Big Data in Healthcare

Enter the phrase 'Big Data' in Twitter and find out what everyone is talking about it today. All around the world, Big Data has sparked interest of researchers, analysts, companies and policy makers in various application fields, such as healthcare. What started with the collection of medical data on paper and in dusty drawers, has led to a billion dollar industry that is currently transforming the healthcare system as we know it. It has even been called the 'Next Revolution in Healthcare'.

In recent years, the total amount of medical data collected has grown exponentially, mainly because of the introduction of new medical technologies and the increased use of IT to manage medical health records of patients. These technologies have been introduced not only to provide higher quality of care but also to help solve some of the major healthcare problems of the US and other developed countries: the lack of productivity and efficiency, the increasing costs and the relatively low accessibility of the system. Big Data, or the capability to develop, analyze and visualize huge and complex data sets for various research interests and applications, has the promise to radically impact the speed and direction in tackling these problems.

John Wilbanks, co-writer of the Ewing Marion Kauffman Report on Big Data, argues that Big Data could help the U.S. overcome its healthcare problems; "[Big Data] could substantially reduce the need for trial-and-error medicine, with all its discomforts, high costs, and sometimes tragically wrong guesses".

The healthcare system in the US has become one of the most costly in the world, spending 17.6% of the gross domestic product on healthcare (2010). One of the problems of the US healthcare system is believed to be connected to the fragmentation of healthcare dating back to a time when diseases were episodic and patients were confronted with infectious diseases. Currently, however, most patients suffer from chronic illnesses. According to William Hsiao, Harvard Healthcare Economist, "This calls for continuous care, from prevention to hospitalization, instead of different doctors asking the same questions, taking the same tests, and prescribing drugs that might not work or conflict with other drugs the patient takes." This systemic fragmentation also leads to the collection of fragmented medical data, in all stages of care. Big Data analysts are now trying to combine these various data sources that can lead to new insights, new discoveries and speed up research outcomes.

Until recently, Big Data in healthcare was only connected to oncology and genomics, finding cures for cancer or predict genetic diseases. Initiatives such as the IBM Watson computer that analyses the growing amount of data related to cancer at the Memorial Sloan-Kettering Cancer Center in New York will eventually result in better decision support tools for doctors. These tools allow doctors to create individualized cancer diagnostics and evidence based treatment recommendations and decisions. Combining genetic data and personal data on drug efficacy, could help patients to receive the right therapies.

Next to these more traditional application fields of Big Data in healthcare, new fields are on the rise. To reduce costs of diabetes care, researchers track people in early stages of diabetes by monitoring health conditions such as heart rate, blood pressure and LDL cholesterol. Other groups use data from socioeconomic, environmental and financial sources and cross reference this with biomedical data, finding (unexpected) results and connections between sources. A key enabling driver in this context is e-Health which is the implementation of present-day information and communication technology in healthcare. Electronic Health Records (EHR) become increasingly filled with medical data that are collected in various interactions between patients and healthcare organizations. Collecting medical data at patient’s homes and analyzing these, looking at many variables, may create forecasts for disease progression and with an aging
society this could prove to be a very valuable technology.

Specialists in the US agree that the relation between patients and the healthcare systems will change due to the use of Big Data, because of the possibility to customize care to the patients, enabling personalized healthcare. This development will increase the effectiveness and the quality of care, and could potentially bring down costs. Big Data will become hotter in the coming years, but scientists also warn for the downside of an increasing dependency on data. Fraud, privacy breaches, security issues and corrupt data are some of the problems that could slow down this development. Cyber security in the healthcare sector is currently one of the least developed and needs attention quickly. Also the enormous amounts of data gathered will impose practical issues in data management and the possibility to give significant outcomes.

In the near future, we will see how Big Data will change the healthcare system and whether it really is a revolutionary development.

**Keywords:** Verenigde Staten, innovatie, gezondheidszorg, life sciences, ICT.

**Sources:**
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