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Healthcare & Lifesciences

Through smartphones, laptops, and various devices, IoT is enabling industries to understand & predict consumer behaviors and develop better solutions. Even in healthcare, remote patient monitoring technology is already reshaping the landscape with significant benefits for patients, clinicians, providers, and payers. This edition explores IoMT's impact on global health outcomes and how the technology is set to transform approaches to population health.

Table of Content

No.	Content Title
01.	Editor's Note
02.	IoMT in Healthcare: Patient Journey Through the Lens of Medical Devices
03.	Big Data Analytics in the Healthcare Market: A Boon or Curse?

Editor’s Note

Dear Friends,

The healthcare field is rapidly and continuously changing. Every aspect, from digital therapeutics and e-prescriptions to telehealth and real-time diagnosis, is undergoing tremendous transformation. And it is leveraging technology tools integrated into an immersive environment to do so.

Healthcare businesses offer medical services, formulate drugs, create medical equipment, and provide insurance, delivering care in many other ways. This necessitates continuous improvements of business models and the development of new revenue sources to enhance users' well-being.

In addition, private equity and principal investors continue to recognize the industry's significant potential for improvement and attractive returns. As a result, they have been deploying substantial capital and bringing in talent, both within and outside healthcare (for instance, technology), all to speed up new business creation and scaling.

In the wake of the COVID pandemic, global healthcare systems have had to relook at several facets of their readiness, especially concerning communications. The initial emphasis for high-growth healthcare companies has been maintaining brand awareness and visibility throughout their expansions.

Increasing access to more self-guided, on-demand healthcare is helping businesses expand their digital markets. The recent trend of having treatment at the fingertips has boosted the mobile device market, leading to a surge in health data. This data is key to the digital transformation in the sector, empowering the creation of a seamless, authentic customer experience.

Hospitals that have already implemented a digital-friendly culture recognize the advantages of their technology investments. They offer training for medical staff to enable effective utilization, improving overall care management.

Due to inadequate space and treatment capacity, several hospitals and centers now provide remote care for patients worldwide. With this system evolution, new technologies, such as IoMT drones for delivering critical supplies, robotics, and 3D-printed healthcare items, have been gradually adopted.

Cybage's industry footprint includes the entire Healthcare and Life Sciences IT solution ecosystem. As a technology partner, we help healthcare innovators solve every piece of the healthcare puzzle impacting clinical outcomes, patient experiences, and costs. And as a critical differentiator, we offer compelling industry exposure, enabling health systems to navigate the challenges of the future as we learn from our past.

It is crucial to unfurl new horizons of quality care available on demand as we move toward a more accessible healthcare landscape. Providers, payers, regulators, technology partners, device OEMs, system integrators, and industry standards/forums must collaborate to interweave their goals. This edition of the Healthcare & Lifesciences magazine hopes to empower its readers with an understanding of the approaches to mitigate risks and ensure interoperability while driving optimal new-generation healthcare delivery.

A better tomorrow awaits us as we build & foster a healthy world with a human-centric approach to service and care.

Shivajyoti Bhattacharjee
Vice President

IoMT in Healthcare: Patient Journey Through the Lens of Medical Devices

Picture a scenario...

Tim wakes up from alarms vibrating on his wrists. He goes for walks wearing devices that measure his daily steps, heart rates, and more. He then comes home and uses several other devices to help him stay fit, putting the power of his fitness right in his hands.

The above scenario sets the scene for modern-day healthcare, created for & by health-conscious & tech-savvy users. The story, of course, doesn't end there. Because now, we have devices that offer more services, from monitoring chronic pains to mood changes (indications of depression, BPD, etc.) to blood sugar levels. And IoT in healthcare or IoMT (Internet of Medical Things) is shaping new personalized and continuous digital patient journeys by collecting health-related data from individuals. These devices today include computing devices, smartphones, wearables, digital therapeutics & medications, or implantable surgical devices. Wearable technology, especially, surrounds us today. These wearables primarily supply other devices with digital information, driving real-world actions.

> **“In fact, there are nearly 26 billion active IoT devices in Healthcare today, and this number will continue to proliferate.”**

Often, like any other customer journeys (in this case, patient journeys) are mapped from the healthcare system's perspective. They are designed to reflect who the patients interact with and what tools are used when the focus should be on the patient's needs and expectations. Which is why the IoMT implementation's ongoing goal is to make these journeys more patient-centered.

Patients are taking a more proactive role in choosing their healthcare plans. They seek high-quality services that match their expectations across every phase of their treatment evolution. IoMT can potentially provide actionable insights, along with tangible & intangible benefits for patients. IoMT devices can be leveraged by patients to improve health outcomes, from monitoring symptoms to ensuring treatment adherence.

IoMT streamlines and enhances healthcare delivery, diagnosing, treating, and monitoring patients in and out of hospitals, helping make care more accessible when & where it is most needed. It can even proactively predict health concerns. Especially in response to the pandemic, government leaders and decision-makers worldwide are implementing policies accelerating IoMT use to improve care quality.

