Chapter 5
Analysis of Breast Cancer and Surgery as Treatment Options

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ABSTRACT
In this case, we analyze breast cancer cases from the Thomson Medstat Market Scan® data using SAS and Enterprise Guide 4. First, we find breast cancer cases using ICD9 codes. We are interested in the age distribution, in the total charges of the entire treatment sequence and in the length of stay at the hospital during treatment. Then, we study two major surgery treatments: Mastectomy and Lumpectomy. For each one of them, we analyze the total charges and the length of stay. Then, we compare these two treatments in terms of total charges, length of stay and the association of the choice of treatment with age. Finally, we analyze other treatment options. The objective is to understand the methods used to obtain some useful information about breast cancer and also to explore how to use SAS and SAS Enterprise Guide 4 to examine specific healthcare problems.

BACKGROUND
Breast cancer can be defined as a malignant tumor that develops in the breast. There are many types of treatment options including surgery, chemotherapy, radiation therapy, and hormonal therapy. The medical team and the patient analyze the options together and decide the best treatment. However, surgery is so far defined as the best therapeutic option for breast cancer. There are mainly two types of surgery options: mastectomy and lumpectomy. Lumpectomy is a breast conserving procedure that consists of removing the ‘tumor’ and a margin of tissue surrounding it to make sure all breast cancer has been removed. Mastectomy is the surgery that removes the whole breast.

A considerable number of studies have been made to compare Mastectomy and Lumpectomy. Fisher, Bernard; Anderson, Stewart; Redmond, Carol K at all (1995) conclude that there are no significant differences found between the patients who underwent total mastectomy and those treated by
lumpectomy alone or by lumpectomy plus breast irradiation. Lumpectomy is a breast conserving procedure and is more modern. Mastectomy is more “traditional”. Mastectomy was for long believed to be the best treatment option. Now, with new techniques, the greater concern is on knowing which one is better and which one fits better the needs of the patient, and also which one works. It is in this view that many analyses were made and they all seem to agree on the fact that these two treatments deliver the results. Fisher, Bernard; Anderson, Stewart and Bryant, John at all (2002) found that no significant differences were observed among the three groups of women with respect to disease-free survival, distant-disease free survival, or overall survival. In the same spirit, Obedian Edwards; Fischer Diana B. and Haffty, Bruce G. (2000) discovered that there seems to be no increased risk of second malignancies in patients undergoing Lumpectomy and Radiation Therapy using modern techniques, compared with Mastectomy. Their studies did not yield statistical differences.

It is clear that these two surgical procedures do not statistically differ in treatment outcomes. In agreement with this fact, we put our interest, during this case study, on the comparison of these two treatment options with respect to Length of Stay at the hospital during treatment and the total charges for the whole treatment sequence.

**SETTING THE STAGE**

For the analysis in this whole chapter, we use SAS software and the SAS Enterprise Guide 4.1. SAS is software that is used for explaining statistically the data or for predicting results.

Enterprise Guide 4 is a point and click interface that uses SAS in-built functions. It helps the user to explore the power of SAS without writing the codes. Throughout this chapter, SAS and Enterprise Guide 4 are used to produce the results. We divide our study into three parts: Analysis of breast cancer, analysis of mastectomy and lumpectomy as breast cancer treatments and other frequent treatments used for breast cancer.

**MEPS and NIS**

This project examined the breast cancer cost and treatment of mastectomy versus lumpectomy. Mastectomy is the surgical procedure in which the entire breast is removed and lumpectomy, also called wide local excision, is a conservative surgery in which only the cancer, along with a border of healthy tissue around it is removed. We used two datasets incomplete in themselves: the National Inpatient Survey (NIS) and the Medical Expenditure Panel Survey (MEPS). (Anonymous-MEPS, 2007; Anonymous-NIS, 2007)

The NIS data are used to complete the MEPS data using predictive modeling. Data Mining can be defined as the process to extract the implicit, previously unknown, and potentially useful information from data. It includes the general technique of predictive modeling. Predictive modeling is the process by which a statistical model is created or chosen to find the best predictor of an outcome.

First, mastectomy and lumpectomy were studied using a suitable model, and then the result was scored to the MEPS data that were then analyzed with more traditional statistical tools. Mastectomy is higher in cost and hospital length of stay, and is more likely to be used as a treatment than lumpectomy. Once the MEPS data are scored, we can examine differences in follow up treatments when comparing the two procedures.

The data used were from the NIS and MEPS. These data were first filtered for breast cancer cases only. The MEPS data were downloaded from the MEPS website: www.meps.ahrq.org. For these data, four sets of files were chosen: inpatient, outpatient, physician visits, and the medication dataset. To execute the entire task for this research, we used SAS Enterprise Guide 4.1. We wanted to study the treatment procedures of breast cancer, the follow up and different complications.