A new push to remove barriers to genome sequencing

As evidence increases, Illumina works with payers to realize broader coverage for sequencing to benefit patients with genetic diseases

A NEW PAPER PUBLISHED in *Genomic Medicine* details the progress that has been made worldwide to expand access to genome sequencing for people with suspected rare genetic disorders.[1] With this technology, many of these health conditions can be diagnosed at birth or in early childhood; access to it can reduce the time it takes to reach a definitive diagnosis, prevent unnecessary medical procedures and tests, and soften the emotional and economic toll that searching for such answers takes on families.

Traditionally, clinicians tend to use a tailored suite of medical tests to diagnose certain genetic conditions. Only when these targeted efforts fail will they look to comprehensive, untargeted tools, like exome or genome sequencing, to understand the root cause of disease. "We tend to see very low utilization of exome or genome sequencing, which means medical professionals do not prescribe these tests very often," says Kalliopi Trachana, director of Health Economics & Outcomes Research at Illumina.

A review of the literature shows that up to 77% of patients experience a change in their clinical management after receiving a diagnosis by genome sequencing,[2-9] which suggests that using it as a first-line test can be efficient and potentially lead to improved outcomes. Moreover, studies have demonstrated that first-line genome sequencing can also be a cost-effective approach for diagnosing rare disease.[2,4,5]

Why doctors do not immediately reach for these tests when faced with a suspected rare disease is a bit "chicken and egg," Trachana says: If these tests are not broadly available, not covered by insurance, or locked behind other administrative barriers, medical professionals will use something else to avoid delaying their patients' care.

This new paper was authored by members of the Medical Genome Initiative, a consortium of clinical laboratories that are working to establish best practices and increase the adoption of genome sequencing testing worldwide, and Trachana says the paper "is a call to action for different stakeholders that can support sequencing for rare disease diagnosis." As a member of the initiative, Illumina helps demonstrate the value that sequencing presents for insurance companies, governments, clinicians, patients, and others across the ecosystem.

Insurance providers in the United States are

increasingly expanding access to genome sequencing by covering the cost for patients with indications of a genetic disease. Currently, more than 50 million individuals in the US are covered, the UK and Germany have been implementing it as part of routine care, and other European countries include it in their national fee schedules or will soon. In the future, the authors suggest prioritizing policy implementation and funding to support universal genome sequencing coverage, reducing administrative barriers for doctors and patients, educating clinicians on the utility of sequencing, and continuing to publish research on the utility of genome-informed treatments.

Trachana notes that low- and middle-income countries without access to genome sequencing are moving toward exome sequencing, which can still unearth priceless information: "This shows that people and health systems are endorsing next-generation sequencing at a faster pace than before."

Moving forward, Illumina is engaging with public and private insurance providers worldwide to include exome or genome sequencing in their coverage.

"We're at the tipping point," Trachana says. "I think we're going to see broader genome coverage in the next five years, both in the US and other countries. Illumina will continue to help health systems move across this tipping point and transition toward genome sequencing." ◆

1. https://www.nature.com/articles/s41525-024-00410-2
2. Abul-Husn NS, Marathe PN, Kelly NR, et al. Molecular diagnostic yield of genome sequencing versus targeted gene panel testing in racially and ethnically diverse pediatric patients. Genet Med. 2023;25(9):100880. doi:10.1016/j.gim.2023.100880
3. Bick D, Fraser PC, Gutzeit MF, et al. Successful Application of Whole Genome Sequencing in a Medical Genetics Clinic. J Pediatr Genet. 2017;6(2):61–76. doi: 10.1055/s-0036-1593968
4. Dimmock D, Caylor S, Waldman B, et al. Project Baby Bear: Rapid precision care incorporating rWGS in 5 California children's hospitals demonstrates improved clinical outcomes and reduced costs of care. Am J Hum Genet. 2021;108(7):1231–1238. doi:10.1016/j.ajhg.2021.05.008
5. Dimmock DP, Clark MM, Gaughran M, et al. An RCT of Rapid Genomic Sequencing among Seriously Ill Infants Results in High Clinical Utility, Changes in Management, and Low Perceived Harm. Am J Hum Genet. 2020;107(5):942–952. doi:10.1016/j.ajhg.2020.10.003
6. Farnaes L, Hildreth A, Sweeney NM, et al. Rapid whole-genome sequencing decreases infant morbidity and cost of hospitalization. NPJ Genom Med. 2018;3:10. doi:10.1038/s41525-018-0049-4
7. Kingsmore SF, Cakici JA, Clark MM, et al. A Randomized, Controlled Trial of the Analytic and Diagnostic Performance of Singleton and Trio, Rapid Genome and Exome Sequencing in Ill Infants. Am J Hum Genet. 2019;105(4):719–733. doi:10.1016/j.ajhg.2019.08.009
8. The NICUSeq Study Group. Effect of Whole-Genome Sequencing on the Clinical Management of Acutely Ill Infants With Suspected Genetic Disease: A Randomized Clinical Trial. JAMA Pediatr. 2021;175(12):1218–1226. doi:10.1001/jamapediatrics.2021.3496
9. Maron JL, Kingsmore S, Gelb BD. et al. Rapid Whole-Genomic Sequencing and a Targeted Neonatal Gene Panel in Infants With a Suspected Genetic Disorder. JAMA. 2023;330(2):161–169. doi:10.1001/jama.2023.9350