Digital health - Hope, Hype, and Halt

Abstract

Over the past 40 years, the healthcare community has been repeatedly excited by the hope of providing better care through the effective adoption of the technology. In the hope that digital health is going to be the game changer, an aura of hype has been created amongst the stakeholders of healthcare industry. However, digital health is yet to witness a large-scale adoption that could match the hope created about its utility. There does not exist an example where digital health has successfully transformed the health system of a geography and has demonstrated a net positive return on the initial investment. Owing to the lack of a positive business case, the initiatives pertaining to digital health are losing steam. Corporates are shutting down digital health labs, staunching investments in digital health, digital health conferences are consolidating, and governments are re-evaluating the funding regimes for such initiatives. For the technology to be able to create desired impact in this sector, the principle stakeholders namely governments, hospitals, insurers, tech developers, medical professionals, and patients need to participate equitably. The resources need to be focused on high impact areas like epidemiology surveys, legal and regulatory frameworks, geriatric care, and human resources training. For a new technology to thrive, the industry competitors and governments must work in unison to develop solutions that are pragmatic, solves the problems, reduce the cost of care delivery, and are sustainable in the long-term. Digital health is not dead, but it is in a stage where its revival will be an up-hill task.

Full Article

Tech revolution: First, the world was changed by the invention of wheel. The second invention that matched the magnitude of impact of wheel is the electricity. The concept of electricity has existed for over 2,000 years, but its commercial supply for civilian use began in late nineteenth century. The adoption of electricity has been very steady since then and before the World War II, whole North America and Europe had access to electricity. The third invention in the league of wheel is the internet connectivity. Post World-War II, the world realized the need of effective flow of information. Internet has revolutionised the human civilization beyond the expectations of subject matter experts. The most significant contribution of internet is making the globe a single market place. Internet has uncovered the change that is possible through the power of human interaction. Many industries have reaped the benefits of connected global markets through blockbuster products and borderless territories. The wheel, electricity, and internet form the backbone of the
present-day infrastructure. The technology means productive man-hours, higher revenues, and targeted customer acquisition and convergence across sectors. Finally, leading to convenience, cost savings, consistency, and scaling up with better bottom-lines. Henry Ford used a combination of wheels and electricity to develop assembly line. These assembly lines made cars so affordable, that it changed the way we commute today. Banks use cash counting machines, which are again a precise combination of wheels and electricity. These machines have saved millions of hours of human effort by making our cashiers more productive. Interestingly, internet and global market places are making cash redundant, another seismic shift. Cellular phones have made inter-human connectivity a fundamental service. Human behaviour has evolved significantly by the fact that we are connected to everyone, every time, everywhere. The role of technology is so ingrained in our lives, that any deviation from it is unimaginable. Every industry and sector has been revolutionized by the technology. The dependency of organizations on technology has reached to a point where the survival of industries depends upon technology.

In 1950s, when the world was recovering from world wars, the digital technology was endeavouring to jump out of innovation labs into the real business world. Automation of simple and repetitive human jobs was the lowest hanging fruit plucked by digital technologies in 1950s and 60s. The governments, financial institutions, corporate organizations, and manufacturing industry were tempting to experiment with the idea that data generated can be used to break down the problems and substitute human efforts with mechanical or electronic interventions. As we see the history, military and financial institutions took a lead to transform the lab experiments into opportunities. NASA, for example, leveraged an IBM computer to put a man on moon[CITATION The18 \l 1033 ]. Banking industry created a business case for automated teller machines to reduce the dependency on human cashiers. This introduction marked the dawn of digital era in commercial world. The examples of uptake of digital technologies include self-service gas stations, supermarket billings, online shopping, real-time email communication, automated ticket dispensers, candy machines, traffic signals and cyber warfare. All these examples were advanced features of their time, as well as, saved a lot of money for the public. The proliferation of these innovations was organic in nature. The organic growth was driven by the ability of an innovation to solve the problem at hand. Healthcare, however, has always been a shy cousin of these industries and fails to provide some strong examples of digitalization in that era. Healthcare has spent billions of dollars on committees and conferences to market the idea of digital health yet failing to find any mass adopters.
There is no denying in the fact that digital health has failed to deliver[ CITATION Jos17 \l 1033 ]. In reality, digital health is struggling to survive, and signs have begun to emerge that the era of legacy technologies will soon be gone. In 2012, the moratorium on all E-health and mobile health initiatives in Uganda was the signal that all is not well with digital health adoption and scaling up[ CITATION GSM15 \l 4105 ]. Since then, the number of healthcare conferences on digital health have drastically reduced. More healthcare IT companies have gone bankrupt in past five years, than in two decades before that[ CITATION Bec16 \l 1033 ]. The National Health Services (NHS) in England and, to some extent, Kaiser Permanent are still trying for using telemedicine on mass scale. For the rest of the world, there is no example of digital health being implemented at national level[ CITATION Joh10 \l 1033 ],[ CITATION Phi16 \l 1033 ]. The industry is still struggling with rudimentary issues of interoperability, data privacy, legal frameworks, acceptability and financing issues and changing the goal posts and direction towards blockchain, AI and robotics.

