



Mobilization of Healthcare With IoT



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Health Consumerism—The New Norm

Health consumerism is gradually rising in prominence within the healthcare sector, and healthcare providers, both big and small, are turning its passionate proponents. Under the new regime, consumers have active control over their own health as much as healthcare providers. Organizations are edging towards better care delivery and improved outcomes through a collaborative approach involving medical practitioners, payers, and other stakeholders. Healthcare market, as a whole, is being recalibrated and even nascent entrants into the medical industry have started piloting personalized care.

Internet of Things Enables Health Consumerism

Internet of Things has enlarged the ambit of care delivery in healthcare, an industry which has long been averse to change. In fact, McKinsey concludes in its report released last year that connected technology has more potential for value creation in healthcare than in any other industry¹. Electronic health records, telemedicine, and IoT-based medical devices have become channels of pervasive healthcare to reach patients at the right time. A plethora of medical devices—implantable and wearable—have eased out the pain of routine monitoring for both patients as well as medical practitioners.

Given the pervasive nature of such tracking devices, keeping tabs on patients on the fly and creating data fingerprints unique to individuals is no longer cumbersome. Streams of data created thus add value to the traditional core of healthcare, improving clinical decision making. These systems help to deliver evidence-based care across the healthcare spectrum, from clinical encounters to remote health assistance.

Digital healthcare has not only proved fruitful in whittling down administrative cost but also in reducing readmission rates. Care providers are leveraging Internet of Things coupled with advanced analytics to tackle the issue of readmission against the backdrop of a rule that penalizes hospitals for readmission within 30 days of discharge. For instance, CVSHealth, with its readmission prevention solution, has witnessed 50 percent reduction in 30-day readmission rates and 65 percent cost reduction per targeted patient². By including remote monitoring in post-discharge care plans, hospitals can improve patient satisfaction, pare down cost, and strictly adhere to gagging healthcare rules.

According to Lux Research, monitoring, diagnostics, and predictive analytics will form the core of future healthcare³. Digital health will consist of six key constituents—namely monitoring, diagnostics, predictive analytics, therapeutics, assistive technology, and behavior augmentation—that together establish a disease-connection framework. It also goes on to say that emerging technologies will bring about a paradigm shift in healthcare, previously classified on the basis of anatomy and disease specialties, by unearthing hidden links between seemingly unrelated medical conditions.

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IoT Applications in Healthcare

1. Remote Monitoring: IoT-Enabled Devices

The shift from an episodic model to a dynamic continuous care model calls for remote patient monitoring on a daily basis. Before the infusion of technology in healthcare, real-time monitoring of healthcare parameters remained rather elusive. Now, with the advent of remote monitoring devices such as heart rhythm monitors, pulse oximeters, and blood pressure cuffs, healthcare specialists get a holistic view of patients' physiological condition and are able to avert serious illnesses through early intervention.

Seven out of ten people die each year due to chronic diseases and about 86 percent of a nation's healthcare costs are exhausted treating patients with chronic diseases⁴. According to CDC (Centre for Disease Control and Prevention), the major causes of death and disability are heart disease, stroke, cancer, diabetes, obesity, and arthritis. Such situations cry out for integration of IoT in personal healthcare to manage early symptoms of a disease and help patients adhere to medication.

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2. Workflow Optimization: Electronic Health Records

Medical paternalism is slowly phasing out from the healthcare scene and care providers, to a great extent, have started acknowledging the role consumers play in managing their own health. Healthcare providers are relinquishing siloed care patterns and are resorting to cloud-based electronic health records (EHRs) to dispense care. Studies indicate that the adoption rate of EHRs in small and solo practises in urban regions have increased from 60 percent in 2013 to 82 percent in 2015⁵. A cloud-based EHR eliminates the need for maintaining separate EHR databases and allows seamless access to patient data. The shared infrastructure automates data handoffs, helping physicians retrieve patient-related data faster without toggling between systems. Patients also stand to gain from this integrated system as it empowers them to demand care of the highest order and choose their own treatment plans.

Often, medical ethics are at odds with technology that share patient data in the light of possible breach of sensitive personal information. Even so, the need for sharing patient data has increased all the more with the transition from a fee-for-service to an accountable care model in which caregivers are held answerable for the quality of care. Healthcare, an industry laden with information, is plagued by concerns such as spotty quality and sporadic care delivery. However, a thoughtful use of technology will streamline workflow, improve care coordination, and allow interoperability.

Digitization of Health Records: Doctors Turn To EHR for Patient Data During Emergency Situation

Imagine a situation where a stroke patient has been admitted to the emergency department. Immediate action is required as studies prove that even a 15-minute delay in treatment can deprive survivors of one month from their entire lifetime⁶. It is a daunting task to arrive at the right decisions at the right time without knowing the case history of patients.

As a result, physicians increasingly resort to digital health records to expedite clinical decision making. Electronic health records provide up-to-date information about the medical condition of patients, making it highly reliable for quick reference in time of need.

Case Study

A leading healthcare systems and solutions provider with over 25 years of experience working with the NHS and entrusted with over 40 million patient records, wanted a digital solution that could help them reduce paper-based documentation, accelerate retrieval of patient health data, and enable remote patient monitoring.

Our Solution

Qburst built an application that helps doctors monitor key health indicators of patients and keep tabs on their overall health on the go. Clinicians can easily assign tasks, fix appointments, and access health records, thus optimizing workflow and enhancing decision-making capabilities.

