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Predictive Hereditary Cancer Panel Testing in Minors: The Experience of Laboratory Genetic Counselors

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I. Background

Multi-gene inherited cancer panels (ICPs) are an efficient, cost-effective option for patients with cancer histories suggestive of multiple genes and have been shown to identify a significant number of clinically actionable results outside of traditional hereditary cancer testing (Lynce & Isaacs, 2016; Lincoln et al., 2015; Tung et al., 2015). ICPs often include genes associated with both pediatric- and adult-onset cancer predisposition syndromes. While it is widely acceptable to perform diagnostic or predictive genetic testing on minors for conditions with clinical implications in childhood, predictive genetic testing for adult-onset cancer syndromes in minors is generally discouraged. Professional guidelines cite lack of clinical intervention in childhood, potential negative psychological impact, autonomy, and the potential for discrimination as reasons for these recommendations (Committee on Bioethics, 2013; Botkin et al., 2015). There is little research, in particular longitudinal analyses, addressing these issues. However, professional guidelines do encourage shared decision making between families and providers prior to testing. Current research has shown that many non-genetics providers have considerable gaps in knowledge about genetic testing and guidelines, but they are open to education and training (Klitzman et al., 2012; Borry et al., 2007).

LabCorp® offers 12 ICPs spanning pediatric- and adult-onset hereditary cancer conditions. Lab genetic counselors (GCs) review every case and contact clients when a minor is ordered for an ICP and an appropriate indication is not provided. The GC will call the client once to discuss the indication for testing, guidelines for predictive testing in minors, and recommend a more appropriate test if possible. The purpose of this study is to review these cases to determine general trends, outcomes, and to identify areas the lab could better cater toward this unique population of patients.

II. Methods

This study is a retrospective case review of 59 consecutive ICP orders on minors submitted to LabCorp® where a lab GC contacted the client. Testing outcomes and results were recorded for each case. Data was analyzed for general trends in indication, ordering provider type, test outcome, and result.

III. Results

The average age of patients was 10 years old, with an age range of 1-17 years old. The data was broken down into three main questions:

- What was the indication for testing? **Figure 1**.
- Who ordered the testing? **Figure 2** and **Figure 3.**
- What was the outcome of the case? **Figure 4.**