**Hope: Health Digitization is a Magic Wand**

Back in 1950s, there existed one example of digital health in the form of telemedicine. The wealthy folks of that time could use their landline telephones to speak to a physician, describe their condition, book an appointment, or even request a home visit. Disappointing it is, that by 1980s, it became almost impossible to get a physician on the phone and ridiculously expensive to request a physician home visit. However, technologies like internet and sensors provided a hope that healthcare would be accessible anywhere and anytime. There was a hope that some digital solution would move the epicenter of healthcare from hospital to patient. Medical staff hoped that they would have patients’ data available on fingertips. Hospitals hoped from an instant payment from the insurance companies through the use of secure technology. Insurance providers hoped to use data and analytics in reducing frauds and save operational costs. Above all, patients hoped to get a better care they deserve. Everyone expected that digital technology was the missing link between “health-care” and “health-cure”, and what come out was, that an entire conference industry got built on digital health in hype of mass adoption of digital health and the IT infrastructure in hospitals did not move beyond billing and administration!!! And the companies that still hold on to the digital health portfolio are cross-subsidizing the losses with their income from BFSI (Banking, Financial Services and Insurance) verticals.

Electronic Medical Records (EMRs) were looked upon as the grail of digital health. Once all the patient data gets digitalized, infinite possibilities would open. Overtime, EMRs found it difficult to break into a physician’s office. For a considerable time, the myth prevailed that physicians are
afraid of technology or physicians see technological advancements as their enemy. This myth loses its rationale when a physician's office is loaded with technologies like digital stethoscopes, portable glucometers, latest Computed Tomography (CT) scan machines, Magnetic Resonance Imaging (MRI) machines etc. Medical devices industry has exploded in past three decades. CT and MRI machines were made commercially available in 1970s. Within 20 years, there was at least 1 MRI and 2 CT machines per million population in developed world. At present, there are more than 10 MRIs and 20 CT machines per million population[ CITATION OEC17 \l 1033 ],[ CITATION OEC171 \l 1033 ]. These statistics are a proxy for physician's acceptance to the new clinically proven technologies as long as they add to his knowledge of diagnosis/treatment, add to his income, and saves time for ‘doing more’ in his practice. Knowledge, money and time are the underlying benefits when it comes to DoI (Decision on investment) for digital health.

Money chasing digital health: USA is paying around $50,000 to each physician for adopting EHRs. This policy has costed $27 billion to the American tax payers. Despite this, the digital adoption in American clinics and hospitals is far from ideal where fax machines have taken a refuge[ CITATION Ric11 \l 1033 ],[ CITATION Nia15 \l 1033 ]. We need a deeper study as to how and why 95% of physician practices and hospitals in South Korea have transitioned to a fully digital state using EHRs without monetary support from the government. Almost all of these EHRs provide some smart functionality like identifying drug interactions and patient communications, in addition to medical data storage[ CITATION You17 \l 1033 ]. The USA policy is a classic case of ‘dollars chasing EHRs, and not EHRs chasing dollars. If EHRs are beneficial in principle, the physician practices should be adopting it for their own profit. But the true value of EHRs has not been captured as of today. Additionally, this example sums up the success day of lobbyists in the Capitol Hill. The bottom line is, digital health is not a resounding success.

The positive side is, hope never dies. The narrative has shifted from e-health/telemedicine to fitness devices, machine learning, artificial intelligence, block-chain and automation. The hope is that these technologies would bridge the gap in access to right care. Google, Apple, and Amazon are driving their success in healthcare through patient centered approach. The hope remains that automation would reduce errors in healthcare, as it did in manufacturing industry. The hope is patient data could travel instantly like money travels in financial sector. The hope is that every patient is accounted for like items are tracked in Walmart. Patients have expressed consent to share their health data, if their hopes are rightfully met.
**Hype: Digital Revolution is Knocking the Doors**

Back in 1970s, when automation, mechanization, and digitalization were sprouting up, another paradigm shift was being orchestrated by Walmart. Being a retailer, Walmart was very close to consumers. It understood their needs, communicated these needs to manufacturers, and delivered products which were consumer centric. Walmart made consumer the king. “Patient Centric Approach” became a hype phrase in healthcare conferences in no time. Ten years ago, the digital platforms created a hype that healthcare will undergo an overhaul in ten years. Ironically, nothing changed in these ten years.

