Workforce 4.0-Is Healthcare Transforming with Information & Communication Technology

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Abstract:

Workforce 4.0 is a tag given to the current trend of automation and data exchange in manufacturing technologies. It includes cyber-physical systems, the Internet of things, cloud computing and intellectual computing. Workforce 4.0 is commonly referred to as the fourth industrial revolution of the era. In health care sector, workforce 4.0 or "Hospital 4.0/ Life Sciences 4.0, taking place in the form of ICT & E-Health practices. E-Health & ICT practices can bridge the health divide between the haves and the have net's. Today, Indian economy is on the threshold of a revolution—a revolution called "Information Medicine". The concept of Hospital 4.0 in a stronger way when compared to Industry 4.0 concept. Hospital 4.0, will soon become personalized and participative Health & ICT applications in healthcare will probably be as important as advances in diagnosis and treatment. In spite of the obvious benefits, the use of IT in the healthcare sector is far less than its use in banking, commerce, travel, Automobile or almost any other industry. The main objectives of this research paper are, To highlights the emerging technologies in E Health, To discuss the main constraints faced in adoption of E- Health by healthcare sector. To outlines some requirements for improving E health services in the present environment. This paper is based on secondary sources of data, collected from journals, research papers and newspaper articles.

Key Words: Workforce 4.0, E Health, Healthcare Sector, ICT, Hospital.

Introduction: Indian Healthcare sector is evolving rapidly after the introduction of new age technologies, Healthcare sector is not an exception to these changes and healthcare is basically a multifaceted sector which has varied stakeholders such as patients, nurses, doctors, paramedical hospitals and pharmaceutical. This sector is restricted by rigorous rules and regulations. To develop, bringing performance gains, risk reduction, automation and cost reduction application of ICT is inevitable to health sector. Information and communication technologies (ICT) are an integral part of the human environment, which is known by the name E-Health. E-Health is possibly one of the biggest sectors in India within digital healthcare, projected market size of 416 million USD in 2015, which is expected to increase to 1 Billion by 2020. A recent study reveals that 68% of doctors in developing markets like

India & China are recommending E-Health and 59% of patients are already using ICT in their day to day life. India's international healthcare delivery market was valued at 7.5 Million USD in likely to grow at a CAGR of 20%. Hospital 4.0 is supported by five pillars: the IoT, artificial intelligence (AI), big data, 3D printing, mixed reality and virtual simulation. Healthcare 4.0 allows to imagines a world where everyone are connected through wearables and every data point of patients is getting recorded no matter where they are. Hence future would be a combination of Artificial Intelligence, Internet of Things (IoT), Genomics and Big Data. Genomic proving to warn us about future risks, big data to make sense of the tons of data from wearables, artificial intelligence to help us make the right decisions about procedures & treatment are expected to become a part of our everyday life just like e-mails and social networking has become a part of every other business.

Objectives of the study:-

To highlights the emerging technologies in E Health,

To discuss the main constraints faced by E Health professionals in adoption of Workforce 4.0.

To outlines some requirements of improving E health services in the present environment

Research Methodology: The present study is based on secondary sources of data/.For the preparation of this research paper, journals, newspapers and relevant government department websites have been accessed in order to make the study an effective one. The study attempts to look at the emerging technologies, opportunities, present position and constraints faced by E Health professionals of Workforce 4.0 in healthcare sector in India.

Need for ICT in Indian Healthcare sector: Indian Healthcare sector is experiencing a major shift towards digitization. Hence is vital to address the following problems which exist presently.

As per Health Profile of India 2017, the country has one allopathic Government

doctor for every 10,200 people, one government   hospital bed for 2050 people and one state-run medical Centre for 90,343 persons.

 67% of Indian population lives in rural areas, so far they are served only by 33% of the local Indian doctors.

The country has 81% deficit of health specialists in rural areas

63% of the hospital beds in the country are from the private sector.

 India's geriatric population is on the rise having crossed 100 million in 2014 itself and is expected to reach 168 million by 2024.

 Non-communicable diseases account for most of the health ailments in India, needing extra intervention.

India spends the lowest- only 4.7% of its GDP on healthcare.

Components Of E Health / ICT: Clinical applications of e-Health include Electronic Health Records, Tele-Consultations, Clinical Decision Making Support Systems, Vital Signs Monitoring Services, Tele-Homecare, Ambulatory E-Health—smart clothing, E-Wear, E-Clothing, E-Prescribing, E-Nursing, E-dissemination of personalised healthcare and professional Continuing Education using e-Learning tools: Health Information Systems, Lifetime Health Records/EMR, Pharmacy Information Systems, Electronic Claims Systems, Laboratory Information Systems, Interfacing with Diagnostic Equipment, ICT in Health Administration, and Identification and Tracking Solutions.

Benefits of ICT in the Health Care sector: Technology is providing constantly more ways of storing and processing Healthcare data. The increasing processing power of portable devices in particular has led to the development and linking together of services that would have been inflexible to imagine few years back. Many Health ICT investments can offer clear quantifiable benefits that produce a measurable financial impact on the sector.

