

Summer Internship
At
IIHMR, Delhi
(April 1 to May 31st, 2020)

A Report
By
Rekha Grover

POST- GRADUATE DIPLOMA IN HOSPITAL AND HEALTH MANAGEMENT
2019-2021



ACKNOWLEDGEMENT

Foremost, I would like to express my sincere gratitude towards **my family & faculty of IIHMR, DELHI** for their kind co-operation and encouragement which help me in completion of this project. I would like to express my special gratitude and thanks to institute persons for giving me such attention and time.

I would like to express my gratitude to my mentor **Ms. Divya Aggarwal** for the continuous support on my summer internship study and research, for her patience, motivation, enthusiasm, and immense knowledge. Her guidance helped me in all the time of research and writing of this report. I could not have imagined having a better advisor and mentor for my summer internship.

My thanks and appreciations also go to **my batch mates** in developing the project and people who have willingly helped me out with their abilities.

DECLARATION

I, **Rekha Grover** hereby declare that this Internship Assignments entitled **“Summer Internship Report”, A. Case Study on ACCESS Health International B. Digital Health (Program of Access Health) C. Comparative Study- Barriers in adoption of Telemedicine D. Narrative report on How Artificial Intelligence contributed in tackling COVID-19 Pandemic** is the outcome of my own study undertaken under the guidance of Ms. Divya Aggarwal, IIHMR- Delhi. It has not previously formed the basis for the award of any degree, diploma, or certificate of this Institute or of any other institute or university. I have duly acknowledged all the sources used by me in the preparation of this field internship report.

Date: 3 July, 2020

Sign: Rekha

Postgraduate Diploma in Hospital and Health Management

International Institute of Health Management Research

New Delhi

CERTIFICATE OF COMPLETION

This is to certify that **Rekha Grover** (PG/19/068) student of Post Graduate Diploma in Hospital and Healthcare Management (PGDHM) from International Institute of Health Management Research, New Delhi has undergone the summer internship assignments at IIHMR, Delhi from 1st April to 31st May 2020. The Candidate has successfully carried out the study designated to her during internship training and her approach to study has found to be a committed, sincere and diligent student who has a strong drive & zeal for learning. The Internship is in fulfillment of the course requirements. We wish her all the best for future endeavors.

Dr Pradeep K Panda

Dean- Academics & Student Affairs
IIHMR, Delhi

Ms. Divya Agarwal

Associate Professor
IIHMR, Delhi

CERTIFICATE OF APPROVAL

The following Summer Internship Project titled “**Summer Internship Report**” at “ **IIHMR DELHI**” is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the report only for the purpose it is submitted.

Name of the Mentor- Ms. Divya Agarwal

Assistant Professor

IIHMR, Delhi

FEEDBACK FORM

Name of the Student: Rekha Grover

Summer Internship Institution: IIHMR, Delhi

Area of Summer Internship:

Attendance:

Objectives met:

Deliverables:

Strengths:

Suggestions for Improvement:

PLAGIARISM REPORT

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ORIGINALITY REPORT			
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ACRONYM

PMJAY	Pradhan Mantri Jan Arogya Yojana
NDHB	National Digital Health Blueprint
ADL	Activity of Daily Living
AI	Artificial Intelligence
ML	Machine Learning
DL	Deep Learning
DNN	Deep Neural Network
CNN	Convolutional Neural Network

Case Study- ACCESS Health International

Introduction

ACCESS Health International is a non-profit think tank with advisory group and implementation partner. Goal of this organization is to provide and healthy and productive lives for everyone. Dr. William A Haseltine (renowned scientist, businessman and philanthropist) co-founded ACCESS Health in 2007. Headquarter is in New York, USA. Globally they have contributed in 20+ Projects, they have 100+ global partners and 125+ publications. ACCESS Health began with a single office in Hyderabad, India in 2007. It has now expanded across the globe with offices in many of the major cities of the world, including New Delhi, Singapore, Beijing, Shanghai, Manila, and New York.

Vision and Mission

Mission - Improve access to high quality, affordable healthcare for people everywhere

Vision - Everyone, everywhere in the word has the right to access high quality and affordable healthcare.

Where we work

Current Offices

India – ACCESS Health India works for the benefit of all Indians by creating system level change ACCESS HEALTH India focuses on issues at the system level and working in collaboration with national researchers, government and donor organization. Main area of research focuses on Building blocks of healthy nation are health policy, Health insurance, health finance, healthcare delivery system

China- ACCESS Health China Committed towards transformation of health system through Innovation. Programs in China include Health Futures and Modern Aging

Southeast Asia - ACCESS Southeast Asia office is a catalyst for innovative health solutions. With an extensive network of public and private partners provide collaborative cross industry partnership opportunities. Programs of Southeast Asia include- Fintech for Health, Health Futures, Modern Aging, Bone Alliance Singapore

Philippines- ACCESS Health Philippines is a trusted partner of Philippines Department of Health. Works to close gaps in access to affordable and high-quality Healthcare. Programs mainly include Global Health Emerging Leaders

United States – ACCESS Health United States assembles and implies the best practices in health and shares with healthcare leaders worldwide. It works on strengthening health system for everyone of all ages in United States.

