Key Takeaways

Genetic testing can be an effective tool to inform a patient’s diagnosis and treatment. Insurance providers continually look for novel ways to identify individuals that may benefit from early intervention for specific conditions.

Experts recommend that patients be advised by a genetic counselor to help interpret the test results and what they may mean for future health care.

Genetic testing products are rapidly entering the market. Not all genetic tests are supported by strong evidence for their clinical use.
Health Plan Landscape for Genetic Testing

There are nearly 70,000 genetic testing products on the market, with an average of 10 new products entering the market each day.

Concert Genetics

Background

Genetic testing, which identifies changes in genes, chromosomes, or proteins, can be an effective tool to inform a patient’s diagnosis and treatment plan. Many types of genetic tests are now available that can be used to diagnose disease, determine the severity of a disease, identify gene changes that may increase a patient’s risk of developing disease, and identify gene disorders that may be passed on to offspring.

For some conditions, genetic testing has already been integrated into care delivery. For example, women with a family history of breast cancer are commonly tested for BRCA1/2 gene mutations. Similarly, genetic tests for colorectal cancer are often provided to individuals with a family history of certain types of colorectal cancer (e.g., familial adenomatous polyposis and Lynch syndrome).¹ Results can inform treatment, empower patients to make lifestyle changes, or increase the frequency of screening to improve their chances for early detection of a disease.

Genetic testing is not without challenges. Strong scientific evidence that a genetic test can provide a health benefit to patients does not always exist. Sparse or inconclusive evidence of the clinical utility (e.g., evidence that the test will result in informed treatment decisions that improve health outcomes) of some genetic tests makes the value of these tests uncertain. Experts recommend that patients work closely with a genetic counselor to understand test results and what they may mean for future health care, since results can sometimes be difficult to understand or act upon. For example, a “positive” test result does not necessarily mean that the patient will develop the condition, nor does it provide any information about the severity of the condition. Similarly, a “negative” test result does not mean that the patient will never develop the condition; rather, the test shows that the patient is at an average risk (or, has a mutation that the test cannot detect).

Adding to this challenge is the sheer magnitude of the subject—22,000 human genes have been identified, with more than 80 million gene variations (e.g., variations in genes from person-to-person) discovered to date. Of this vast quantity of genetic data, a limited portion can be used to improve patient care. Understanding how to interpret the results and apply findings is critical for effective clinical care.

Despite these challenges, there are opportunities for genetic testing to contribute to better health outcomes. Health insurance providers are continually assessing new and existing genetic tests and designing their benefit packages to include genetic tests that are supported by scientific evidence and are a valuable resource for patients.
Insurance Providers’ Use of Genetic Tests to Promote Preventive Screening and Disease Management

Through early detection programs, insurance providers continually look for novel ways to identify individuals that may benefit from early intervention programs for specific conditions. Genetic testing can be a powerful tool in this effort to provide “personalized medicine,” revealing information about a patient that otherwise may not be obtained. Genetic testing is encouraged by health care providers for individuals who are at risk for certain genetic conditions for which there are specific interventions to prevent or treat the conditions. The results can help health professionals and health insurance providers ensure that patients receive appropriate preventive care, coordination of services, and early treatment for their medical conditions.

Some examples include the following.

- **Testing during pregnancy.** Pregnant women may decide to undergo chorionic villus sampling (CVS) or amniocentesis procedures to detect certain fetal genetic abnormalities. Often, these tests are reserved for families with a history of genetic illness, or for women who will be 35 years or older at the time of birth, as chances of chromosomal problems increase with age. Results can help parents identify potential problems before the baby is born and potentially inform newborn treatment immediately following the delivery. However, amniocentesis and CVS carry risks of miscarriage due to injury or infection in the womb, so are often only administered to patients who meet the clinical criteria. Other examples of genetic tests include tests for Patau syndrome and Edwards syndrome.

- **Carrier testing.** Cystic fibrosis (CF) is the result of a genetic disorder that is caused by a gene passed from parent to child. Carriers of the gene are often not aware that they have the gene and may not present with any symptoms, however over time, CF can develop into a serious disease impacting digestion and respiratory function. CF is an example of a condition in which carriers of the gene may be identified.

- **Treatment response.** As an example, genetic testing in individuals diagnosed with lung cancer can help to inform an effective treatment strategy. Non-small cell lung cancer (NSCLC) comprises the majority of lung cancer and comprises about 80-85% of all lung cancers. Genetic research revealed that mutations of the gene for the epidermal growth factor receptor (EGFR) can predict treatment response for individuals with NSCLC.

- **Breast cancer relapse.** There are a number of genetic tests available that indicate whether a woman is more likely to have a breast cancer relapse. Understanding the likelihood of relapse can help providers decide if chemotherapy or other treatments are needed to reduce the relapse risk after surgery.

- **Drug response.** Often, genetic tests can provide insights into how a drug will be metabolized within an individual patient. The presence or absence of the genomic marker can affect a patient’s ability to process medication, as well as inform dosage and potential adverse drug reactions in patients that may metabolize a drug too quickly. For example, genotype testing for the Human Leukocyte Antigen B (HLA-B*5701) provides insights into medication treatments for patients infected with HIV-1. Those patients that test positive...
for HLA-B*5701 are not recommended to receive abacavir treatments, as these patients may have an increased risk of a hypersensitivity reaction to the medication.

- **Multigene panel testing.** Historically, genetic tests have focused on one genetic mutation at a time; however, advances in technology have resulted in the widespread ability to test many genes at once (or, multigene panel testing). While multigene panel tests provide information on many genes at once, it is not clear that all patients would benefit and therefore, questions remain regarding the clinical utility of these tests. Clinicians emphasize that patient education is key for clinical settings and end users need to be informed of the limitations of these tests, regardless of testing cost.