Figure 1: Provided Indications for Ordering an ICP on a Minor

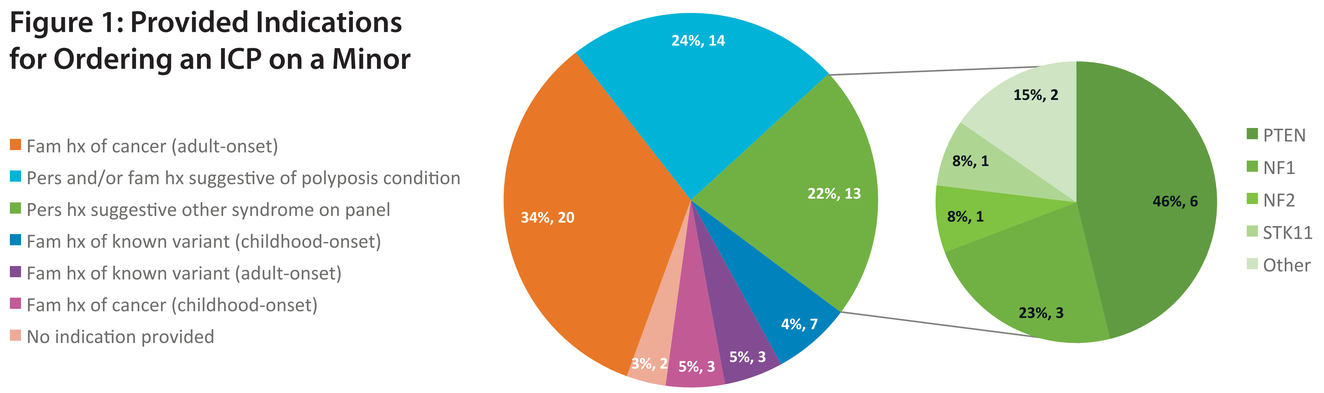


Figure 2: Type of Ordering Provider

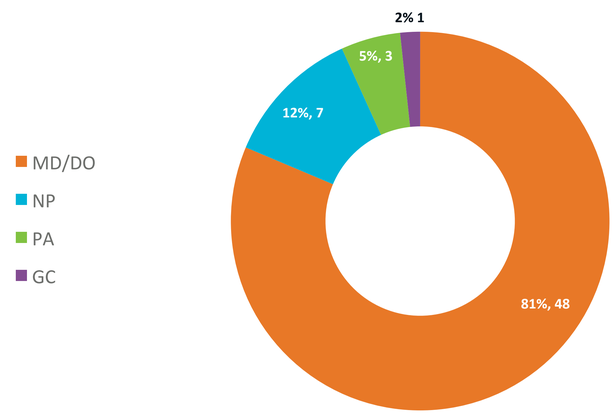


Figure 3: Type of Ordering Practice

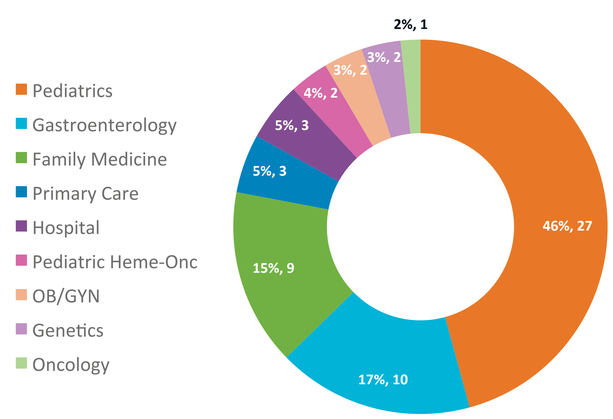
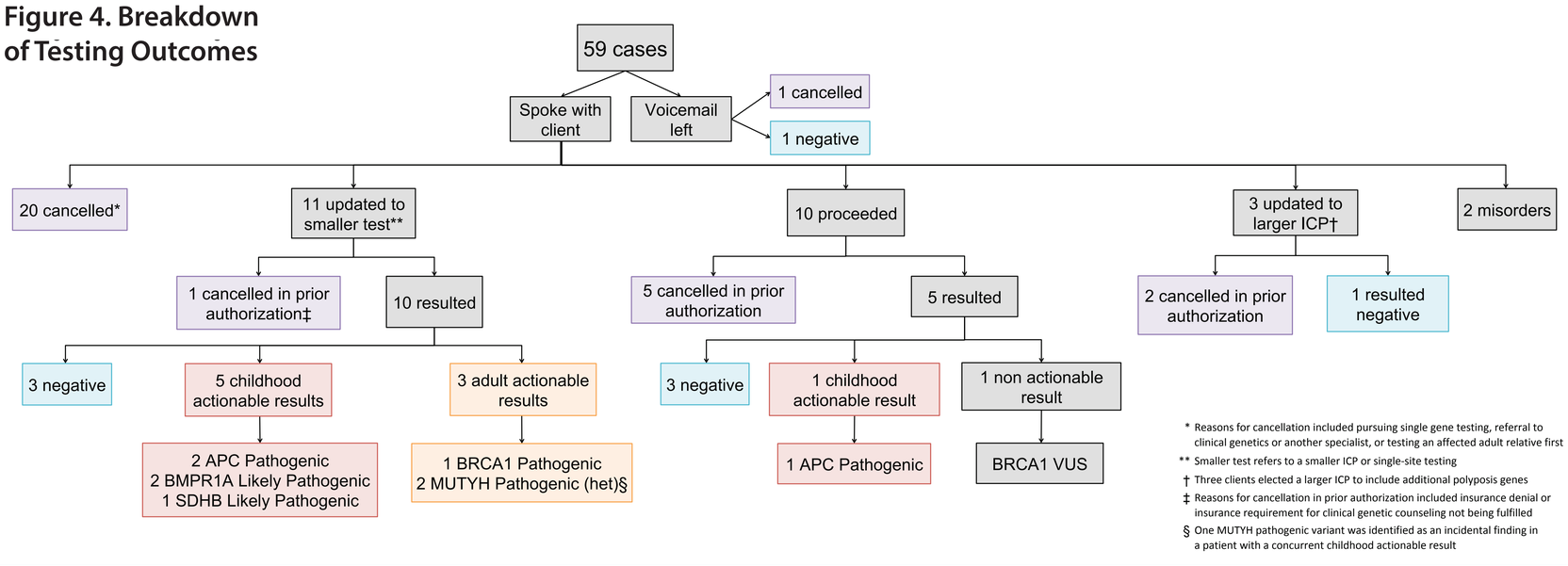