Business Benefits

- Pares down administrative time by 50 percent
- Integrates health records for greater transparency
- Improves and expedites decision making
- Enhances readability and reliability compared to paper-based records

3. Wellness Management: Wearables

Wearables have opened doors to a new era of pervasive computing in healthcare. From fitbits that monitor sleep patterns to devices that monitor vital signs, wearables log even the slightest move made by the wearer. Biometric data collected thus can benefit healthcare industry in more ways than one. Pharmaceutical companies can achieve monumental breakthroughs from patient data by correlating genotypic and phenotypic characteristics in individuals. Although these devices are in the grass-roots level of adoption, better pricing and lesser sophistication can mainstream them into private health management.

The future of wearables is not going to be ruled by fitbits and wearable devices alone. Wearables coupled with drug delivery mechanism, enabling self-administration of drugs, are slowly being explored. For instance, Amgen has introduced Neulasta Delivery Kit—a wearable injector device for Neulasta—for patients suffering from Neutropenia post chemotherapy. Other subcutaneous drug delivery devices of similar flavor are undergoing clinical trials to allow non-invasive and painless drug delivery. Devices such as these are poised to ameliorate health condition of patients as well as provide convenience. To ensure patient safety, organizations need to raise awareness about spurious claims and practices associated with such connected devices and medical apps.

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4. Inventory Management: Radio-Frequency Identification

Due to the sudden escalating demand for medical devices and technologies, health facilities are finding it a grueling task to manage inventory efficiently. Hospitals are gradually integrating IoT into inventory management systems to optimize warehouse processes and enable greater transparency in supply chain operations. In this regard, RFID (radio-frequency identification) is slowly gaining foothold in the healthcare industry and the market is expected to soar from \$90 million in 2006 to \$2.1 billion in 2016⁷. RFID tags on products help to maintain appropriate stocking levels, thus eliminating the need for markdowns. This kind of tracking replaces manual inventory management by automating order placement for replenishment of medical supplies in a timely manner, avoiding excess stock. For smaller establishments surviving on trifling margin, even a paltry sum lost in the form of inventory shrinkage can have a huge financial implication.

Apart from inventory tracking, IoT has been found effective in tracking the functioning of implantable devices such as pacemakers, vascular grafts, intraocular lenses. Furthermore, it can monitor environmental factors such as humidity, pressure, and temperature associated with the smooth working of these devices. In the future, doctors are likely to use RFID-tagged implantable products to keep tabs on diseases and infections following an operation, improving patient recovery. To ensure the efficacy of

drugs and bioproducts are not lost with storage, IoT also enables estimation of shelf-life and deterioration rate. By leveraging technology wisely to improve supply chain visibility and patient care, healthcare establishments stand to gain huge advantages.

Reassessing IoT in the Light of Feasibility



“The world is being reshaped by the convergence of social, mobile, cloud, big data, community and other powerful forces. The combination of these technologies unlocks an incredible opportunity to connect everything together in a new way and is dramatically transforming the way we live and work.” —Marc Benioff, CEO of Salesforce.com



From streamlining workflow at healthcare facilities to personal wellness management, there is no doubt about the potential of Internet of Things to transform the healthcare industry. The scalability of IoT technology, decline in the price of connected devices, and the introduction of patient protection acts have incentivized organizations to make great strides in the digital health realm with IoT.

Although this may be the case, the Internet of Things is certainly a double-edged sword. The healthcare industry is beset with challenges posed by data explosion. The accretion of newer types of healthcare data collected by IoT-enabled devices, such as digital pathology data, aside from clinical CPOE data, diagnostic data from digital imaging devices, sensor data, EHR data, and research data from genomic studies, has caused health data to snowball. Such overwhelming data volumes pose a predicament to physicians, who are left to connect the dots themselves.

Healthcare data buildup also brings along with it security concerns related to breach of sensitive patient information. Fraudsters make use of biometric data of individuals to make false claims from insurance companies, thwarting legitimate claims handling. The small size of medical devices, their limited processing power, and outdated architecture have put a cap on data encryption that could be extended to such devices. However, organizations are continuously developing advanced security strategies that can stand the test of time, to enhance data privacy.

With the increasing demand for care of the highest order, sale of medical devices is on the up and up. That being said, devices come in all shapes and sizes purporting to function as diagnostic and therapeutic devices. To keep such hoax at bay, FDA has set forth rules and regulations for the safe use of medical devices and apps.

Wearables are known to help people get into shape, yet they are found to be relegated to cold storage within days of its purchase. This could be partly attributed to a user population consisting mainly of older or disabled people rather than the tech-savvy. For the same reason, squeezing too many elements on a smaller screen might confuse users. One workaround would be to use color-based navigation keys with broader bounds.

While digitization of health records has simplified administrative tasks in the past, it has also engendered the productivity paradox: the lag in productivity with the adoption of technology. A recent research, conducted by a team of Harvard investigators, identified that 63,040 cases out of 1.04 million medication

errors (nearly six percent) were related to computerized physician order entry⁸. Such documentation errors underscore the need for hands-on training to familiarize physicians with digital health records.

More often, interoperability within the healthcare system is hard to achieve and in most cases it is easier said than done. Different hospitals use different kinds of health information exchange systems, causing fragmentation of information. At times, even the nuances of medical terminologies and explanations within medical documents can result in diseases to be misconstrued. Vendor policies that prevent the exchange of patient data in order to retain customers also add fuel to the fire. To ensure meaningful use of health data, a health information standard that takes care of semantics and language should be instituted across health information systems. With a digitally optimized, secure environment for integration of critical health data, organizations can extend care and timely help to patients in their hour of need.

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