### Policy Issues

#### Clinical Utility

Health plan coverage policies include specific genetic testing and counselling for patients when clinically indicated. Covered genetic tests typically must have significant scientific evidence to support the validity and predictive accuracy of the test and the results must be able to impact treatment decision making. With many genetic tests, however, questions remain about their efficacy and value.

Despite a booming market with new products entering the field each day, regulatory oversight remains limited. For example, while the Food & Drug Administration (FDA) has the authority to regulate genetic tests, its oversight is limited based on the product's intended use and risks associated with an inaccurate test result. And while the Center for Medicare and Medicaid Services (CMS) regulates clinical laboratories that may perform genetic testing, they do not determine if the test itself is clinically meaningful.

### Interpretation of Results

In 2015, the American College of Medical Genetics and Genomics (ACMG) stated that "the increased availability of sequence data in

### Breast Cancer Spotlight

Genetic testing for breast cancer and the BRCA genes look for changes or mutations in the BRCA1 and/or BRCA2 genes. A mutation in these genes may indicate an increased cancer risk: 72% of women who inherit a harmful BRCA-1 mutation, and 69% of women who inherit a harmful BRCA-2 mutation, will develop breast cancer before the age of 80. However, a negative BRCA1 or BRCA2 result does not mean that the patient will not develop breast cancer. Instead, a negative result indicates that the patient is thought to have the same risk of cancer as someone in the general population. The United States Preventive Services Task Force (USPSTF) has designated a Grade B recommendation for BRCA1/BRCA2 screening for women who have a family history of breast, ovarian, tubal, or peritoneal cancer.

It's important to note that the BRCA gene mutation is not the only indicator of breast cancer. In fact, only 5-10% of breast cancers are associated with BRCA1 and BRCA2 mutations. Therefore, BRCA testing is not universally recommended for all women; providers typically only recommend testing for those patients with a personal or family history of breast cancer appearing before the age of 50.
clinical settings has been accompanied by challenges in standardization, interpretation and reporting of genetic tests.” Genetic testing is a field that continues to emerge and evolve. Results are not always straightforward, and experts agree that further research is needed to be able to fully interpret results.

Additionally, there is an emerging trend of direct-to-consumer (or at-home) genetic tests marketed directly to consumers through advertising. One company has received regulatory approval to market a genetic test directly to consumers that screens for risk factors associated with ten diseases and genetic conditions, including late-onset Alzheimer’s and Parkinson’s disease. Individuals may purchase the genetic test from a manufacturer and complete the test by sending a sample back to the manufacturer’s laboratory. There is wide variation across different manufacturers regarding procedures for informing consumers about the results and often, a genetic counselor or health care provider is not involved in communicating and explaining the results. Genetic counseling is key to interpreting the results of a test that imparts a probability of disease. To fully understand what that probability means, genetic counselors can explain the penetrance of the gene mutation and incidence of the disease in the population. Genetic counseling is often not included in direct-to-consumer testing products and can lead to patients misinterpreting results of a test.

Further, in some cases, genetic testing may reveal information that is of little value for patients. For example, some genetic tests are looking at conditions for which there are no available treatments. These results may cause unintended consequences for the patient, such as emotional distress. At worst, inappropriate genetic testing can lead to unnecessary follow-up care, including invasive testing or therapy.

Nondiscrimination

Current law protects Americans from unfair treatment by employers and health insurance providers because of differences in their DNA that may affect their health (Genetic Information and Nondiscrimination Act (GINA)). Health insurance providers strongly support these protections, which prohibit discrimination against individuals based on their genetic information and protect the confidentiality of patient-identifiable genetic information. The law specifically prevents discrimination from employers and health insurers. For example, GINA makes it illegal for health insurance providers to use the results of a genetic test to make decisions about a person’s health insurance eligibility or coverage.

However, concerns remain regarding ultimate ownership of genetic information and the potential consequences of sharing genetic information with third parties. This is particularly concerning for direct-to-consumer products, where manufacturers often build in clauses regarding ownership of the information into the terms and conditions of agreements.

Health Disparities

While the availability and use of genetic testing products is rising, much of the research completed to date has focused on non-Hispanic white individuals of European ancestry. A 2016 Nature study revealed that over 80% of research subjects in large genetic studies have been non-Hispanic white individuals of European ancestry. Low participation of minority groups in genetic research limits understanding of how these interventions may be applied across different races and ethnicities and further perpetuates health disparities.
Conclusion

As genetic testing continues to evolve, health care professionals are learning more about how best to use the results to diagnose disease and design personalized treatment plans. Health insurance plans are committed to providing their members with the highest quality care possible, and plans recognize the role that genetic tests play in early detection and disease management programs. Insurers encourage genetic testing for individuals who are at an increased risk of certain genetic conditions for which there are specific interventions and treatment options, or for conditions where the presence of a genetic mutation can help in guiding selection of treatments that improve health outcomes.

With new direct-to-consumer genetic products entering the market every day, patient education is critical. Beyond testing, plans are also investing in consumer education and genetic counseling, to ensure that patients understand their results and can make informed decisions about their future care. Additionally, as they design their medical policies, plans look to those genetic tests with significant evidence to support the validity and accuracy of the test. With the proliferation of new testing products available to providers and consumers, regulatory oversight of these products is critical to ensure that patients are receiving high-quality, actionable information that is easy to understand.

Resources

- National Human Genome Research Institute: Regulation of Genetic Tests.

Endnotes

5. USPSTF Recommendation Statement: “BRCA-Related Cancer: Risk Assessment, Genetic Counseling, and Genetic Testing.”