A Patient's Prerogative

- eHealth,
- Mobile Health [mHealth]
- Ambient assisted living
- Semantic devices
- Wearable devices & smartphones
- Community-based healthcare

The various IoMT services can track and monitor health progress remotely and keep healthcare professionals informed. The technology improves self-management of chronic conditions, enables early detection of anomalies, fast-tracks identification of symptoms, and enhances prescription adherence. At an individual level, IoMT offers the ability to link and monitor daily activities, provide support with information, and promote behavior changes.

A Doctor's Perspective

IoMT benefits for medical practitioners

- Fewer in-person visits
- Better access to essential data
- Less scope of errors

IoMT can improve the accessibility of preventative health services, making the healthcare system more proactive, continuous, and coordinated. Such applications can help better employ healthcare resources and provide quality, low-cost medical care. In addition, this can ensure more transparent, evidence-based decision-making, driving a change in disease patterns and improving the well-being of citizens on a large scale.

A Systemic Change with Digital Health Data

The data from IoMT devices can provide valuable information about population-level surveillance in diseases and accidents, risk factors, and environmental conditions, which is difficult to collect through the traditional human-reported disease surveillance system and can be particularly beneficial in pandemic responses.

This can enable decision-makers to make evidence-based decisions in promoting healthy social and built environments, safe transportation systems, high-quality public services, and intelligent healthcare and emergency response systems.

Perception and identification technologies such as sensors are the foundation of IoT. Technology that can perceive environmental changes, such as radio frequency identification (RFID), infrared sensors, cameras, GPS, medical, and intelligent device sensors, allows treatments to be monitored in real-time. This data can further facilitate understanding many patient parameters to fast-track diagnoses and high-quality treatment.

Examining the Challenges in IoMT Adoption

The following concerns generated by IoT-based healthcare result in barriers to larger adoption from healthcare providers and patients alike:

Acceptability and Accessibility: The premise of IoT is apparent to society. What is unclear, however, is the actual value IoT delivers to them personally from a healthcare perspective. Many factors affect clinicians' acceptability of technology-supported programs, such as individual attitude, organization readiness, etc. Healthcare systems also need to be aware of the inequalities that could result from the widespread implementation of IoMT. This includes individuals who may be unable to afford or access the technology or reliable internet due to geographic or economic limitations.

Cybersecurity and Interoperability: IoMT-based applications are vulnerable to cyberattacks as most of the communications are wireless, and many IoT components are characterized by low energy, making implementing complex security frameworks difficult. The drafting of security guides and recommendations is already underway and will emphasize data security. The industry and manufacturers have yet to reach a consensus on wireless communication protocols and standards for machine-to-machine communication. Achieving interoperability across platforms can provide clinicians and patients a safer, more productive, and more satisfying experience.

Data Storage and Ownership: Higher the level of intelligence and autonomy, the more challenges these devices face when protecting identities and privacy. Transparency and implementation of codes of practice regarding the storage & ownership of centralized cloud data need to be enforced by policies.

Remuneration: Finally, remuneration for technology-assisted health care has historically been challenging and differs appreciably across different countries. As international health systems develop robust policies and guidelines on reimbursement and regulatory considerations.

Contemplating Workarounds & Anticipating the Future

Today, many care services are less accessible for people who don't live in big cities or cannot afford specific treatments. IoMT has the potential to improve population health and transform our healthcare models into digitally capable health systems that utilize its existing workforce more efficiently.

With decentralized data processing & networking approaches such as Edge Cloud & Blockchain storage, the scalability of IoT in healthcare may be improved. We can then move away from healthcare focusing on illnesses and medical interventions, making healthcare more person-centered. That comes with the understanding that an individual's health strongly depends on the environment and social circumstances— income, transportation, neighborhoods, and emotional & familial support. This will ensure care systems are motivated by ongoing individual wellness and infuse them with a culture of health.

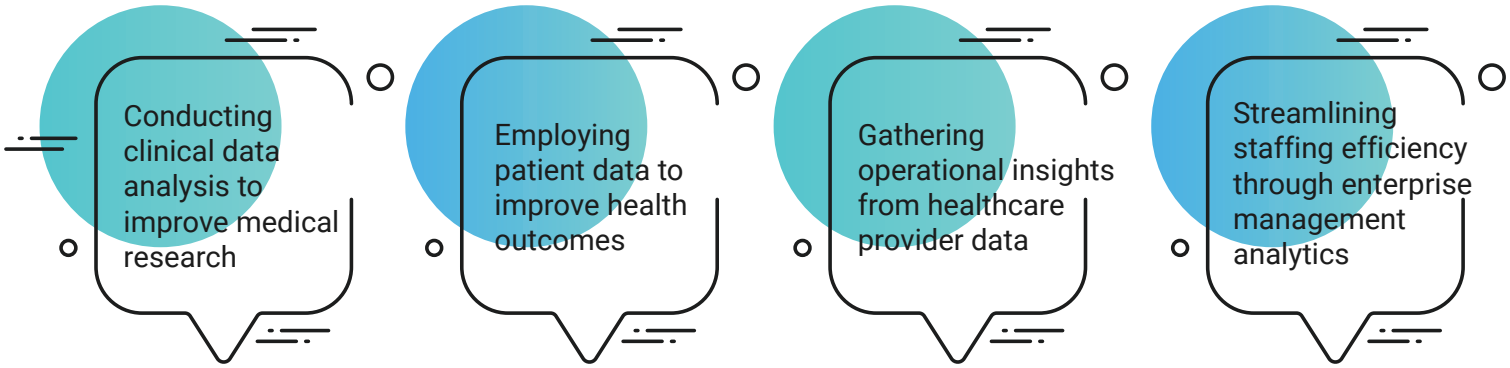
When healthcare moves to the internet, it democratizes all services under its umbrella. It empowers people in a small town to virtually access the same benefits as people much closer to these urban centers. And this potential is not lost on the policy-makers, health systems, or the communities they serve.