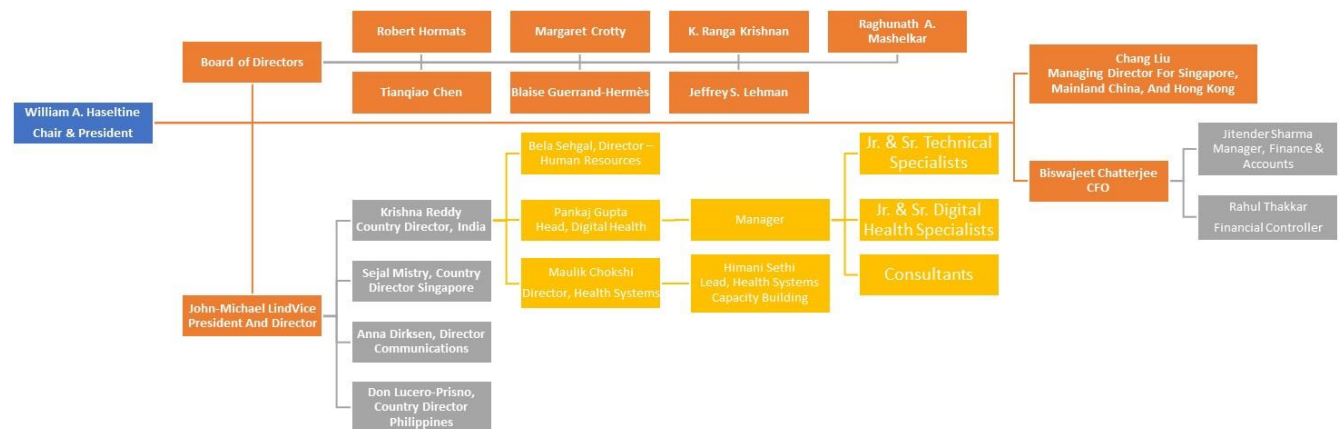
Former Offices

Morocco- Access Health's work in Morocco involved in providing information regarding best practices to Morocco Health System

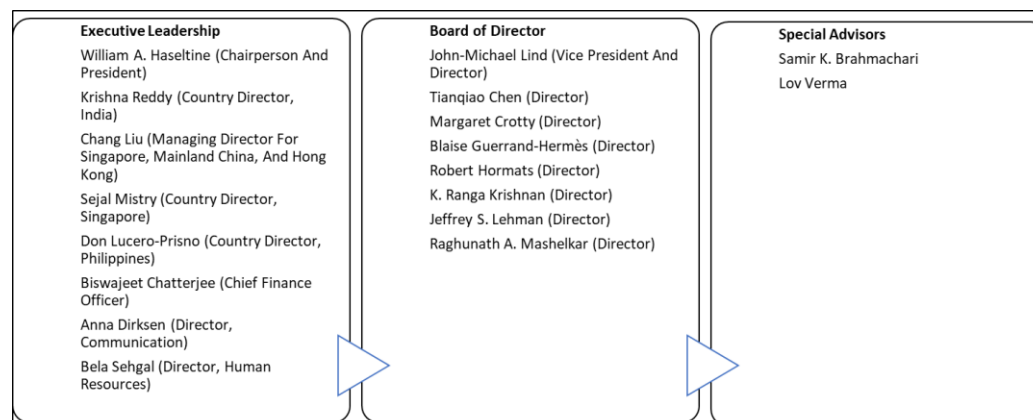
Northern Europe- ACCESS Health helped to create detail study of market opportunities in Northern Europe including highest quality healthcare system in the world.

Sweden- ACCESS Health Sweden provide research on improving the elderly care

Organogram



Leadership of ACCESS Health International



Roles and Responsibilities

- 1.To establish of digital health partnerships with government and the public and private sectors, as well as with research and development organizations.
- 2.To develop a set of guidelines to help policymakers understand the role.
- 3.Responsible for health and aging innovation platforms and leads research and consulting work in the region.
- 4.Collaborations with governments and external organizations for health systems strengthening.
- 5.To provide the technical and programmatic leadership for policy work.
6. To support the development of a health financing strategy that will meet the needs of government, public, private, and academic partners

