

ADOPTION OF NEW TECHNOLOGIES IN HEALTHCARE AND ITS IMPACT ON QUALITY OF CARE





INTRODUCTION

- The technological innovation, more specifically the digital revolution, is deeply changing the way healthcare processes are managed, promoting cooperation of several healthcare players. Healthcare processes strongly rely on both information and knowledge (Lenz et al., 2012; Lenz and Reichert, 2007).
- Technological developments in healthcare have saved countless patients and are continuously improving our quality of life. It has brought about a massive and welcome change to the healthcare industry. Patients now have access to some of the best diagnostic tools, new and cutting-edge treatments, and a myriad of minimally-invasive procedures resulting in less pain and quicker healing.
- The future of healthcare is shaping up with advances in digital healthcare technologies, such as artificial intelligence, VR/AR, 3D-printing, robotics or nanotechnology.
- From real-time diagnoses aided by machine learning to wearable devices that track and transmit patient data from a distance, a host of new and evolving technologies are poised to influence care delivery.

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- According to a study from the University of Michigan, shifting from paper to electronic health records reduced the cost of outpatient care by 3%. These researchers estimated this as \$5.14 in savings per patient each month. In a large city hospital network, that amount is incalculable.
 - Along with the opportunities that technology brings, there are some challenges that need to be addressed too such as increasing cyberattacks, patient's data breach, application management, training of staff with digital & artificial learning etc.
 - In 2015, hackers stole records for almost 80 million Anthem customers and employees, the second-largest health insurance company in the US. Only names and addresses were stolen, (no details of illnesses or treatments were exposed), but if this can occur to an insurance giant such as Anthem, it raises questions about how safe patient records really are in a local clinic.
 - Technological developments are better adopted into the healthcare fields in some parts of the world than others. Developed nations have been able to harness technology more efficiently for improved patient care; however, developing nations are catching up quickly. Healthcare providers who haven't yet adopted the tools technology places at their disposal are realizing their vast untapped potential and are making the changes and the investments required to streamline processes, lower costs, increase efficiency and most importantly, to improve quality of care.

OBJECTIVE

General objective:

To study the impact and challenges of technological advancements in healthcare industry.

Specific Objectives:

- To study the impact of technology on quality of care
- To study the challenges in adoption of technology to patients
- To study the challenges in the adoption of technology by health professionals.

METHODOLOGY



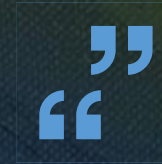
Descriptive research methodology is used in this study



Secondary data was collected from the internet using search engines like Google scholar, PMC and PubMed



Only those articles/papers/researches which are peer reviewed are taken in this paper



Sources used in the research are selected based on some criteria, first is source should be authentic and renowned and the second is source must be in line with the objective of the study



The inclusion criteria for studies that has been taken includes, peer reviewed articles/papers and the time frame of 2016-2021

Only those literatures and papers that were thematically aligned with the research question and which have met the inclusion criteria were included and summarized

Literatures are not excluded based on which type of data has been used, both qualitative and quantitative data type are included if they are aligned with the proposed research question

Key words that has been used to locate different articles are *Healthcare IT, Technology and care, Quality of care, Technology adoption, IT adoption, MIA, EHR, EMR etc.*



LITERATURE REVIEW



Title of Paper	Authors	Year of Publication	Data Size	Key Findings
Impact of Longitudinal Virtual Primary Care on Diabetes Quality of Care	Lu, A.D., Gunzburger, E., Glorioso, T.J. <i>et al.</i>	2021	Patients with diabetes who received care at VA primary care clinics between January 2018 and December 2019	- Telemedicine strategies confer modest improvements to glycemic control with minimal effect on blood pressure - Social and behavioral determinants of health likely contribute more to intermediate and long-term diabetes outcomes than the modality of care delivery
Factors Impacting Clinicians’ Adoption of a Clinical Photo Documentation App and its Implications for Clinical Workflows and Quality of Care: Qualitative Case Study	Jacob C, Sanchez-Vazquez A, Ivory C	2020	20 in-depth interviews with mHealth providers, clinicians, and medical informatics experts from 8 clinics and hospitals in Switzerland and Germany.	- The use of mHealth in clinical photo provides benefits such as time-saving and efficacy, better patient safety, quality of care, enhanced data security and better accessibility - Important factors that contribute to hinder adoption are material nature of the tool, such as the perceived usefulness, ease of use, interoperability, cost, or security of the app, or social aspects such as personal experience, attitudes, awareness, or culture
Implementation of Telehealth Resources in Primary Care in Brazil and Its Association with Quality of Care	Alaneir de Fátima dos Santos, Anthonio Thomaz Gonzaga	2019	A cross-sectional study analyzing data from interviews with 29,778 primary care team professionals in Brazil	- Only 50.1% primary care units had internet access, and 32.71% of teams claimed to be involved in telehealth actions. - The highest magnitude was observed for the association between employment of telehealth and improvement in childcare, followed by diabetes mellitus care, hypertension and finally, women's health.
Artificial Intelligence and the Future of Primary Care: Exploratory Qualitative Study of UK General Practitioners’ Views	Charollete Blease, Ted J Captchuk, John D Halamaka	2019	Web-based survey of 720 UK General Practiconers	- Perceived limitations included the beliefs that communication and empathy are exclusively human competencies - Perceived benefits of technology included expectations about improved efficiencies, reduction of administrative burdens on physicians

