

## RESEARCH ARTICLE

# Breast Cancer Inpatients Undergoing Mastectomy from a Hospital in Guangzhou, China: A Retrospective Analysis 2004-2013

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## Abstract

**Background:** To explore the hospitalizations of breast cancer patients undergoing mastectomy, and to provide a basis for management, clinical prevention and treatment. **Materials and Methods:** We conducted an investigation by means of the retrospective survey and the medical records retrieval system, and made out the data of patients suffered from breast cancer in a hospital in Guangzhou from 2004 to 2013, including age, medical payment methods, pathological type, treatment, treatment results, complications, hospitalization days, cost and so on. **Results:** The average age of the inpatients was 50.14 years old. The main histologic types were infiltrating duct carcinoma (88.06%). The main surgery was modified radical mastectomy (80.41%). The cure rate was 90.80% during the 10 years. The main medical payment method was self-paying (57.28%). The average hospital stay was 13.51 days, and average hospitalization cost was RMB 23,083.66 yuan, proportion of drug fees up to 39.70%. Postoperative complication rate was 0.79%. The self-paying group was with the highest proportion of drug fees ( $P < 0.05$ ), while the free medical service group was with the longest hospitalization days ( $P < 0.05$ ). **Conclusions:** The payment methods significantly affected the proportion of drug fees and hospitalization days. The therapeutic effect was satisfactory with less complications and reasonable proportion of drug fees in our hospital.

**Keywords:** Breast cancer - hospital-based - surgery - mastectomy - hospitalization cost - payment methods

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## Introduction

As a developing country, China faces many social problems such as defective health care system, large numbers of breast cancer patients and per capita medical resource shortage. It is necessary the government and medical staff should work together to select proper treatment, improve work efficiency and reduce the economic burden in female breast cancer. Although many studies suggest socio-demography is one of important predictors of health-related quality of life of breast cancer survivors (Vithana et al, 2015; Shankar et al, 2015; Ramadas et al, 2015), however, there are few reports on the status of hospitalization and trend of the economic burden in female breast cancer. Therefore, the purpose of our study was to analyze the clinical features of female breast cancer to reveal the changing patterns of female breast cancer in a hospital in Guangzhou from 2004 to 2013, in order to provide epidemiological direction for clinical prevention and treatment in other areas of developing countries.

## Materials and Methods

### *Hospital-based data*

We selected clinical records consecutively from the database of a teaching hospital, which had collected information of more than 1,000,000 patients. Data of cases with available age, surgery, hospitalization days, cost and pathological characteristics were included in this study, excluding the cases of recurrent breast cancer and male breast cancer. In all, there were 2,649 women suffered from the breast cancer in the study hospital from January 2004 to December 2013. 119 inpatients did not undergo biopsy or surgical treatment, so we couldn't get pathological type. 503 women did not undergo surgical treatment after getting the pathological types by biopsy. Finally, We identified 2,027 women who received primary surgery in this research.

### *Ethics consent*

Our study didn't require an ethics statement. And our study didn't need written informed consents given

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by patients. We can confirmed that that the records/information was anonymized and de-identified prior to analysis.

*Statistical analysis*

The analyzes of clinical features were according to the one-hospital-based data. Statistical methods consisted of frequency for categorical variables and rank sum test analysis for numerical variable. For comparisons, a  $P < 0.05$  was considered statistically significant. Statistical analysis was performed using SPSS (version 15.0, SPSS Inc. Chicago, IL, USA).

**Results**

*Age distribution of hospital-based data from 2004 to 2013*

When age distribution of hospital-based data from 2004 to 2013 was analyzed, all 2,027 cases could be subdivided into 8 groups with an interval of 10 years (Figure 1 A).The most frequent age group of hospitalized patients was the 40-49 year group (667 cases; 32.91%), followed by the 50-59 group (566 cases; 27.92%) and the 30-39 group (331 cases; 16.33%). The average age was 50.14 years old.

*The changing choices of surgical modalities and a downward trend of hospitalization days and cost*

In this hospital, the modified radical mastectomy was the main surgery method in the past ten years (80.41%),

followed by simple mastectomy (9.42%) and radical mastectomy (including extensive radical mastectomy) (7.15%) (Figure 1B). The ratio of radical mastectomy was decreasing from 2004 to 2013. The ratio of breast-conserving surgery showed an upward trend from 2007 to 2013. It suggested that clinical doctors in our hospital became more cautious on the relations between curing the primary lesions and improving the patient's survival quality.

In the past ten years, the average length of stay(LOS) were  $13.51 \pm 5.86$  days. The average preoperative LOS were  $(4.38 \pm 2.84)$  days. The postoperative LOS were  $(9.13 \pm 4.68)$  days. The LOS decreased from 17.61 days to 11.14 days. The preoperative hospitalization days decreased from 5.49 days to 3.59 days, and postoperative hospitalization days decreased from 12.12 days to 7.55 days (Figure 1C).