Increasing quality in the patient assistance: One of the most important flaws of this sector is the fragmentation of the health care and the difficulties for efficiently transmitting the information. ICT can help improve patient safety through the direct access to the medical case story, checking the treatments online, keeping track of the patients' progress and anticipating possible medical errors. In general terms, they are regarded as generally positive tools among professionals and users. Since they provide a way to increase the patient safety, their use is being promoted in many countries.

Cutting down of the medical expenditure: Using ICT and Serious Games for Health help reduce these costs by reducing the time required to process data and manage paperwork. The system for image transmission and storage is essential to promote the development of the electronic medical case story and telemedicine since it speeds up the tests and the gathering of results.

Decreasing administrative cost: Invoicing brings about many possibilities of saving due to the use of ICT and the new remote devices. Although the evidence of these data, electronic invoicing is not widely used in most of the countries yet.

Opportunity to carry on brand new health models: ICT have been defined as technology with a high transformative potential, since it introduces new ways to carry out medicine and develop health care. They are definitely essential to renew primary health care since they contribute to a personalized following of chronic diseases; they improve the access to health care in rural populations; and they contribute to the optimizing data measuring and supervision.

Emerging Technologies of Workforce 4.0: Healthcare technology trends continue to initiate growth in the medical industry. Among 2018 trends, nothing is fierier than the digitization of healthcare. New trends in healthcare technology are always exciting. From the invention of the x-ray machine to modern 3D, MRI scanners, every step forward increases the quality of life for millions beneficiaries. Following are the some of the emerging technologies of workforce 4.0.

1. Big Data and Predictive Analytics: Big data is the vast quantities of information created by the digitization of everything, which gets consolidated and analyzed by specific technologies. Predictive analytics is the process of learning from historical data in order to make predictions about the future (or any unknown). For health care, predictive analytics will enable the best decisions to be made, allowing for care to be personalized to each individual. The application of big data and predictive analytics in healthcare has a lot of positive and also life-saving outcomes .In healthcare, the use of electronic medical records (EMRs) and electronic health records (EHRs) has been increasing over the past 15 years. EMR adoption has risen from 20 % in 2001 to 82% in 2018. As EHRs are a collective view of the individual EMR experience of a patient, the growth in the adoption of EMRs incited an exponential growth in EHRs, providing a 360-degree view of the medical history of a patient. With this, data are abundant and increasing immensely as the number of electronic devices rises and adoption of, and innovation in, technology increases.

For healthcare, the trend of big data and predictive analytics is a blessing. Creating risk scores based on historical data could give care providers the opportunity to provide appropriate interventions before unhealthy conditions and diseases manifest

2. IoT in Healthcare: Internet of things or The Internet of Medical Things (IoMT) is the collection of medical devices and applications that connect to healthcare IT systems through online computer networks. Medical devices equipped with Wi-Fi allow the machine-to-machine communication that is the basis of IoMT. IoMT devices link to cloud platforms such as Amazon Web Services, on which captured data can be stored and analyzed. IoMT is also known as healthcare IoT.

The adoption of the Internet of Things (IoT) in healthcare is a done deal. In 2017, 60 percent of all healthcare organizations globally had adopted IoT in some form. This number is set to reach 87 % by 2019. Currently, we see two main applications of IoT in healthcare. i.e., IoT initiatives are driving the improvement of care, typically through remote monitoring and tele monitoring and, a significant amount of IoT is employed for tracking, asset monitoring and maintenance. The work IoT is doing in these two fields is very promising, increasing efficiency and optimization of assets, keeping patients safe, improving health and care delivery and promoting engagement. These advanced and integrated approaches are exploding

up which are helping with diagnosis and treatment, to deliver personalized care. IoT is everywhere,

3.   **AI for Healthcare:** AI or augmented intelligence, is a branch of computer science concerned with simulating "intelligent" behavior in computers. In case of AI computer systems are fed with large amounts of data, which they then use to learn how to carry out a specific task. In healthcare, AI is about how doctors enable machines to help them in providing better healthcare to patients. HealthCare sectors are increasingly adopting artificial intelligence to improve patient care and improve process efficiencies. The application of AI in medicine has been expanding in the last few years. Some uses of AI are:

4. **Virtual Nurses for Advanced Personal**: Health Monitoring and Nursing Assistance the AI virtual nurse concept means 24/7 support, quick answers about medications and constant health monitoring.

Surgical Outcomes: The use of artificial intelligence for surgical purposes is probably among the most complicated issues. It includes a sophisticated Approach to the pre- and post-surgical activities and not a mere use of AI Algorithms in app development.

Artificial intelligence (AI), Market is expected to reach a value of $6.6 billion that is with a CAGR of 40%. Around 86% of healthcare organizations, healthcare technology vendors and life sciences companies are already using AI in some form. AI connects the dots between the various innovations we already see, building upon them by making them more efficient, faster, smarter and more sophisticated. With applications such as robot-assisted surgery, virtual nursing assistance, administrative workflow assistance, fraud detection, automated image diagnosis, dosage error reduction and many others, AI is a self-running engine for positive growth in healthcare.