Healthcare conferences are a major source of useful information and unnecessary hype in this sector. In the digital health conferences, experts would talk about patient data privacy, data analysis, data portability, etc. Not many digital health providers discussed about patient itself. Top-down approach adopted by digital initiatives has landed on its face. Healthcare needs a bottom-up approach, where patients dictates their needs and providers improvise themselves to cater to these needs. Companies like Apple, Google, Facebook, and Amazon, who have deep access to consumers and their data, are positioned very well to make digital health a success. What happened to Nokia and Blackberry in the cellular industry, might happen to most of the digital health providers in near future.

**Dot com moment:** During the hype phase of digital health, every corporation invested in building a healthcare division. Software veterans like Microsoft, Qualcomm, Siemens, Intel, Oracle, Cisco, BlackBerry, Nokia etc. invested billions of dollars in developing healthcare solutions. Manufacturing conglomerates invested in health tech to hedge their risks. Venture capitalist funding flow in healthcare increased exponentially. Even healthcare organizations like Mayo Clinic and MD Anderson invested a significant amount in digital health offering. IT companies spent millions of dollars on healthcare conferences to get a tap on hype or build their client pipeline by getting leads. How long did this hype survive? Microsoft dropped down its HealthVault app[ CITATION Fol18 \ 1033 ]. Google declared that “Google Health” has failed[ CITATION Lee11 \ 1033 ]. Mayo clinic & Noaber Foundations Joint venture spins out their digital arm Vital Health and then sold it to Philips[ CITATION Jes17 \ 1033 ]. MD Anderson ended contract with IBM Watson health, after losing over $62 million in digital health experiments[ CITATION Mat17 \ 1033 ].

Even the ‘Digital Health conference’ industry is under pain, losing momentum and consolidating. mHealth summit was acquired by HIMSS. It is important to note that mHealth summit a leading
conference on health and mobile based technologies was backed by National Institute of Health (NIH) and Fogarty International Center[ CITATION Bar12 \l 4105 ]. The Connected Health Symposium organized by Partners HealthCare, merged with the Personal Connected Health Alliance’s (PCHA) ‘Connected Health Conference’ to stage a single conference since 2017[ CITATION Don16 \l 1033 ]. Health 2.0 got acquired by HIMSS[ CITATION Tom17 \l 1033 ]. The consolidation in the event organization space is an indicator to dwindling confidence in digital health events. Even the WHO trimmed their team in eHealth department drastically reduced. In 2004, there were 22’ support staff at the WHO’s eHealth health unit. By 2008, it was reduced to about 14 and in Jan 2017, 03 people with no dedicated support staff and in Dec 2017, the eHealth unit was left with just one staff.

98% of the digital health start-ups have failed to survive[ CITATION Dav16 \l 1033 ]. No single healthcare start-up attains unicorn status (more than $1 billion valuation). There is not a single example, except National Health Services (NHS) and to some extent, Kaiser Permanente of a large-scale implementation of digital health solution. Smaller countries like South Korea and Estonia have made remarkable implementation of digital health solutions but the percentage of global population impacted by them is akin to a rounding error of numbers. These examples point in a direction that all the hype about digital health was based on speculation instead of facts. The result is, people lost money and time, and health system have sustained inertia. Someone, somewhere has got something wrong in healthcare.

**Halt: The Non-starter**

In 1990s, when digital technologies and platforms were going viral with software and websites, the protectors of healthcare invested their energies in building a strong wall to keep status quo intact. In a time when people could do banking from home, book tickets from anywhere, and get groceries delivered at home, hospitals are enjoying a romantic relationship with paper and fax. Less surprisingly, healthcare industry missed the digital wave. What is the reason behind digital phobia of healthcare industry? Despite all the hype created around digital health, why have the experts failed to declare digital health dead? Despite examples and comparisons with other industries, healthcare has not adopted technology to the level it should have.