In this study, after the removal of price swings, the average hospitalization cost and proportion of drug fees were RMB 23,083.66 yuan and 39.70% respectively. The hospitalization cost increased from RMB 22,704.97 yuan in 2004 to RMB 27,267.32 yuan in 2013. The hospitalization cost in 2013 was RMB 4000 yuan more than that in 2004. In consideration of the new technology application, updated medical equipment and consumables during the past 10 years, we considered the variation range was reasonable. The proportion of drug fees decreased from 35.57% in 2004 to 29.58% in 2013 (Figure 1D).

*Pathological types affected the tumor metastasis and treatment results*

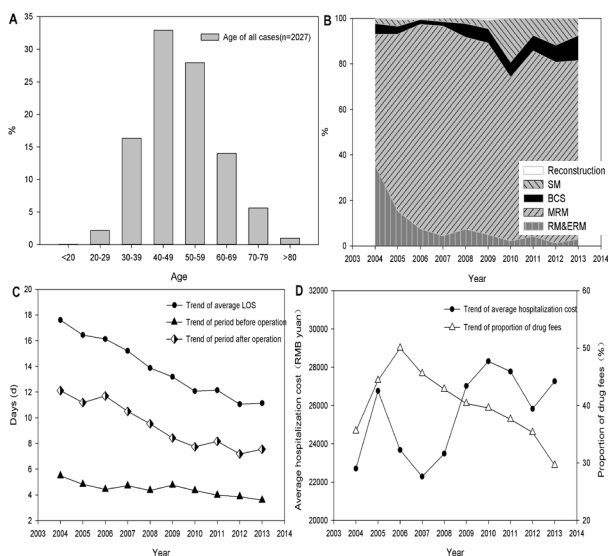
The infiltrating ductal carcinoma was the most common pathological type (88.06%), followed by invasive lobular carcinoma (2.86%) and mucous adenocarcinoma (2.61%). Other types were relatively rare. The metastasis rate of Nonspecific infiltrative breast carcinoma (NSIBC) was highest (34.19%), followed by the rare cancer (11.54%) and specific infiltrative breast carcinoma (SIBC) (10.31%) (Table 1). 3 women died during the hospitalization.

*Influence of different payment methods on the hospitalization days and proportion of drug fees*

The self-paying was the main payment method (1161 cases, 57.28%), followed by medical insurance (660 cases, 32.56%), the free medical service (167cases, 8.24%). We explored the influence of different payment methods on the hospitalization days and proportion of drug fees. We divided the patients into 4 groups by the payment methods. We found the LOS of the free medical service group was the longest ( $P < 0.05$ ), and the proportion of drug fees of self-paying group was the highest ( $P < 0.05$ ). (Table 2)

*Clinically significant postoperative complications*

There were 16 cases (0.79%) with postoperative complications in 2027 cases, including 10 cases (0.49%) with skin breakdown or delayed wound healing, 3 cases (0.15%) with haematoma needing surgical evacuation, 2 cases (0.10%) with infection needing intravenous antibiotics or surgical intervention and 1 case (0.05%) with skin necrosis. The disparity of postoperative complications reported is obvious. On the 15th annual meeting of the



**Figure 1. Age distribution, changing patterns of surgical modalities, cost and a downward trend of hospitalization days and proportion of drug fees, 2004-2013.** Age distribution of the study population (2004-2013, n=2027). Trends of surgical modalities to breast cancer. In this study period. MRM: Modified radical mastectomy. Surgical treatment reveals an emergence of less invasive modalities. ERM: extensive radical mastectomy. RM: radical mastectomy. BCS: Breast-conserving surgery. Trends of LOS, period before and after operation. LOS: Length of Stay. Trends of adjusted hospitalization cost and proportion of drug fees. We had eliminated the influence of price changes to hospitalization cost by accounting with the inflation rates in Guangzhou during the study years

**Table 1. Pathology Details of 2027 Cases in 2004-2013**

Tumor type		n	%	Metastases rate	Clinical cure rate	Clinical effective rate
				(%)	(%)	(%)
NSIBC	Lobular carcinoma	58	2.86	34.19	89.06	97.43
	Infiltrating duct carcinoma	1785	88.06			
	Medullary carcinoma	26	1.28			
	Adenocarcinoma	5	0.25			
SIBC	Intraductal papillary adenocarcinoma with invasion	7	0.35	10.31	89.69	96.91
	Mucinous adenocarcinoma	53	2.61			
	Adenoid cystic carcinoma	4	0.2			
	Sweat gland adenocarcinoma	2	0.1			
	Squamous cell carcinoma	5	0.25			
	Paget's disease, mammary	9	0.44			
	Phyllodes tumour, malignant	14	0.69			
Cribriform carcinoma	3	0.15				
Rare type	Signet ring cell carcinoma	1	0.05	11.54	84.62	92.31
	Fibrosarcoma	6	0.3			
	Inflammatory carcinoma	1	0.05			
	Comedocarcinoma	3	0.15			
	Neuroendocrine carcinoma	15	0.74			
Intraductal carcinoma, noninfiltrating		30	1.48	0	93.33	100
Total		2027	100	32.31	90.08	98.37