4. 3D printing in the Clinic: 3D printing represents a shift in the healthcare sector, because the technology emphasis on relatively low cost and small size of printers promises to make the technology widely accessible, allowing doctors and researchers to create personalized devices for patients. A physician whose patient experiences pain or has developed an infection from a non-customized prosthetic can now use imaging technology and a 3-D printer to customize a new prosthetic that conforms to the specific shape and movements of the patient's body. This technology is also known as bio-printing, it involves printing human tissue and organs by layering living cells instead of plastic or titanium. While bio-printing remains in the experimental phase, the ability to print human tissue could have a huge impact on such things as pharmaceutical research, transplants, surgical operations and reconstructive surgery.

3D printing has been developed since 1984. The healthcare 3D printing market reached $578 million in 2017 and is expected to increase its value with a 21.2 percent CAGR between 2018

and 2024. Besides the growing R&D investments, a major driver is the increased demand for customization. Personalized prosthetics and organ transplants are in the realm of possibilities because of 3D printing. Apart from customization, 3D printing aids healthcare by providing an alternative for human transplants which could, when the technology is further developed, significantly decrease costs. The technology provides burn victims with the possibility to recover their skin. It also opens the door to simplifying the life for patients who are taking multiple drugs by combining those medications layer for layer and before they are released in the body at different times.

5. Block chain Technology for Healthcare: It is a technology that creates immutable and distributable data records which are shared peer to peer between networked database systems. The technology records digital events in a way that does not allow for the data to be changed or recognized until it reaches the recipient. Block chain technology might just be the solution to the privacy and security issues hindering the digital transformation of healthcare. The block chain healthcare market is currently worth $53.9 million and is expected to reach $829 million in 2023, with a massive CAGR of 72.8%. Block chain system is a boon to the healthcare system as it serves following applications. It helps to manage patient records-compiling episodes, disease registries, lab results, treatments and also these data's can be achieved through block chain, including inpatient, ambulatory and wearable data- assisting providers in coming up with better ways of delivering care. Tracking Clinical Trials and Pharmaceuticals, to Stop Counterfeit Drugs with Block chain technology.

The main constraints faced by E Health professionals in adoption of Workforce 4.0:

Health professionals face numerous challenges to their poor ICTs utilization in daily activities. Some of the important constrains are:

Incentivizing: Incentivizing all the stakeholders involved is a major challenge and raises the question of who will pay the bill since the cost of infrastructure, medical drugs, doctors' fees, and other operating costs could be very high. Hence, there is a need to divide these costs among different entities

Cost Containment: Providing health care to India's population is costly, and introducing ICT would require extra upfront investment. There is a need to manage the costs in such a way that the overall cost of health care goes down. This could be achieved if the overall health care budget includes more money for ICT. An E-Health program would need to generate large numbers of beneficiaries for costs to be justified.

Adoption and Resistance: In India and across the globe, there is reluctance on the part of patients and doctors in fully adopting eHealth. The right kind of technology must be utilized in the right way so patients as well doctors feel comfortable in adopting eHealth practices.

Companies not only have to prepare the best technical systems but also make sure that they are easy to understand and use. Success will require multiple public awareness programs on the benefits of eHealth.

Staffing at Different Levels: eHealth is not just about having technology in place. It should also have an identifiable, approachable and well-qualified human interface. Getting the right people to use these technologies in order to provide proper health care services is very important. Hence, there is a need to hire the right people and train them properly so that they are well equipped to carry out the task of providing health care to remote areas.

Managing Information: The information collected should be media rich (containing video, image, text, etc.). These informations should be properly archived, accessible, retrievable, secure, and readable from remote locations using different technology platforms. "One patient, one record" needs to be implemented, so as to avoid duplication of information. Innovative and cost-effective health informatics solutions need to be created to meet this goal.

Education: E-Health is not just about providing health care service when someone is unwell, but it should also be used to promote preventive health care to improve the standard of living and reduce health care costs in the medium-to-long term. This will also help in improving and enabling higher productivity elsewhere in society. But achieving this requires bringing people into the system and educating them about the different preventive measures to avoid disease outbreaks like H1N1 or other seasonal diseases.

Conclusion: The level of sophistication in the healthcare sector is not only requires a high level of technological transformation but a shift in mindsets. At present, fragmentations in the sector don not allow a seamless experience for patients who have to go through multiple parties and struggle with storing their medical records. ICT can support improvements in the quality of health care by helping to increase the qualifications and skills of health professionals and thereby improve the delivery of health services. However, access to information may not be sufficient in and of itself. Health professionals need to gain an understanding of how to evaluate, interpret, and apply this information to their specific practice The complexities involved in the healthcare sector would need to be untangled if we want Healthcare 4.0 to become a reality.

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