

Hereditary Breast and Ovarian Cancer Predisposition Testing: Experience at a Large Community-Based Hospital



Beaumont
William Beaumont Hospital

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Introduction

Testing for hereditary predisposition to cancer has increasingly become an important component of the comprehensive care of patients with cancer, or those with a significant family history of cancer. Of the over 200,000 breast cancers occurring in the U.S., 5%-10% are associated with a genetic alteration leading to a significantly increased risk of cancer. As our knowledge expands rapidly in the area of cancer genetics, there is an ever expanding need for patients to have access to high quality, comprehensive genetic evaluation, counseling and testing. In order to meet this growing need, a comprehensive cancer genetics program was established at Beaumont Hospital, a 1,061 bed community teaching hospital in S.E. Michigan.

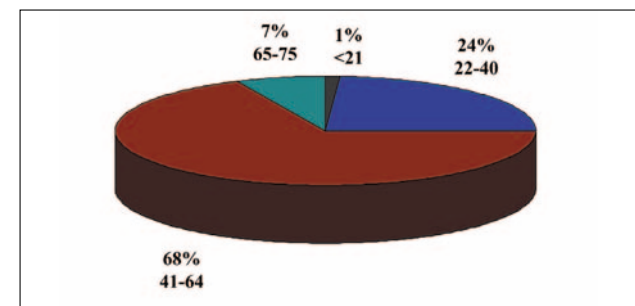
Background

The Beaumont Cancer Genetics Program was established in 2004. The program is staffed by a physician with training in medical oncology and cancer genetics, one genetic counselor with a masters in genetic counseling, a part time nurse counselor, social worker, data manager, and medical assistant. In addition, personnel from the cancer clinical trials office coordinate participation in clinical trials for patients deemed high risk for cancer who are interested in participating in clinical research. In the time interval from Oct '05 through Aug '06 a total of 165 new patients were seen for genetic counseling and testing for breast cancer susceptibility (*BRCA1* and *BRCA2* genes). Presented are the demographic and clinical data, as well as the results of testing on this cohort of patients.

Results

In between October 2005 and August 2006, the Beaumont Cancer Genetics Program encountered 164 patients for *BRCA* counseling and testing. This included an initial consult, blood draw, and a follow up appointment to discuss test results. Twelve patients are still awaiting the results, and are not included in every analysis.

Figure 1: Age Distribution of Patients Seen for Genetic Counseling & Testing



We analyzed the demographics of our patient population, which included 152 women and 12 men. The majority of our patients were in the age range of 41 to 64 years (68%). 24% of our patients were within the ages of 22 to 40 years, and 7% were 65 to 75 years old. Only one patient was less than 21 years of age, and we did not encounter any patients over the age of 76 years.

Figure 2: Genetics

Specialty	Referred Patients	Total Patients Seen
Family Internal Medicine	13.94%	23
Medical Oncology	19.4%	31
Ob/Gyn	12.12%	20
Radiation Oncology	2.42%	4
Surgery	38.79%	64
Self	13.33%	22
Total	100%	164

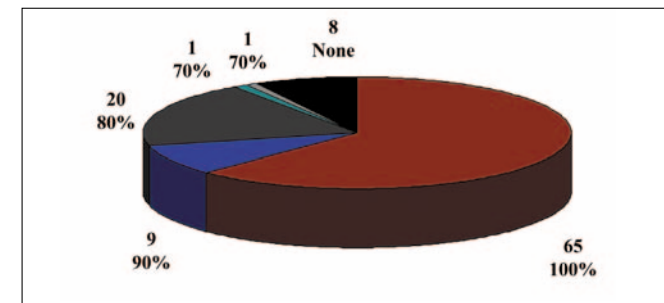
The specialties of physicians who referred patients to our Program included surgeons, ob-gyns, medical oncologists, family medicine physicians, and radiation oncologists. We also saw some patients who were self-referred. The majority of our patients were referred by a surgeon (40%). Radiation oncologists referred 2% of our patients. The other four sources of patient referrals were equally divided between ob-gyn, family practice, and oncology.

Figure 3: Surgical Decisions

Surgical Decision	Cumulative Totals
Yes	25
No	139
Total	164

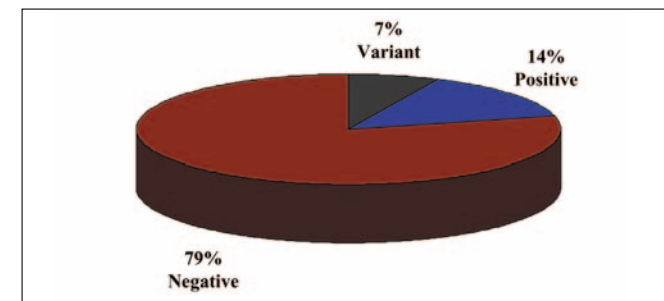
Several of our breast cancer patients that were referred were planning on using their gene test results to aid in their decision-making process for surgery. Of the total 164 patients encountered, 25 (15%) had based the type of surgery on their test results.

Figure 4: Insurance Coverage - Extent of coverage



65 patients had 100% coverage for *BRCA* testing. 9 patients had 90% coverage, 20 had 80% coverage, 1 had 70% coverage, and 1 had 60% coverage. 8 did not have insurance coverage at all. Not included in this are the 12 patients who elected to pay out of pocket for the cost of testing. The majority (90%) of patients had at least 80% coverage for the cost of *BRCA* testing.

Figure 5: Test Results



Of the patients we counseled and tested, 14% tested positive for a deleterious mutation in either the *BRCA1* or *BRCA2* gene. 79% tested negative for any type of mutation, and 7% had a variant of undetermined significance.

Figure 6: Ethnic Origin and Results of Patients Tested

Ancestry	Positive	Negative	Variants of Undetermined Significance	Total Patients
African American	1	9	3	13
Caucasian, non-Ashkenazi Jewish	18	88	7	113
Caucasian, Ashkenazi Jewish	2	19	0	21
Asian	0	0	0	0
Arab	0	4	0	4
Hispanic	0	1	0	1
Total	21	121	10	152

Of the 21 patients who tested positive for a *BRCA1* or *BRCA2* deleterious mutation, 18 were Caucasian, non-Ashkenazi Jewish, one was African-American, and 2 were Ashkenazi Jewish. Of the 10 patients who had a variant of undetermined significance (VUS), 30% were African-American and 70% were Caucasian, non-Ashkenazi Jewish.

Conclusions

Testing for hereditary susceptibility to cancer is an increasingly important component of cancer management at many large centers.

Beaumont Hospital has successfully implemented a comprehensive, multi-disciplinary cancer genetics program serving a wide range of patients referred from a variety of medical specialties.

The majority of patients seen at our program were referred by a surgeon (38%), with the remainder coming from medical oncology (19%), internal medicine (14%), and ob-gyn (12%).

A significant number (15%) of patients used the information obtained from their test to help guide a surgical decision for breast cancer management.

The vast majority of patients (90%) had at least 80% coverage for the cost of the gene test, and 62.5% had full coverage. Most individuals and physicians have a pre-conception that insurance companies do not cover this test. Our data shows that this is not the case.

Minorities represented a small portion of those tested, however a third of the individuals with variants of uncertain significance (VUS) were minorities.

Continued efforts need to be made to expand access to genetic counseling and testing services, particularly among minorities and other underserved groups. As more patients undergo testing, we will be able to better understand the significance of variant mutations in these populations.