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*Sector Thought Leadership Series*

# MEDICINE AND TECHNOLOGY

## A Marriage of Convenience?

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## TRADITIONAL HEALTHCARE DELIVERY SYSTEM

Modern-day healthcare delivery systems have been around in Nigeria since the first Europeans arrived on the country's shores. The Portuguese journeyed with their own medicine as they explored the world and were not unwilling to administer it to locals as they engaged with them. When the British came, they made the administration of health-care more organised in their colonial system. Indeed, before then, the peoples who will make up Nigeria had their traditional healthcare systems that were very effective in their communities, although not as organised as their European counterparts.

Today's healthcare delivery system in Nigeria comprises a group of people, institutions, resources, and activities that deliver healthcare to its population. With the recent out-break of COVID-19, the direct relationship between the health of a nation and its econo-my and overall wealth has become clear. **Therefore, we can say that a crucial part of building a nation's economy is building its healthcare system.**

Healthcare delivery in Nigeria was designed to follow the pattern of the three tiers of government, with each tier focusing on specific aspects of national healthcare delivery. The Local Government is responsible for managing primary healthcare such as local dis-pensaries, regular immunizations, and environmental sanitation. These are the funda-mentals of any healthcare delivery system. A comprehensive health centre is supposed to offer both primary healthcare and some secondary healthcare services. Every local government area should have at least one comprehensive healthcare centre.

The State Government is responsible for secondary healthcare such as general hospi-tals, health centres, and other health delivery systems. While the Federal Government is responsible for tertiary healthcare such as National hospitals, the Specialist/Teaching Hospitals, and the interventionist Federal Medical Centres.

In reality, the primary level of healthcare delivery in Nigeria is non-existent. This means that all those that are supposed to get healthcare from this level are forced to move to the secondary level and those that can't afford this, are forced to rely on quacks and self-medication. The lack of state-of-the-art equipment with the latest technological advancements in healthcare delivery makes this already terrible situation dire.

## Innovations Occasioned by a Health Crisis – 1918 Pandemic

In the decades following the **Spanish flu pandemic**, scientists worked tirelessly to understand the disease better. They were unable to view the smaller agents which they called viruses that were mixed in with the bacteria. Even though vaccines had been created against these viruses going back to the smallpox vaccine in the late eighteenth century, it was in the 1930s that contemporary researchers developed methods to view such small particles using electron microscopes. It chemically recognized them as being made up primarily of protein and ribonucleic acids.

As researchers worked tirelessly to create a vaccine for the deadly influenza, they made many discoveries and breakthroughs in medicine. They include understanding the nature of genes and the chemicals that encode them, which, in 1944, was discovered to be deoxyribonucleic acid (DNA).

The development of these vaccines and the better understanding of these microbes – viruses, bacteria etc. – would not have been possible if technology did not develop as fast as possible. We can also argue that somehow, the emergence of such a disease that evolved into a pandemic would have contributed to the advancement of science and technology as man raced to find a cure. It is obvious in our day and time with COVID-19 how the technology behind contact tracing – data science and mining - is moving at a much faster rate and gaining more relevance such that in a post-COVID-19 world, it would be a technology that has come to stay with us irrespective of the ethical issues of privacy invasion it comes with.

## Alternative Methods of Healthcare Delivery Using Technology

Technology has played a major role in developing many customer-facing industries such as banking, retail, and hospitality. Healthcare is a couple of years behind these industries in the use of innovative technology for its delivery. Still, it is catching up very fast, with progress being fragmented due to the industry's complex structure.

Artificial Intelligence (AI) has exploded in the last decade due to the rise of data and computing power. The healthcare industry is projected to become a huge beneficiary of this technology, even if it lags behind sectors like transportation and advertising in the use of AI. The critical areas of applying the technology in healthcare include diagnosis and treatment recommendation, patient engagement, and administrative activities.

There are already researches that suggest that AI can perform just as well as or even better than humans at essential healthcare tasks. Today, algorithms are already outperforming radiologists at spotting malignant tumours, although it's going to be a while before AI replaces humans in broad medical processes.

Below are a few other technologies paving the way to the future of healthcare delivery:

**Virtual reality** is changing the lives of both patients and medical personnel. It's being used to train aspiring surgeons and actual surgeons on performing surgical procedures, even complex ones. Software companies such as Osso VR and ImmersiveTouch have developed software programs that are being used with positive results. Studies have shown that surgeons trained using VR technology have a more than 100% boost than their traditionally trained counterparts as they were faster and more accurate in their procedures. VR tech is also being used in pain management for patients such as pregnant women going into labour, post-surgical pain, patients suffering from cardiac or neurological pain, etc. It has also been shown to reduce anxiety and lessen pain in patients undergoing surgery.

**Genome Sequencing** is the way toward deciding the total DNA arrangement of a living being's genome at a solitary time. It makes sense of the request for DNA nucleotides, or bases, in a genome—the request for As, Cs, Gs, and Ts that make up a life form's DNA. The human genome comprises more than 3 billion of these hereditary letters.

In 2017, Illumina's CEO Francis deSouza flaunted the machine, called the NovaSeq, in front of an audience at the JP Morgan Healthcare Conference in downtown

San Francisco, telling the group the machine's checking speed could decipher an entire human genome in less than an hour. The company says its "expected one day" to order up your whole genome for less than $100. With this innovation, one would get information about your drug sensitivity, multifactorial or monogenic medical conditions, and even your family history.

Some fields, such as nutrigenomics, dietetics, and genomics, are already taking advantage of the innovation.

