than 35.

Table 1. Population, number of cases and incidence of breast cancer by year and gender.

	total population (millions)			breast cancer cases			incidence rate (per 10 ⁵ /year)		
	female	Male	Total	female	male	total	female	male	total
1999	10.78	11.31	22.09	4405	26	4431	40.86	0.23	20.06
2000	10.88	11.39	22.28	4642	23	4665	42.65	0.2	20.94
2001	10.96	11.44	22.41	5067	28	5095	46.22	0.24	22.74
2002	11.04	11.49	22.52	5339	41	5380	48.38	0.36	23.89
2003	11.04	11.49	22.6	5325	32	5357	48.25	0.28	23.7
2004	11.15	11.54	22.69	6176	48	6224	55.4	0.42	27.43
2005	11.21	11.56	22.77	6594	48	6642	58.83	0.42	29.17
2006	11.28	11.59	22.88	6895	46	6941	61.10	0.40	30.34

Table 2. Age-specific incidences (per 100,000/year) of female breast cancer by year.

Age group (year)	≤19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	≥85
1999	0.19	1.78	9.42	24.91	51.86	85.24	110.12	110.78	111.38	95.02	70.43	70.95	60.55	51.19	52.22
2000	0.25	1.64	8.81	22.41	52.70	82.88	122.44	111.32	115.44	89.95	73.70	80.48	66.21	51.17	49.46
2001	0.10	2.16	7.34	24.23	53.54	93.44	127.36	108.81	116.66	102.63	88.12	80.37	78.66	70.01	59.19
2002	0.13	1.84	7.78	25.91	54.65	90.92	124.65	114.86	130.87	108.89	100.48	83.81	73.10	58.97	56.70
2003	0.10	2.28	8.46	24.25	55.38	90.44	108.93	120.15	123.56	107.46	94.32	77.82	78.73	67.58	50.77
2004	0.03	2.23	9.36	24.74	60.98	98.50	137.34	130.84	132.83	128.45	111.17	94.46	75.71	70.00	39.06
2005	0.07	1.54	6.71	27.73	61.54	102.81	143.11	138.58	134.91	142.75	119.41	78.51	81.38	69.61	78.64
2006	0.00	1.87	9.55	25.32	61.92	102.49	143.67	141.89	140.09	140.73	119.52	101.40	76.30	78.32	56.20

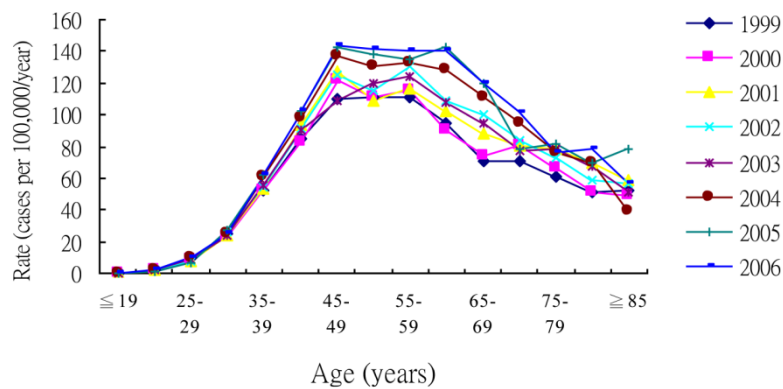


Fig 1. Incidence rate by age groups in the period 1999-2006. Data sources: Taiwan cancer registration system.

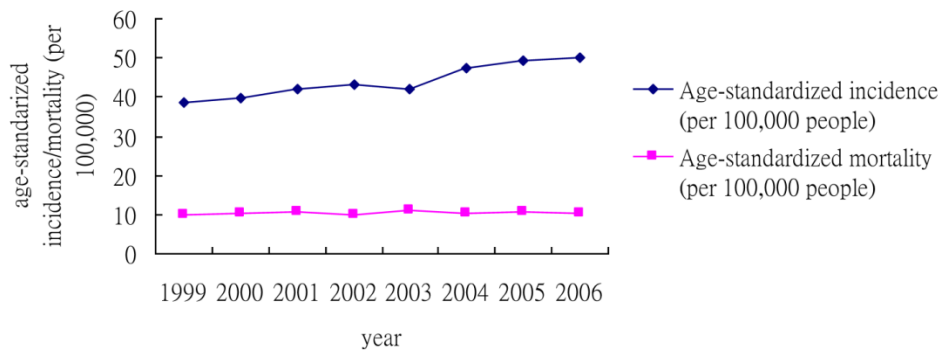


Fig 2. Age-standardized incidence (per 100,000 people) and Age-standardized mortality (per 100,000 people) of female breast cancer in Taiwan, 1999-2006. Data sources: Taiwan cancer registration system. Table I. Population, number of cases and incidence of breast cancer by year and gender.