Big Data Analytics in the Healthcare Market: A Boon or Curse?

Patient interactions in Healthcare often involve interactions with a myriad of medical equipment and devices. A few years ago, this would have primarily included MRI and CT scanners, blood pressure monitors, and several other products for diagnosing, monitoring, and treating the patient. However, today, healthcare technology has taken numerous forms and has been instrumental in helping organizations deliver improved patient outcomes and lower costs while also boosting efficiency.

With several devices working in tandem, significant volumes of medical data are also being leveraged. The data is being generated from a great many sources, such as smartphones, wearable sensors, patient records, clinical reports, researchers, healthcare professionals, and organizations. And it has the potential to foster rapid decision-making for the detection of acute diseases and even pandemics.

Big Data Analytics Use Cases in Healthcare



Big Data Analytics (BDA) in Healthcare has already resulted in substantial advantages for providers, enabling offer high-quality care efficiently & cost-effectively. However, this impact on patient outcomes and healthcare processes continues to grow as more and more data becomes available. Every day, new innovative tools are also being developed to help make these analytics results both more precise and easier to access.

But IoMT is Accelerating Care on Demand

For years now, continued technological and cultural revolutions have led to increased interconnectivity between technology and the people using it, even in healthcare. Significant advances in wireless innovation and the rise in computing power have driven disruptions across the healthcare industry, leading to an increasing number of connected medical devices. These devices generate, collect, analyze, and transmit data, which is integral to empowering patients and improving patient engagement. And the adoption of the Internet of Medical Things (IoMT) and related technologies offer solutions for several challenges within the areas of remote patient monitoring, telehealth, robotics, etc.

> “The evolution of IoMT has been a significant game-changer when it comes to roles & relationships within the healthcare sector.”

The IoMT ecosystem combines digital and physical worlds to improve the pace and accuracy of diagnoses and treatments, helping monitor, and drive patient behavior (therefore, outcomes) in real-time. It also improves health care organizations' operational productivity and effectiveness by streamlining clinical processes, information, and workflows.

But for successful & widespread acceptance of IoMT, systems are required to process and store heterogeneous, complex, and unstructured data in real-time. As a result, weaving in BDA through the healthcare ecosystem is vital to reducing healthcare costs and identifying risks effectively.

Although comprehensive knowledge has been compiled and exchanged, the structured, systematic review of data post-BDA application will be crucial. It will help healthcare practitioners, policymakers & decision-makers, and scientists & researchers gauge IoMT's relevance in medicine more efficiently.

> **“In Healthcare, the global big data analytics market is projected to reach $67.82 billion by 2025.”**

Disputed Ownership of Health Data

But compared to other industries, the circumstances are widely different in Healthcare. Several areas need to be addressed to improve the translation of existing data into new healthcare solutions. These areas include the collection & standardization of datasets and the gaining of prior informed consent for the use of de-identified data.

Medical records often represent personal information and are more carefully guarded. The data is also usually siloed in clinic or hospital databases without central sharing. This results in a lack of velocity or volume of data needed to leverage Big Data methods.

The data is more complex & less "usable" and therefore requires processing to become readily usable. The proper infrastructure for such processing also needs to be established. The ability to feed this data back to the healthcare and research communities for further use must also be installed.

Sources of Big Data in Healthcare

- Government agencies
- Electronic
- Patient portals
- Research studies
- health records (EHR)
- Wearable devices
- Payer records
- Public records
- Search engine data
- Generic databases
- Smart phones

Creating a Record for Precision

Electronic Health Records (EHR) provide diverse opportunities for improving human health. This wealth of existing data empowers providers to create richer profiles to help study health and disease at a societal level. The EHR allows efficient and cost-effective treatments, enabling efficient data exchange between patients and providers.

Summary

BDA in Healthcare brings with it the ability to reduce treatment costs, sidestep preventable illnesses, and enhance the quality of life in general. It can even help predict potential outbreaks of epidemics!

Realizing such a potential for transformation begins by understanding how the technology can address healthcare providers' challenges to deliver patient-centered healthcare by identifying patient needs. Forming collaborative networks—sharing samples, data, and methods—is now more critical than ever and increasingly requires building bridges to less traditional collaborating specialties such as engineering, computer science, and industry.