**The need for Digital Health is far more than ever before;** holding back the ubiquitous implementation of digital health is estimated to cost over a trillion dollars annually to the global population.
A technology like digital health records would help physicians to better manage their operations, increase health access to the patients, and lower the long-term healthcare cost for the payer. Yet, EMRs failed to establish a rapport with physicians because the physicians cannot find the value-add worth their time and money investment[ CITATION Llo17 \l 1033 ]. The biggest reason for the failure of digital health is that more energies have been spent in developing policy manuals and organizing conferences, than developing a product that can demonstrate value to the user and demonstrate clinical evidence for better healthcare delivery. Also, the technology becomes outdated and updated often. The hope that patients will get better healthcare with the help of technology is fading away. EMRs solved the issue of billing and data storage, not access and care. The EMRs failed because they were designed around hospitals and doctors and not on value to the patient’s treatment[ CITATION Mar13 \l 1033 ]. The need is to design patient centered solutions.

The bottom line is, digital health has not paid off to the investors, users and the patients. This technology has not earned the value it promised for the governments, healthcare providers and the patient communities. A bigger focus was laid on the development of the business case. Digital health industry should have shifted focus from tuning business model to fixing the service model. With most of the software being sold as a service, digital health should be viewed as a service to the key stakeholders of the healthcare industry. Going forward, the hype and promises should be driven by the magnitude of impact created, and not by the speculation of company valuations. It has to be a game of ‘clinical value creation’ and not just ‘financial valuations for investors’.

**Moment of Truth: A Call to Action**

The industry and the governments have begun to get the sense of the failing digital health initiatives. We can either declare the digital health as dead or initiate a resuscitation phase. Another truth is, the rules of the game have changed. Doctor is no longer the king of healthcare, patient is. Digital health is becoming a service supporting clinical outcome instead of acting as a standalone product and solution. As the businesses are driven by the profit motives, follow the money. Money in healthcare can be backtracked to insurance companies (payers) and patients. Health insurance providers would have larger role to play in digitizing health sector to save costs and gain competitive edge.

Looking at the history of evolution of digital health, it is clear that it is in a state of atrophy. The nomenclature and the goal posts have kept changing over the past two decades, helping to rebrand the idea of IT in healthcare. We are back from "Hope, Hype to Halt" to hope again and it
looks tough to take off. We need to galvanize the global efforts for deciding a roadmap as to what are the building blocks; EHR with Blockchain, epidemiology surveys, legal and regulatory frameworks, starting with referrals and psychiatry, geriatric care, human resources training, AI in radiology, diagnostics and treatment, etc. We have to take start at hurdle race once again, but the path and goal must be clearly articulated with evidence of impact documented as we go along. The role of the Government has to evolve. Governments need to go beyond its current role of acting as a catalyst to derive consensus amongst stakeholders. Providing funding and operational support at national or global level is the need. For example, the Government of India is funding telemedicine as an integral service at Health & Wellness Centers and collaborating with private players to operate these centers[ CITATION Pre15 \ 1033 ]. Three major developments in 2018 could well give the much-needed boost as one last chance to lift up the adoption of Digital Health.

First major development is the mHealth resolution at the World Health Assembly proposed by the Indian Government and this resolution received global support[ CITATION Org18 \ 4105 ]. This resolution signals an increased focus on mHealth, but the rest has to be a grounds-up movement. The second major development was the launch of the Global Digital Health Index, which may play a role of a barometer for adoption and maturity of digital health[ CITATION Gin17 \ 4105 ] and was launched alongside the World Health Assembly in May, 2018[ CITATION GDH18 \ 4105 ]. Third major development is the final meeting of the guidelines development group (For digital health) that happened at the World Health Organization in June 2018. Once released, these guidelines would help the governments of the WHO member states to take decisions on deploying digital health solutions across the continuum of care.

The healthcare systems across the world are becoming unsustainable. Technology can help the health systems but we must start with human interoperability before technical interoperability, human-ware before software or hardware. Challenges in healthcare are opportunities for digital health. Digital initiatives in other industries have worked the best when the implementation was orchestrated by the whole industry as a uniform effort. Aftermath 9/11, the initiative of developing a process to deposit cheques electronically was develop by big banks in a unison. Perhaps, this offers a cue to what is needed. It’s time that the industry takes the lead on patient centric and clinical outcome driven solutions, government’s take the lead in catalysing integration of digital tools in delivery of care and the UN, WHO & ITU work in unison to provide an umbrella cover for guidelines, standards and legal frame-works, best practises and shared common goal to ensure success leveraging the latest developments. Time to re-start is now!
Prof. Rajendra Pratap Gupta is the former advisor to the Health Minister of India & Dr. Rahul Garg works for a leading global consulting firm

Authors email: emailrajendra@yahoo.com / Rahul.k.garg@outlook.com
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