The Effects of Public Concern for Information Privacy on the Adoption of Health Information Exchanges (HIEs) by Healthcare Entities	Pouyan Esmaeilzadeh	2018	An online survey in the United States using 826 samples	- Perceived health information sensitivity and computer anxiety meaningfully contribute to information privacy concerns and CFIP construct significantly impedes consumers’ opt-in decision to HIEs - Perceived poor health status considerably attenuates the negative effects exerted by CFIP on opt-in intention.
Understanding factors influencing the adoption of mHealth by the elderly: An extension of the UTAUT model	Rakibul Hoque, Golam Sorwar	2017	A face-to-face structured questionnaire survey method,data from nearly 300 participants of age 60 years and above from the capital city of Bangladesh.	Performance expectancy, effort expectancy, social influence, technology anxiety, and resistance to change ($p < 0.05$) had a significant impact on the users’ behavioral intention to adopt mHealth services.
Examining individuals’ adoption of healthcare wearable devices: An empirical study from privacy calculus perspective	He Li, Jing Wu, Yiwen Gao, Yao Shi	2016	Data collected from a survey. The sample covers 333 actual users of healthcare wearable devices.	- Individuals’ decisions to adopt healthcare wearable devices are determined by their risk–benefit analyses - Individuals’ perceived privacy risk is formed by health information sensitivity, personal innovativeness, legislative protection, and perceived prestige
Investigating the Challenges and Opportunities in Home Care to Facilitate Effective Information Technology Adoption	Güneş Koru, Dari Alhuwail, Maxim Topaz, Anthony F. Norcio, Mary Etta Mills	2016	Semistructured interviews, participants recruited from 13 local HHAs in one of the states in the United States.	- Coordinating clinical and administrative workflows, Hiring, training, scheduling, and retaining qualified personnel constituted important challenges - Inadequate access to patients' medical history and difficulties with medication reconciliation detracted from the quality of care - Training and educating patients, caregivers, and families hold important opportunities for improving the quality of care

A network diagram consisting of several nodes (small circles) connected by lines, forming a complex web. The nodes are positioned at various heights, creating a three-dimensional effect. The background is dark and textured, possibly a wooden surface. The word "DISCUSSION" is overlaid in white, sans-serif capital letters, centered horizontally and partially obscured by a vertical white line on the left.

DISCUSSION

IMPACT OF TECHNOLOGY ON QUALITY OF CARE

TECHNOLOGY	IMPACT
Telemedicine	• Cost effective • Immediate emergency assistance • Accessibility • At present, Apollo Telehealth runs around 700 healthcare centers in Public–Private partnership mode across India and significantly spread across various states, touching more than 11.4 million lives.
Health apps	• Monitor health and disease • Drug dosing recommendations, test results, vaccine certification etc. • IQVIA conducted a study to assess the impact of consumer-focused health apps on the healthcare system in 2015 and concluded that the use of health apps and wearable devices could potentially save the U.S. healthcare system \$7 billion per year • This analysis centered on diabetes prevention, diabetes care, asthma, cardiac rehabilitation, and pulmonary rehabilitation, but it was concluded that if health apps were used across all diseases, that the healthcare system could potentially save \$46 billion in annual cost
RFID Technology	• RFID tags provide quality information on whereabouts of a patient • RFID tags can also be used to check waiting time of patients, logistics of blood related products and they are also a part of quality control.

e-Prescribing

- Enhance clinical decision support
- Information about formularies, dosing and frequency of such formularies, checking for allergies to medications, drug interactions, avoidance of therapeutic duplication, and maximum or minimum doses
- Provide computer-based support for creation, transmission, dispensing, and monitoring of drug therapies
- reduce clinical risk management and provide operational efficiency

Big data & Cloud

- Integration of data to provide better clinical outcomes
- Preventive medicine
- Cloud technology is integrated with EMR and HER
- Reduction of adverse medication events
- Population health

Patient Portals

- Easy accessibility to medical records
- Streamline workflows within medical facilities and improves efficiency
- Single point of all data

Clinical information system

- Collect aggregate data
- Use coded terminologies
- Clinical analytics
- Without a CIS, clinicians must collect most of the measurements and record them on paper-based 24-hour 'ICU flow charts
- ICU clinical information systems are well established and used routinely in many parts of the world



Improving population-health management

Improving operations

Strengthening innovation

CHALLENGES

The Challenge
Of
Interoperability

Cyber attack risk

Security & data
privacy

Training of staff

Affordability

User-Unfriendly
Interfaces

High performing
and high-quality
solutions

Overall
Implementation

CONCLUSION

- The introduction of various forms of digital technology resulted in improved quality of service delivery, readiness, accessibility, affordability and accessibility to healthcare in various countries. For example, the use of virtual consultation has led to reduced hospital admissions which resulted in decrease of unnecessary hospital burden as well as death rates in patients with heart disease and diabetes
- The introduction of digital medical technology can lead to better access to public health care. It includes access to open health information, treatment, problems, and the latest advances in biomedical research.
- Although there is a lot of encouragement towards technological advancement in healthcare industry, a lot of challenges still persists
- In summary, the digital revolution has reshaping health care systems around the world for good. The future of healthcare is better but a concrete system and planning is required to make it happen. As challenges of implementing technology is not large in number but has very serious impact if any loophole is there. The correct implementation with proper research is a way forward



THANK YOU

