Teaching Internal Medicine Residents about Genetics: One Topic at a Time - Breast Cancer

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Background
- The field of medicine is experiencing rapid changes in genetics and genomics information.
- While medical school curricula all include some component of genetics education, the content may vary from one school to another, leaving Internal Medicine (IM) residents with different skills and knowledge.
- Patients would stand to benefit if physicians were trained to recognize the role of genetic and genomics that contribute to the management of common encountered primary care diseases such as diabetes mellitus, acute coronary syndrome, and certain cancers.

Purpose
- To identify baseline genetics knowledge of Internal Medicine (IM) Residents at The George Washington University.
- To determine the effectiveness of a 20-minute presentation to teach basic genetics concepts and specific guidelines for breast cancer diagnosis and treatment.

Methods
- We performed a literature review of currently available information on genetics curriculum for IM residents and residency programs in other specialties.
- A total of 30 articles were reviewed, only 12 of which had any link related to genetics education and IM.
- No standardized curriculum in genetics for IM residents currently exists.
- However, we did identify a proposed curriculum in genetics for IM¹.
- There has also been research in education about genetics in other residencies including Pediatrics, Obstetrics and Gynecology, Psychiatry and Surgery.
- A 20-minute PowerPoint presentation was developed to present basic genetics concepts as well as specific information about breast cancer screening guidelines when a significant family history of breast and ovarian related cancer syndrome arises.
- The presentation was delivered to IM residents and medical students at GWU during Grand Rounds.
- Participants were asked to denote their level year they were on the assessment forms.
- Pairings were tracked using paired numbers on the forms.
- Pre-test and post-test scores were compared using student’s paired t-test.
- The assessment form included four questions related to confidence in certain domains (differential diagnosis, risk assessment, screening guidelines, and implications of genetics testing).
- Items were scored using a Likert Scale (1 through 6).
- Three questions related to breast cancer diagnosis and screening were included. Item 1 asked participants to identify conditions related to BRCA1/2; Item 2 asked them to identify the mechanism of normally functioning BRCA; and item 3 was scenarios related to screening guidelines (see figure 1 for full questionnaire).

Results
- We received a total of 29 pre-test questionnaires and 27 post-test questionnaires.
- The questionnaires were completed by internal medicine residents and medical students.
- A paired t-test was performed on the paired 27 completed pre and post-tests. The p-level was set at < 0.05 for significance.
- Table 1. presents the p-level for the confidence questions.
- Table 2. presents the p-level for the quiz.
- Figure 1. compares the average confidence levels for each item on the pre and post-tests.
- Figure 2. compares the average score on the quiz between pre and post.
- Figure 2. is a sample of the breakdown of confidence scores for item 4 (implications of genetic testing).

Discussion
- As compared to the pre-test, confidence scores increased post presentation in all areas: differential diagnosis, risk assessment, screening guidelines, and implications of genetic testing.
- Participants learned how to find a five year risk assessment using the GAIL tool available online.
- They learned the importance of taking a three generation family history for risk assessment and the importance of identifying high risk individuals. On the post-test, most participants were able to correctly identify 3 out of 4 scenarios for genetic counselor referrals (up from 1 out of 4).
- Participants were able to identify 5 out of 7 BRCA related cancers post presentation as compared to 2 out of 7 on the pre-test.
- Prior to the presentation, none of the participants were able to identify the mechanism of the BRCA1 gene, post presentation 23 out of 27 participants were able to correctly identify the mechanism.
- Given these results, it appears that a 20-minute presentation is efficacious in presenting genetics concepts and screening guidelines for breast cancer.
- This could be used as a model for other genetics education for IM residents. Possible topics for monthly presentations could include: colon cancer, ovarian cancer, emphysema, cardiology – long and short QT, blood disorders, pancreatic cancer, neurologic disorders, among others.

Limitations
- Initially, the plan was to use the medical students as a control and compare their results to the residents. Participants were asked to denote what PGY they were in or they were a student. However, only 10 participants actually filled that information in. Therefore, we chose to analyze the data as one group with no control.
- The presentation was compiled and delivered by a fourth year medical student, therefore, it would be difficult to replicate.
- The presentation design was not standardized.

Graph 1. Average Confidence Scores (+/- 1 S.D.)
Graph 2. Average scores on Quiz (+/- 1 S.D.)

Table 1. P-level for Confidence Questions
<table>
<thead>
<tr>
<th>Domain</th>
<th>Pre</th>
<th>Post</th>
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<tr>
<td>Risk Assessment</td>
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<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Screening Guidelines</td>
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<tr>
<td>Implications of BRCA1/2 testing</td>
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Table 2. P-level for Quiz
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<th>Quiz</th>
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<td>BRCA1/2 mechanism</td>
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<td>BRCA1/2 screening guidelines</td>
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<td>BRCA1/2 implications</td>
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<td></td>
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</tr>
</tbody>
</table>

Figure 1. Questionnaire
- Graph 1. illustrates the average confidence levels for each item on the pre and post-tests.
- Graph 2. illustrates the average score on the quiz between pre and post.
- Figure 2. illustrates the breakdown of confidence scores for item 4 (implications of genetic testing).

References