NSIBC: Nonspecific infiltrative breast carcinoma. SIBC: Specific infiltrative breast carcinoma. (Standard according to the WHO classification of tumours of the breast, 2012). Clinical cure: After treatment, clinical symptoms disappear with complete functional recovery. Clinical improvement: After treatment, clinical symptoms relieve with partly functional recovery. (Definitions from requirements and instructions filling out front page of medical records published by national health and family planning commission of China, 2012). The clinical efficiency rate was the sum of the cure rate and the improvement rate

**Table 2. The Influence of Different Payment Methods on the LOS and Proportion of Drug Fees**

Group	n	%	Length of stay(d)	Proportion of drug fees(%)
Self-paying	1161	57.28	13.53	44.20*
Medical insurance	660	32.56	13.15	32.3
Free medical service	167	8.24	16.07*	38.95
Others	39	1.92	14.59	33.99
Total	2027	100	13.51	39.7

Free medical service: Publicly funded free medical care for government employee in China. Medical insurance: Social Security or business insurance. This study analyzes the influence by using rank sum test. Statistical meaning was described using “\*\*”

American Society of Breast Surgeons, it was reported the incidence of postoperative complications was around 5%. The rate is higher than that of our hospital (0.79%). We believe it was due to the construct of the mammary gland surgical specialty in our hospital and improving diagnosis and treatment techniques.

## Discussion

Breast cancer is one of the most common malignant tumors among women worldwide. It is projected there are more than 232,670 new cases and nearly 40,000 deaths occurring yearly in American in 2014 (Siegel, R. et al, 2014). Although the incidence rate of breast cancer

is low in China compared with western countries, but there are many new cases which accounts for about 21% of the world's new cases because of a large population. The breast cancer turns into the most common female malignant tumor in China in 2010 (Song et al, 2014; Beckmann and Lux, 2013; Fiszler et al, 2014).

In this study, we found Guangzhou women were diagnosed at a relatively early age. From 2004 to 2013, the average age at diagnosis in our hospital was 49 years, earlier than that of Western countries (for example, 62 years in the Europe and 61 years in the US). The regional difference of diagnosed age is also obvious in China. It is reported women in eastern China are diagnosed at earlier age compared with the women in western China,

because of different environment, economic situations and lifestyles (Song et al, 2014).

In China, the proportion of breast conserving surgery (BCS) was about 10%, which was lower compared with that in the western countries (above 50%). The reasons lied in two aspects. First, the prevention programs of female breast cancer in China started late, and most women in China did not take regular physical examination, so they were diagnosed with advanced tumor stage. Second, the health knowledge pervasion of breast cancer was poor among Chinese women. So many women suffered breast cancer in China mistakenly considered the radical mastectomy as the only surgical modality which was safe enough avoiding tumor metastasis or recurrence.

Debating about the radical mastectomy was ongoing in the past 20 years (Edwards et al, 2014; Medina-Franco et al, 2013). Generally speaking, BCS may cause a relapse of tumor, while radical surgical method may affect the survival quality of patients. So many doctors supported a conservative resection range for the low-risk patients. Despite most surgeons favored the BCS and the rate of BCS is still increasing now, but there are many experts insist the breast radical surgery is still used too much (Katz and Hawley, 2007; Hawley et al, 2009). In Western countries, surgeons often recommend breast conserving surgery, and most patients adopt the advices. For doctors, selecting the radical surgery mainly because doctors believe radical surgery can reduce the risk of recurrence, the patients have contraindication of BCS, or patients have assisted radiation therapy (Gnerlich et al, 2007). But for the patients, selecting the radical surgery is often because of the failure of breast conserving surgery (Hawley ST et al, 2009). So the patient's subjective will and the failure of breast conserving surgery contribute to the rate of radical mastectomy (Morrow et al, 2009). Nevertheless, a research suggests mastectomy can improve the survival rate for patients with stage IV breast cancer, but these benefits is only for patients without tumor metastasis. Palliative treatments need to be considered in patients with tumor metastasis (Bafford et al, 2009; Gartner et al, 2009; Kim et al, 2013; Chung et al, 2013; Comsa et al, 2014). Otherwise, another research suggests whether the axillary lymph nodes accept the dissection has nothing to do with the survival in the invasive breast cancer patients with only axillary lymph node metastasis (Giuliano et al, 2011; Murthy et al, 2012; Davidson et al, 2013; Reinisch et al, 2013; Vahdat et al, 2013).

The average proportion of drug fees was 45.48% in China during 2004 to 2008, but it was 10.13% in American in the same period. There were two reasons why the proportion of drug fees in China was far higher than that in the American. First, it was due to the current policy giving preference to public hospitals with poor financial support in China. Second, the constructing of a doctor's income in China was unreasonable, and a few doctors could take rebates from extraordinary prescription. It was widely believed the two reasons above are important factors causing the medical violence in current China.

This research is a single center study. So the sample size and its representation is somewhat influenced. In addition, this study is a cross-sectional study, so the

long-term survival of patients with breast cancer, such as the survival rate of 1-year, 5-year, 10-year, have been unable to get yet. It calls for further multicenter, long-term follow-up study.

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