Figure 4. Breakdown of Testing Outcomes



* Reasons for cancellation included pursuing single gene testing, referral to clinical genetics or another specialist, or testing an affected adult relative first
** Smaller test refers to a smaller ICP or single-site testing
† Three clients elected a larger ICP to include additional polyposis genes
‡ Reasons for cancellation in prior authorization included insurance denial or insurance requirement for clinical genetic counseling not being fulfilled
§ One MUTYH pathogenic variant was identified as an incidental finding in a patient with a concurrent childhood actionable result

IV. Discussion

Most patients did not have an indication supported by professional guidelines for ICP testing in childhood. The majority of ordering providers in this dataset were non-genetics professionals. This data suggests that non-genetics providers may need assistance both in choosing the most appropriate test for a minor exhibiting symptoms of a pediatric-onset hereditary cancer condition and understanding when it is appropriate to order an ICP for a minor with a family history of adult-onset hereditary cancer conditions. Education from lab GCs about predictive testing in minors can help guide the provider towards the most appropriate test for this special population. Additionally, the increased rate of tests moving to completion for smaller ICP or single-site testing suggests improved test selection can help remove financial barriers for appropriate testing and warrants future exploration

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V. References

1. Lynce F, Isaacs C. How Far Do We Go With Genetic Evaluation? Gene, Panel, and Tumor Testing. *American Society of Clinical Oncology educational book American Society of Clinical Oncology Meeting*. 2016; 35:e72-e78.
2. Lincoln SE, Kobayashi Y, Anderson MJ, et al., A Systematic Comparison of Traditional and Multigene Panel Testing for Hereditary Breast and Ovarian Cancer Genes in More Than 1000 Patients. *J Mol Diagn*. 2015; 17(5):533-44.
3. Tung N, Battelli C, Allen B, et al., Frequency of mutations in individuals with breast cancer referred for BRCA1 and BRCA2 testing using next-generation sequencing with a 25-gene panel. *Cancer*. 2015; 121(1):25-33.
4. Committee of Bioethics, Committee on Genetics, and, American College of Medical Genetics, and, Genomic Social, Ethical, Legal Issues Committee. Ethical and policy issues in genetic testing and screening of children. *Pediatrics*. 2013 Mar; 131(3):620-2. doi: 10.1542/peds.2012-3680. Epub 2013 Feb 21.
5. Botkin JR, Belmont JW, Berg JS, et al., Points to Consider: Ethical, Legal, and Psychosocial Implications of Genetic Testing in Children and Adolescents. *Am J Hum Genet*. 2015; 97(1):6-21.
6. Klitzman R, Chung W, Marder K, et al., Attitudes and practices among internists concerning genetic testing. *J Genet Couns*. 2012; 22(1):90-100.
7. Borry P, Stultiëns L, Nys H, Dierickx K. Attitudes towards predictive genetic testing in minors for familial breast cancer: a systematic review. *Crit Rev Oncol Hematol*. 2007 Dec; 64(3):173-81.

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Poster presented at the *ACMG Annual Clinical Genetics Meeting*; 2019 April 3-5; Seattle, WA.