Age-standardized incidence (per 100,000 people) and age-standardized mortality (per 100,000 people) of female breast cancer during 1999-2006 were shown in Figure 2. The age-standardized mortality rate for female breast cancer remains essentially unchanged, while the age-standardized incidence increased steadily (except 2002-2003).

Expenses of outpatient and inpatient services for breast cancer were detailed in Table 3. The total expenses increase from 1,449,333,521 in 1999 to 4,350,400,592 Taiwan dollars 2006.

The top 20 coexisting ICD-9 codes were listed in Table 4. The most common coexisting ICD-9 code was V58.1 (Encounter for chemotherapy), followed by 401.9 (essential hypertension). Among the top 20 coexisting ICD-9 codes, four are directly on cancers, including [1] Encounter for chemotherapy, [2] secondary malignant neoplasm of bone and bone marrow, [3] Secondary and unspecified malignant neoplasm of lymph nodes of axilla and upper limb, and [4] secondary malignant neoplasm of lung. 16 of the top 20 are on other diseases or symptoms, which are not necessarily caused by breast cancer.

Table 3. Number and total expenses of outpatient and inpatient services for breast cancer patients.

	Number of outpatient service	number of inpatient service	total expenses (TWD)
1999	233,460	15,834	1,449,333,521
2000	320,520	17,445	1,748,047,603
2001	349,191	18,285	1,884,945,689
2002	418,370	22,458	2,360,593,919
2003	449,415	28,472	2,858,184,684
2004	545,514	40,143	3,664,411,771
2005	624,332	42,083	4,111,497,959
2006	703,227	38,422	4,350,400,592

Table 4. The top 20 coexisting ICD-9 codes of breast cancer in Taiwan.

ICD-9 code	Disease	frequency
V581	Encounter for chemotherapy	149912
4019	Essential hypertension, unspecified	112057
4659	Acute upper respiratory infections of unspecified site	96892
25000	Diabetes mellitus without mention of complication, Type II [non-insulin dependent type] [NIDDM type] [adult-onset type] or unspecified type, not stated as uncontrolled	81676
78052	Other insomnia	75039
1985	Secondary malignant neoplasm of bone and bone marrow	74155
1963	Secondary and unspecified malignant neoplasm of lymph nodes of axilla and upper limb	47781
6929	Contact dermatitis and other eczema, unspecified cause	43031
5640	Constipation	34942
1970	Secondary malignant neoplasm of lung	34344
7291	Myalgia and myositis, unspecified	32371
5369	Unspecified functional disorder of stomach	31304
6272	Menopausal or female climacteric states	31010
57140	Chronic hepatitis, unspecified	29792
73300	Osteoporosis, unspecified	28474
460	Acute nasopharyngitis [common cold]	28358
78050	Sleep disturbances, unspecified	27920
30000	Anxiety state, unspecified	26169
7862	Cough	22272
4011	Benign essential hypertension	19436

Discussion

Our study showed that medical expenses of breast cancer treatment increased significantly and linearly from 1999 through 2006 in Taiwan (Table 3). However, the age-standardized mortality rate for female breast cancer remained essentially unchanged, while the age-standardized incidence increased steadily (except 2002-2003) (Figure 2). These facts indicate that significantly increased medical expenditure on breast cancer have failed to bring down its mortality and incidence rate.

The primary factors accounting for the significant increase of medical expenses on breast cancer appear to the followings: [1] A significant amount of the expenses are not directly related to cancer. In our

study, among of the top 20 coexisting ICD-9 code (Table 4), four are directly on cancers. 16 of the top 20 are on other diseases or symptoms, which are not necessarily caused by breast cancer. [2] The applications of novel treatment regimens, including newly developed target therapy, hormone therapy and chemotherapy. Chemotherapy numbers were steadily increasing during the study period. Hormone therapy steeply increased since 2004. [3] A significant expansion of the breast cancer screening program. In Taiwan, the National Health Service breast cancer screening program was introduced in July, 2002 (3). After repeated review and improving, breast cancer screening services expand to female 45-69 years in 2009; and further, women aged 40-44 with a family history of breast cancer were covered since 2010. [4]

Increasing incidences of more aggressive breast cancer types that require more comprehensive and costly treatment. A significantly higher incidence of axillary lymph node metastases for Taiwanese women with small breast cancer than for Western women was demonstrated (8). [5] Poor patients' compliances for physicians' advice lead to disease advance and increase medical expenditure.

Our study showed that significantly increased medical expenditure on breast cancer failed to bring down its mortality and incidence rate in Taiwan. Furthermore, it might be a similar situation in other countries. The finding has implications for healthcare policy planners in proposing strategies for breast cancer control and allocating the resources.

Limitations of this study are stages of diseases and prognosis of the patients not clear due to database not support. The medical expenses may not reflect the variations for each stage of diseases. No connected mortality database for estimations of individual medical expense of treatment is also a limitation of our study.

Acknowledgments

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Competing Interests

The authors have declared that no competing interest exists.

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