

Arab Health Congress 2017

5th Big Data Conference

31st January – 1st February 2017, 9:00 – 17:00

Location:

Dubai International Convention and Exhibition Centre, Dubai, UAE

Conference attendees:

Oehoe Data Science

Micha Bouts, Managing Director

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Conference Minutes:

The 5th Big Data Conference at Arab Health 2017 took place in Dubai International Convention and Exhibition Centre between January 31 and Feb 1, focusing on the challenges and issues of efficiently collecting and analysing large volumes of data to bring better quality of care improving clinical practice and patient outcomes.

Throughout the four conference sessions, the following key topics were reviewed and discussed through presentations, real life case studies and interactive panel discussions with clinical and big data experts:

- Cyber security
- Connected devices
- Electronic health records
- Population health
- Business intelligence
- Clinical decision support

On cyber security

Healthcare and the Public Health sector are large sectors that provide a diverse set of products and services relying more and more on technology to support and improve the provision of care, disease prevention, and emergency response. Large amounts of health-related data are generated with the proliferation of health information technology and cyber systems within the healthcare and public health sector. The need to address and manage the risks associated with cyber threats is huge, although **cybersecurity** tends to be viewed as a secondary activity. Actually, Public Health is used to monitor cybersecurity rather than the other way around.

Ted Harrington, Executive Partner from Independent Security Evaluators, presented a research study on security assessment in twelve healthcare facilities, two healthcare data facilities, two active medical devices from one manufacturer, and two web applications. The addressed question is “Could cyber-attacks affect patient health?” The study reveals that “Healthcare industry focuses almost exclusively on the protection of

patient health records, and rarely addresses threats to or the protection of patient health from a cyber threat perspective, addressing only untargeted attacks and unsophisticated adversaries.” [1]

Thus, a multitude of attack surfaces are left unprotected, and attack strategies that could harm the patient not considered. As Mr. Harrington explained: “Security is very different from compliance and hackers don’t care about compliance! Modern adversaries have a targeted approach, while the status quo is untargeted”. Figure 1 provides an overview of these types of attacks.



Figure 1. Attack surfaces model that expose patient health. From [1]

Many of the above attack surfaces have little value for patient privacy or personal health information, which the hospitals strive to protect most, but they have direct consequences regarding patient health. As an example, if wrong data is loaded into a passive medical device it can generate false alarms.

Hospitals are failing on a variety of levels to properly address security threats ranging from business level (lack of funding, staff, or training) to technical problems specific to departments (e.g., vulnerable network design, use of legacy systems, and the use of vulnerable vendor systems). In some cases, it will take several years to implement effective programs for ensuring security on every level, from the device vendor, to the hospital,

and to the patient at home. “It is the responsibility of all parties involved to participate honestly and strive for the best interests of the end users: patients. For healthcare facilities, there is no question that the ultimate priority is to protect patient health.” [1]

On connected devices

Mobile Health (m-Health) is revolutionizing healthcare systems and healthcare delivery services with the use of mobile and **connected devices** to collect patient data, provide remote diagnostics and care and access medical records. According to Prof. Robert S. H. Istepanian, Visiting Professor, Imperial College London, the rapid evolution of m-Health in parallel with the maturing process of its enabling technologies, from bio-wearable sensors to the wireless and mobile communication technologies from IoT to 5G systems and beyond will bring opportunities and challenges for health data analytics[2]. Mobile Health 2.0 is driven by larger clinical evidence and robust data insight for predicting the patient, according Prof. Istepanian. Big data analytics, artificial intelligence and machine learning algorithms (Google Deepmind, IBM Watson, Amazon Echo) will lead the use of prescriptive analytics in Healthcare beyond descriptive and predictive analytics. Prescriptive analytics ultimately aims to understand how to prevent a disease to happen.

Chris Sullivan, Global Healthcare Practice Lead from Zebra Technologies, reinforced the tech megatrends and importance of cloud solutions, mobility and IoT devices in achieving continuous improvement in healthcare, with mobile healthcare solutions that enable professionals to capture, analyse, track, share and act on that real-time data from anywhere and at any time. Reality today however is still poor workflow and a poor connection between physician and patient. To overcome these barriers, Mr. Sullivan believes that connectivity matters in reaching accurate identity, advanced mobility and actionable insights. His vision is “a coordinated system of systems”.

