Paving the way forward for precision medicine

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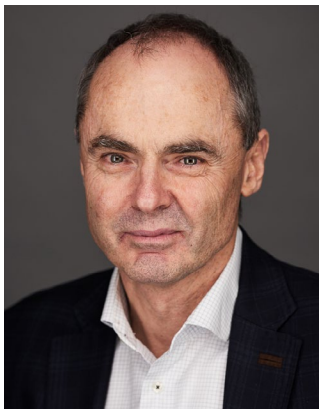

Ian McCrae,
CEO Orion Health,
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Human characteristics are profoundly influenced not only by genetic makeup, but also by environmental and lifestyle factors. Combined, these can greatly influence susceptibility to infectious and complex diseases. However, until recently, treatment options have been made on 'evidenced-based' decisions using clinical and real-world data to predict the outcome of the average patient with a one-size-fits-all mentality.

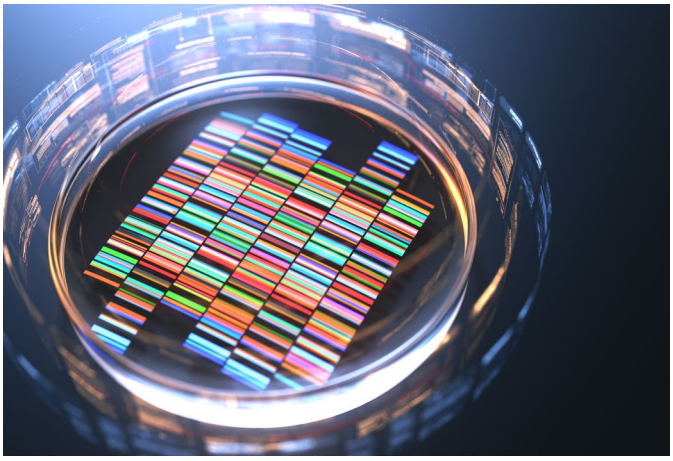
Vast amounts of data can today be derived from the human body, due to the wide availability and decreasing cost of genome kits and next-generation sequencing. Molecular profiling approaches employ "panomic" technology that derives genomic, epigenomic, proteomic and metabolomic data to characterize individual patients. This can be coupled with vast amounts of end-user data gathered from smart devices using mobile and GPS technology.

Precision medicine is a revolutionary emerging approach to healthcare provision whereby advanced technologies can be harnessed to obtain multidimensional data on patients' genetic makeup, disease state, lifestyle and environment. Used appropriately, this collective data can generate an unprecedented amount of insight to determine the most effective treatment strategy for an individual.

The migration away from blanket treatment approaches holds great promise, as today patient-specific data is being generated and harnessed on a scale that was not even imaginable a decade ago. Through advanced predictive analysis techniques, this personal information has the potential to enable diagnosis, treatment and prevention of diseases on an individual basis.

Considering the field of oncology as an example, clinicians are now seeking to find personalized treatment and moving away from the traditional trifecta of radiation, chemotherapy and surgery. To do so, they are now testing patients diagnosed with cancer to map mutations in the genome and identify biomarkers to determine which treatments will work best with the fewest adverse side effects.

The development of such complex approaches and predictive models relies heavily on upon the capacity to organize, manage and analyze huge amounts of "big



data". The complexity and volume of this data can lead to increased requirements for computing power and storage capacity, resulting greater costs of maintaining data management systems. In many cases, existing digital infrastructure simply cannot handle the rate at which data workflows are expanding. As a result, many healthcare data management platforms are fragmented, with multiple different systems assigned to separate processes.

Given the challenges of handling such large volumes of multidimensional data, healthcare providers and organizations are turning to end-to-end solutions that allow them to fully utilize their big data. Cloud-based informatics platforms present a practical way to handle data, proving to be highly scalable and flexible to unify and integrate data into one digital ecosystem. With integrated real-time analytics, care coordination and patient engagement applications, these platforms are proving necessary to translate the goals of precision medicine into reality.

"Healthcare providers will soon experience a huge influx of big data that will revolutionize the way patients are treated" said Ian McCrae, CEO, Orion Health. "Migration to unified systems that are able to acquire, analyze and access traditional medical records will be key in the ability to deliver precision medicine. These electronic medical records could eventually contain as much as 6 Tb of data per patient, so we can see why the move to cloud-based platforms is so critical in the functionality to store, analyze and implement data, and ultimately improve healthcare delivery for the patient."

When considering the practical aspects, there are several key stages healthcare providers can expect to face in the journey to implementing precision medicine. Firstly, they must acquire data which may currently be stored in a wide range of internal and external source systems. Multiple electronic medical records (EMRs) and other clinical organization systems store, format and share data in many different ways. Hence, this data must then be aggregated to a common format to allow analysis. Mining this data then allows for insight into individual treatment benefits and population health trends. Different types of stakeholders will need secure access to various aspects of the stratified data, including clinicians, patients, health insurers and government regulators.

The full potential of precision medicine is yet to be realized; future progress will be accelerated through enhanced harnessing and analysis of genotypic and phenotypic data through cloud-based platforms. Analysis of this information will help develop insights into genetic factors that predetermine disease, as well as large-scale population sequencing projects to ensure broader understanding of genetic variation.

The sheer volume of data means that a real-time analysis infrastructure must be leveraged to allow for the most efficient use of these platforms, giving healthcare professionals actionable population insights, and allowing for customized action plans to be put into place for each patient to coordinate care across facilities. The success of precision medicine relies heavily on the successful adoption of integrated systems but has the promise of bringing healthcare providers into a new era.

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