**Robotics** is another exciting innovation in healthcare. Robotics includes robot companions, surgical robots, pharmabotics, and exoskeleton or disinfectant robots. In 2019, the first exoskeleton surgery was conducted, and a tetraplegic man became capable of controlling an exoskeleton with his brain. Robotics aids nurses in lifting elderly patients help patients with spinal cord injuries, and much more. There are also robot companions who help reduce loneliness, treat mental issues, and help kids with chronic illness monitor their medications while also singing to them and telling them stories.

Due to **Nanotechnology,** nanoparticles and nano-devices will before long work as exact medication conveyance frameworks, malignant growth treatment apparatuses, or small specialists. As far back as 2014, researchers from the Max Planck Institute designed scallop-like microbots designed to swim through your bodily fluids. Little, smart pills like the PillCam are now being used for colon tests in a non-invasive, patient tolerant way. In late 2018, MIT specialists made an electronic pill controlled remotely and hand-off indicative data.

**Healthcare wearable devices** that can be used to track a patient's sleep patterns, workout routine, stress level, weight gain/loss, etc. are an excellent way for people to monitor their health from home and share the results with their physicians. Some of these technologies include Fitbit Ionic (for sleep and workout), Muse headband (meditation), and more.

**Telemedicine/Telehealth** utilises telecommunication technologies to advance healthcare delivery. This enables patients to consult with a specialist from anywhere in the world. This can be done using telemedical

devices to transmit signals, medical images, and other data to a specialist (this can be achieved without both parties being online simultaneously). The introduction and uptake of the 5G mobile technology, which promises high data speeds with very low latency, will see innovations like remote surgical procedures etc. become a reality. Telemedicine enables specialists to monitor patients remotely; it can help manage chronic conditions effectively and economically.

**Electronic Medical Records or Electronic Health Records (EHRs)** are digital summaries of a person's health records. They provide an overview of a person's health and medical histories such as lab reports, hospital stay details, surgeries, prescriptions, and more. It enables more accurate and improved patient care and enhances the easy transfer of information about a patient between labs and specialists without wasting time and resources. EHRs, when appropriately managed can increase accountability and reduce malpractice.

## Overarching Benefits and Concerns of Technology in Medicine Given Nigerian Peculiarities

As technology assumes an increasingly significant role in each field of the world, the Nigerian health sector is not being left out. In supporting these improvements, the World Bank has contributed $3 million to back Nigerian tech centre points, making the nation an essential hotspot for digital health technology innovation in Africa.

Some of the benefits of implementing technology into the Nigerian health delivery system are the ability for patients to communicate with doctors and nurses using communication systems in hospitals; patients can easily, with the press of a button, get a doctor's attention. New technologies in medicine are creating new career paths for people to explore to enable them to fit into the evolving industry. This is also consequently creating new jobs, as each new technology requires technicians to operate the equipment. As more hospitals integrate tech into their healthcare delivery system, the country's mortality rate is sure to drop. Making use of Electronic Health Records would help reduce the risk of patients' records being misplaced since records will be stored in the cloud. It will also make it faster to retrieve information about patients instead of relying solely on paperwork and physical records.

Some concerns include an increase in the cost of treatment as hospitals and clinics will want a quick return on investment on the technological improvements they have made to their operations.

The perennial problem of epileptic power supply that has bedeviled the country for decades is a major challenge for the industry's evolution to high-tech operations as most tech equipment are power sensitive. Also, the skill gap in adequately trained personnel to handle equipment will be another showstopper in the quick uptake of these technologies in the country.

## Examples from international communities

In 2015, Atomwise propelled a virtual quest for protected, existing medications that could be updated to treat the Ebola virus infection. They discovered two medications anticipated by the organization's AI innovation, which may essentially lessen Ebola infectivity.

Earlier in the year, Google's DeepMind developed AI for breast cancer analysis. The results outperformed all human radiologists on average by 11.5% to positively identify breast cancer on pre-selected data sets.

Habit, a California-based start-up company, is one of many companies offering personalised diets based on genetic codes.

In November 2019, researchers at the Rensselaer Polytechnic Institute in Troy, New York, created a way to 3D-print living skin along with blood vessels. This is a crucial development for skin graft for burn victims.

## The Way Forward

Right strategy and structure required subsidies and training of medical service staff, indigenisation, improved security, and political stability would be a start in propelling the Nigerian healthcare delivery system in the right direction.

The need to have stable and reliable power supply cannot be overemphasised. Additionally, security will also help drive foreign direct investment. We desperately need the healthcare industry to rise to its full potential and catch up with the rest of the world. Most, the need for proper legislation will secure the path to this futuristic healthcare delivery system that Nigeria needs to become the giant it truly is.

It goes without saying that with the present state of the Nigerian economy, as it tries to transit from being completely dependent on crude oil into being a more rounded and resilient one, that private-public, government, and non-governmental funding will be required to support the healthcare infrastructure and delivery thereof, that the workforce required to deliver that envisioned economy desperately needs. With COVID-19, we saw a glimpse of this with the likes of Aliko Dangote organising and pulling resources together with other titans of industry in the country. Abdulsamad Rabiu, Chairman of BUA group, also did the same. So did Dr. Paul Eneche of Dunamis International Gospel Centre Abuja and many other religious and non-governmental organisations weighing as best they could as the country grappled with the crisis. These initiatives went a long way in complementing what the government at all levels were doing. Such partnerships will be required and perhaps institutionalised if Nigeria is to guarantee the workforce's health it will ever so heavily be reliant on in the coming years.

Again, COVID-19 has made us realise how closely linked healthcare is to the economy of any nation. It would be foolish to prioritise commerce over healthcare as the latter is the foundation for the former to truly boom. As a nation, we stand at the threshold of a pivotal moment which we can take advantage of to build a robust healthcare system that will guarantee a vibrant economy. This will, in turn, create opportunities and wealth for our people. The next best time to act is now as the marriage between technology and healthcare is not just a marriage of convenience but one of necessity.

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