On Electronic Health Records (EHRs)

The challenges of the real-time physician and how big data analytics can enable smart clinical decisions were addressed by Prof. Lawrence Friedman, Associate Dean for Clinical Affairs, Professor of Pediatrics and Medicine, from the University of California San Diego Health System and School of Medicine. He sees a shift taking place from EHRs to Health Record Interchange to Cloud Patient Data. With consumer-driven health and increased demand for transparency in reporting as two major trends in the USA Prof. Friedman aspires to provide the best care possible. Real-time feedback becomes crucial in fulfilling this need, capturing data in biomedicine & healthcare systems which comes in various forms: physiological signals (remote monitoring, quantified-self); images (radiology, pathology); omics (such as genomics); social data (network analysis, crowdsourced), EHRs (unstructured, structured). Most clinical data are collected at the point of care, and comes foremost from **Electronic Health Records (EHR)** and Health Information Exchange systems (HIE). However, more data needs to be collected by the patient. The University of California put together an integrated data warehouse moving forward on this pathway. Prof. Friedman acknowledges a number of risks: how to distinguish what’s important or not, who will monitor data and pay for it, today’s physicians are still handling one patient at a time and as such how about diminishing interaction between doctor and patient, data privacy and data security. He also advises front line care providers to capture data in a structured way, to work in teams and drive for transparency, to use data to improve quality and outcomes and to demonstrate value. He concludes with stating that knowledge gained from populations benefits individuals and the best outcome to patients’ health is his own education and engagement.

On Population Health

Diabetes is frequently monitored as part of quality programs in a **Population Health** Approach for Diabetic Patients. Type two diabetes is a common and increasingly prevalent illness that is largely preventable. Many of the risk factors for type two diabetes include lifestyle decisions and can be eliminated or reduced with time and effort. Matthew Goodman is a medical Director and Chief Medical Officer at [Mapmyhealth](#), an NHS award-winning program of information, guidance and self-help tools to support diabetes patients in the self-management of disease. Implemented into usual care pathways the Mapmydiabetes App helps healthcare providers, clinicians and patients tackle type two diabetes in a highly engaging, effective and easily scalable way. Mr. Goodman explained the benefits of digital therapeutics in patient empowerment and self-management of disease, leading to significant (more than 50%) improvement on the patient's clinical condition due to behaviour changes and adoption of healthy lifestyle habits. Technology behind digital therapeutics is already available for some time but the main barrier is in fact how it is implemented. Implementation of Mapmydiabetes at NHS was largely improved with practice training. Prescription of the App increased significantly the adoption rates due to the recognized credibility when prescribed as digital therapeutic.

On Clinical Decision Support systems

Florent Gilard, Director of Operations Europe at [Arterys](#), presented an automated, intelligent imaging analytics cloud platform that unleashes real-world clinical data to make healthcare more accurate and data driven. With the increased development of **clinical decision support systems** the medical image post-processing market is estimated on 3.2B USD. According to Mr. Gilard, hospitals face issues with legacy IT systems and high workloads for physicians and clinical staff, leading to unleveraged data. Arterys uses smart machine algorithms and deep learning (e.g. segmentation in cardiac imaging) applied to big data for medical imaging analytics, leveraging massively parallel GPU architecture to offer instant big data quantification. 4d Flow post-processing is reported out as the first technology to visualize & quantify blood flow in the body using MRI imaging. Mr. Gilard's vision for the hospital of the future is built on connected, scalable infrastructure and on automated, tedious and repetitive work as such leveraging all data available.

Dr. Manish Kohli, Chief Medical Informatics of Cleveland Clinic Abu Dhabi, explained how to leverage care pathways around a medical condition to deliver better outcomes in healthcare. As example he highlighted the stroke pathways implemented at the clinic. He sees value in healthcare under pressure to deliver higher quality with a higher accessibility at a lower cost. And this with many data points which are too grey for meaningful use. Dr. Kohli recognizes a shift from intuitive medicine to evidence based medicine with partial data to precision based medicine with real-time aggregated insight. As such clinical decision support becomes rather a key enabler than an alert system. Dr. Kohli promotes a workflow starting off with a care guide, to an algorithm, to analysis, to practice transformation, to building an EHR, to training and implementation. He challenges us to take the patient journey, the physician journey, the nurse journey throughout this cycle.

Massimo Angileri, Vice President Sales & Services EMEA from Carestream Healthcare Information Solutions, showed how business intelligence systems and data mining can be implemented not only focused on productivity and business intelligence dashboards, but also for reports analytics, concept search, finding errors & discrepancies and imaging analytics.

On the panel discussion “How to use data and clinical decision support for better outcome”

Clinical decision support is growing from scattered spreadsheets to daily automated dashboards. Some measures are easy to take, others are harder to tackle. For instance, diabetic patients will ultimately like to know what their overall condition is expected to be over time, how their eyesight will be and so on. This is the true challenge to overcome.

Social media is expected to get an ever-bigger impact. Patients themselves will be the key drivers of success. They are the ones who spends twenty-four hours a day with themselves! Time management and awareness are the two biggest barriers for self-management.

Final conclusions from the clinical decision support discussion panel is that there’s a behavioural change undergoing between care professional and the patients. Repetitive task will be replaced by automated systems and care professionals and more specifically doctors will become more a “care coach” than a care provider.

This makes us think about “Health” and “Care”, which comes back in “Healthcare”.

References

[1] “Hacking Hospitals”, February 23 2016, ISE Independ Security Evaluators, San Diego - California

[2] “m-Health: Fundamentals and Applications”, January 2017, Robert S. H. Istepanian, Bryan Woodward