HIM's Role in Disease Tracking, Data Mining, and Patient Monitoring

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by Mary Butler

In the current US healthcare climate, panic and paranoia prevail as deadly diseases like Ebola and tuberculosis command public attention and the World Health (WHO) organization and the Centers for Disease Control and Prevention (CDC) work to provide relevant guidance. Although professionals working in areas such as health IT, health information management (HIM), mobile health (mHealth), data analytics, and informatics typically don't play a hands-on role in treating disease, they're starting to play a major role in tracking diseases and deploying treatments.

Not only are health IT and HIM professionals learning how to harness Big Data in the treatment and prevention of infectious and chronic disease, implementing telemedicine, and managing public health databases and registries, they are also increasingly are tasked with making sure that the protected health data (PHI) exchanged by these technologies is HIPAA-compliant and secure. This is not an insignificant task—an executive order by President Obama in 2013 authorized the US Department of Health and Human Services to make over 1,000 data sets available on HealthData.gov over three years.

While this "open data" is invaluable to informaticians and health researchers, "they all face some common hurdles ahead including how to keep patient data secure, how to protect patient privacy, and how to tidy up reams of messy government data," according to a report from Gigaom Research.

Opportunities for Health IT, in Public Health

An innovative group of researchers, epidemiologists, and software developers at Boston Children's Hospital, called HealthMap, identified a "mystery hemorrhagic fever" in the West African nation of Guinea more than a week before the WHO officially reported the Ebola outbreak there. Researchers at HealthMap collect data from social media, online news aggregators, and Twitter chats, along with official public health reports, to provide a comprehensive view of the current global state of infectious diseases, according to the *Boston Globe*. HealthMap also tracks foodborne illnesses, respiratory infections, several strains of the swine flu, and several other contagious diseases.

Public health officials have praised the ways mHealth technologies have helped their efforts in West Africa. On October 20, the WHO declared that Nigeria had been Ebola-free for 42 days, thanks in large part to social media campaigns and a real time reporting Android-based smartphone app.

"The phone app helped in reducing reporting times of infections by seventy-five percent," said Nigeria's Minister of Communication Technology Omobola Johnson, while speaking at the International Telecommunication Union's Plenipotentiary Conference October 21, *Healthcare IT News* reported. "Test results were scanned to tablets and uploaded to emergency databases, and field teams got text message alerts on their phones informing them of the results."

Experts say that while Big Data has helped to track and detect Ebola outbreaks, combining it with predictive analytics can identify areas where prevention and awareness campaigns could be successful.

"I think big data has a huge potential to help fight not only Ebola, but other disease outbreaks," said Marisa Eisenberg, a mathematical epidemiologist at the University of Michigan told Agence France-Presse (AFP), according to an article in *Medical Xpress*.

Eisenberg has also used data models to study cholera outbreaks in Haiti, and says researchers and tech developers can get better information by analyzing Twitter messages, airline data, emergency calls, and other available health data.

"We need to find a way to do these things on a large scale, using real-time data because time is of the essence," she added.

Beyond Ebola

Wearable fitness trackers such as the latest Fitbit have been popular for several years now, but the next wave of health monitoring looks to be coming in the form of biosensors integrated into smartphones.

An engineer at the University of Illinois, Brian Cunningham, is working with students to develop mobile apps with existing biosensors that can detect chemicals such as methane gas, sarin gas, explosives, allergens, water contaminates, and diseases such as H1N1, influenza, HIV, salmonella, and listeria.

According an article published by Gigaom Research, integration with smartphones is still a few years off, but other engineers say that the power consumption and battery life needed to run the applications could limit their success. Additionally, the sheer volume of biosensing options could leave consumers feeling put off.

"It could take some time to get to a point where it's useful data for the consumer," Alex Hsieh, the developer of health apps picked up by Apple, told Gigaom. "And as soon as you overload, people start to not care, and that's a line you should try not to cross."

However, there are newly approved biosensors that don't require users to have a smartphone. The US Food and Drug Administration this summer approved HealthPatch MD, which monitors individuals recently released from the hospital. The sensor is attached to the patient's skin with an adhesive patch that monitors heart rate, heart rate variability, skin temperature, body posture, fall detection, steps, and other metrics that are relayed via WiFi or Bluetooth technologies to a caregiving team. This transmitted data is encrypted to meet HIPAA privacy requirements, according to *VentureBeat*.

HIM Concerns with Monitoring and Big Data

HIM professionals are playing a major role in how patient monitoring data is inputted, used, and stored. Often, the patient monitoring data is fed into electronic health records (EHRs), and there is some evidence that shows that physicians see patient-generated data as "trivial," according to a PricewaterhouseCoopers (PwC) series of reports on wearable health devices.

According to those reports, nearly one in five Americans use a wearable device, but those who do not cite concerns about price, privacy, security, and the lack of "actionable" and inconsistent information from such devices.

"For wearables to help shape the New Health Economy, next generation devices will need to be interoperable, integrated, engaging, social and outcomes-driven," said Vaughn Kauffman, principal of PwC Health Industries, in a statement.

Similar concerns linger around the use of Big Data to improve healthcare. The *New York Times* recently profiled the efforts of physicians and medical informatics specialists who mine databases in search of patterns that can help dictate disease treatments and identify drug interactions.

Nicholas Tatonetti, an assistant professor of biomedical informatics at Columbia University, develops algorithms that combed the FDA's records for adverse medication interactions and discovered a dangerous interaction between the antidepressant Paxil and the cholesterol drug pravastatin. The combination can cause an increase in blood glucose levels. Since drugmakers rarely test the safety of certain drugs in combination with others, this potentially dangerous reaction could have gone unrecognized.

While data mining techniques used by Tatonetti and other researchers are exciting, hospitals remain concerned about maintaining the privacy of the patients whose data is being mined. And as the *New York Times* points out, the records of patients who are only seen in the emergency department are often incomplete—an issue that HIM professionals can help rectify. The hospital mentioned in the *Times* article warned physicians to refrain from using data mining practices until a proper framework for storing and accessing patient information is in place.

"As with so much network-enabled data-tinkering, this research is freighted with serious privacy concerns. If these analyses are considered part of treatment, hospitals may allow them on the grounds of doing what is best for a patient," Veronique Greenwood writes in the *New York Times*. "But if they are considered medical research, then everyone whose records are being used must give permission. In practice, the distinction can be fuzzy and often depends on the culture of the institution."

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