The impact of genetic counseling on patient knowledge of hereditary breast and ovarian cancer

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BACKGROUND

- Patients at risk for hereditary breast and ovarian cancer (HBOC) referred to the Genetic Risk Assessment Service (GRAS) are provided with genetic counseling as part of their consultation.
- Genetic counseling sessions include: collection of personal/family history, risk assessment of inherited cancer syndromes, genetic testing options, discussion of confidentiality considerations and safeguards, variability of test results and potential impact on familial and personal risk management options.
- An 11 item standardized questionnaire, which has been used and validated in previous research, was developed to measure patient knowledge of HBOC[1, 2, 3].
- This questionnaire measures four aspects of HBOC genetics knowledge: (1) prevalence of the *BRCA* gene mutations; (2) patterns of inheritance; (3) cancer risks associated with *BRCA* mutations; and (4) risk management options[1, 2, 3].

OBJECTIVE

- To evaluate patient knowledge of HBOC pre-genetic counseling (GC) and post-GC to explore factors predictive of higher knowledge scores.

METHODS

- 256 female patients referred to GRAS and evaluated for HBOC were included in this study.
- Patient knowledge was measured at two time points (pre- and post-GC session) using the 11 item standardized questionnaire.
- Multiple linear regression was used to identify significant predictors of higher knowledge scores pre-GC.
- Paired-sample t-test was used to assess mean differences in knowledge scores between Timepoint1 and Timepoint2.

DESCRIPTIVE STATISTICS

N=256	Value	Missing
Knowledge Score (Pre)[i]	5	0
Knowledge Score (Post)[i]	9	0
Mutation Risk	12.18%	3
Age[i]	52	0
Education Level N (%)		10
< High school	17 (6.91)	
High school graduate	22 (8.94)	
Some College/Vocational school	58 (23.58)	
College graduate	101 (41.06)	
Post-graduate	48 (19.51)	
Personal History of Cancer N (%)		0
Yes	202 (78.91)	
No	54 (21.09)	
Family History of Cancer N (%)		0
Yes	245 (95.70)	
No	11 (4.30)	
Cancer Status N (%)		1
Active	72 (28.13)	
Past	130 (50.78)	
No personal cancer diagnosis	54 (21.09)	
Cancer Diagnosis N (%)		0
Breast	188 (85.07)	
Ovarian	13 (5.88)	
Other	20 (9.05)	
BRCA Carrier Status N (%)		0
Carrier [ii]	19 (7.42)	
Non-carrier [iii]	163 (63.67)	
Results pending	15 (5.86)	
Not pursuing testing	59 (23.05)	

[i] Mean
[ii] Including suspected deleterious
[iii] Including variant of unknown significance

KEY FINDINGS

MEAN DIFFERENCES IN KNOWLEDGE SCORES PRE- AND POST-GC BY SELECTED PREDICTORS, N = 256

Variable	Pre-GC Score	Post-GC Score	% Change+ (Pre vs. Post)
Age			
26-40	4.71	8.88	38
41-50	4.61	8.62	36
51-60	5.11	8.37	30
61+	5.31	8.69	31
P-value	*0.4062*	*0.5506*	
Education			
≤HS	4.03	7.92	35
Some college	4.41	8.71	39
College grad	5.32	8.54	29
Post grad	5.63	9.35	34
P-value	*0.0097***	*0.0324**	
Cancer Diagnosis Status			
Active	4.96	8.58	33
Past	4.98	8.61	33
No history	4.85	8.65	35
P-value	*0.9564*	*0.9790*	
Personal History of Cancer			
No	4.81	8.61	35
Yes	4.99	8.61	33
P-value	*0.6818*	*0.6466*	
Mutation Risk			
<5%	4.68	8.52	35
5-11%	4.89	8.57	33
11+%	5.79	8.91	28
P-value	*0.0720*	*0.5330*	

Key: ~P<0.10 *P<0.05 **P<0.01 ***P<0.001
+All percent changes are significant (P<0.05)

Age, education level and mutation risk found to be significantly associated with higher knowledge score pre-GC.

PRE- AND POST-GC MEAN DIFFERENCE IN KNOWLEDGE SCORE OVERALL, N = 256

	Pre-GC Session	Post-GC Session	P-value
Knowledge Score (Overall)	5	9	0.0001

Significant difference in patient knowledge within education levels exists both pre- and post-GC.

Knowledge scores increased overall.

LINEAR REGRESSION MODEL OF THE RELATIONSHIP BETWEEN SELECTED PREDICTORS AND KNOWLEDGE SCORE (PRE-GC), N = 256

Parameter Estimates:	Pre-GC Model	95 % CI
Intercept	1.6265~	(-0.2289, 3.4820)
Age	0.0343*	(0.0042, 0.0644)
Education Level		
Some college vs. ≤HS	0.3829	(-0.6520, 1.4179)
College grad vs. ≤HS	1.3521**	(0.4106, 2.2935)
Post grad vs. ≤HS	1.7592**	(0.6623, 2.8561)
Cancer Diagnosis Status		
Active vs. No history	-0.0591	(-2.0731, 1.9550)
Past vs. No history	-0.1802	(-2.0990, 1.7386)
Personal History of Cancer	0.4909	(-1.4483, 2.4300)
Mutation Risk		
5-11% vs. <5%	0.1590	(-0.7358, 1.0539)
11+% vs. <5%	1.3157**	(0.4610, 2.1704)
Analysis of Variance Statistics:		
F Value	2.93	
Pr > F	0.0026	
R^2	0.0968	
Adj. R^2	0.0638	

Key: ~P<0.10 *P<0.05 **P<0.01 ***P<0.001

NCHGR CANCER GENETICS STUDIES CONSORTIUM KNOWLEDGE SCALE

Item	
1. One in 10 women has an altered breast cancer gene	**False**
2. One half of all breast cancer cases occur in women who have an altered breast cancer gene.	**False**
3. A father can pass down an altered breast cancer gene to his children.	**True**
4. The sister of a woman with an altered breast cancer gene has a 50% risk of having the altered gene.	**True**
5. A woman who does not have an altered breast cancer gene can still get breast or ovarian cancer.	**True**
6. Early-onset cancer is more likely due to an altered breast cancer gene than is late-onset breast cancer.	**True**
7. A woman who has an altered breast cancer gene has a higher ovarian cancer risk.	**True**
8. All women who have an altered breast cancer gene get cancer.	**False**
9. A woman who has her breasts removed can still get breast cancer.	**True**
10. Ovarian cancer screening tests often do not detect cancer until after it spreads.	**True**
11. Having ovaries removed will definitely prevent ovarian cancer.	**False**

RESULTS

- Patient knowledge scores significantly increased post-GC.
- Based on the multivariable regression model, for every ten year increase in age, pre-GC knowledge scores increased by 3% (p<0.05).
- Pre-GC knowledge scores for patients with at least a college degree were 15% higher than patients with a high school diploma or less (p<0.01).
- Pre-GC knowledge scores for patients with a mutation risk greater than 11% were 12% higher than patients with a mutation risk lower than 5% (p<0.01).
- Regardless of age, cancer diagnosis status, personal history and mutation risk, patients' knowledge of HBOC increased significantly (p<0.001).

DISCUSSION

- These findings suggest that information provided during genetic counseling sessions significantly increase patients' hereditary breast and ovarian cancer knowledge.
- While patient knowledge of HBOC increased significantly post-genetic counseling compared to pre-genetic counseling, the gap in patient knowledge based on education level remained post-genetic counseling. Providers may consider this during genetic counseling sessions and incorporate strategies to ensure comprehension of information provided.

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REFERENCES

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