Flagship Initiative

- Digital Health** - Access Health created a new program of ACCESS Health Digital. Main objective of Digital health is to support all the efforts and activities of Indian government to achieve Universal health coverage by different and innovative platform of digital technologies in Healthcare. In 2017, National Health Policy was introduced by Govt of India and universal health coverage concluded as a goal. To achieve this goal, Govt introduced National Health Insurance program called Pradhan Mantri Jan Arogya Yojana (PMJAY) or Ayushman Bharat. Impact of ACCESS Health Digital made a digital health strategy of six pillars and work toward transformation of Health system. For this Govt of India also launched Nation Digital blueprint which validates the six-pillar strategy. Continuous implementation of new digital health strategy and to further refine the strategy ACCESS Health work jointly with Govt of India
- Payers of Health-Fintech for Health** – Donors and partners of this program- MetLife Foundation. The program objective is to improve engagement between Fintech and health tech, generates knowledge of best practices and implementation of health projects and facilitate partnership among different sectors to provide financial solutions for healthcare industry. There is tremendous financial burden on the people due to Out of pocket expenditure in healthcare. This program enables the cocreation and launch of 9 projects for 5 lakhs of low- and moderate-income group among different countries which includes Bangladesh, China, India, Malaysia, Nepal and Vietnam. MetLife Foundation had partnership with ACCESS Health to help people afford and access quality of care with the innovative measures.
- Elderly and Long- term Care** - Donors and partners of this program - Arthur D. Little, Gary Weber, Haseltine Foundation for Science and the Arts, Swecare Program objective is to understand, analyse best practices and help in implementing better and effective way of providing care to elderly and people affected with Dementia. ACCESS Health interviewed more than 60 pioneers in elderly care and Dementia care for 3 years in Asia, the United states and Northern Europe. Impact was that it provided best innovative solutions in providing care to the individuals living with Dementia. ‘Voices in Dementia care’, ‘Aging with Dignity’ and ‘Aging Well’ are the 3 major books which published after research and it provides the glimpse of challenges in elderly care are Healthcare Delivery Systems - There is a need for global health leaders to meet the day to day health challenges. To achieve this, Philippines team launched a new “Global Health Emerging Leaders” program in 2019 in Hangzhou, China at Zhejiang University. This course was inspired by global course launched by ACCESS health Philippines in 2015. This initiative helped in developing new leaders with the skills of critical thinking, Innovative solutions, armed with latest information, new technologies, program management. Impact of this program is in 1st year, ACCESS health organized workshops in China, Egypt and Nigeria. Graduates from global health course inspired our new program and influenced the new policy and which further applied to locally, nationally and internationally for the welfare of people. Research projects with aim to provide better health outcomes for all people and to reduce inequities.
- Healthcare Futures** - Health Systems are the foundation of society on upon which all other improvement can be done. Traditional system of health includes the idea of patient care in hospital but due to changing needs and demands of society, risk of chronic disease has increased tremendously. ACCESS Health believes healthcare system is patient centred and community based. ACCESS Health developed this program called Health Futures, it bring together all the industry partners, investors,

service providers, institutions, research organization and academia members and they all together explore and provide new models of better ways of distributing care and health financing that serve for the wellbeing of society. In addition to Singapore, the Health Futures Network was rolled out in China with locations in Shanghai and Beijing). Through the ACCESS Health offices in Delhi and Hyderabad the Health Futures network now covers most of Southeast Asia and beyond.

- **Bone Alliance Singapore-** Around 200 million older individuals got affected globally due to poor bone health and can lead to disability, injury, chronic pain and premature death. In Singapore, number of hip fractures has been rising tremendously and impact of this not only physical disability, but it further leads to the limitation of person's ability to work, travel and Activity of daily living (ADLs). ACCESS Health Singapore is driving a new bone health initiative to improve awareness among people and to build new partnership, ecosystem and communities to practice for better bone health. ACCESS Health and Alliance partner come together to provide solution for early identification of Osteoporosis and innovative solutions that close the fracture gaps and increase awareness of bone health. Impact of this program is alliance members are more focused on increasing preventive initiative to preserve bone health and timely intervention to prevent further complications. All the members provide solutions and contribute towards policymaking and to improve patient experience.
- **Primary Care Pilot Program-** Primary care is the main backbone of efficient health System. It is the also often First point of contact with healthcare System. Adequate Primary care can help to identify the illness at its onset or early stages and can reduce burden of high hospitalisation rates, burdensome out of pocket expenditure and other poor health outcomes. Access health And Indian School of Business are working with Bill Melinda Gates to design and assist the development of transformative primary care program. Main aim of program is to improve effectiveness and efficiency of healthcare system and health services. It uses private sector skills and resources to manage healthcare delivery in public sector. Pilot program is showing success, a full accounting of our impact of this ongoing program based on health outcomes and data over a longer length of time is still forthcoming
- **Saving Care, Saving Lives-** Donor and Partners include Department of Health and Family Welfare, Government of Telangana, Department of Health and Family Welfare, Andhra Pradesh, Dr. NTR Vaidya Seva Scheme, Andhra Pradesh, Aarogyasri HealthCare Trust, Telangana, Children's Investment Fund Foundation. Around 650,000 newborn babies die every year in India. It is the highest number of newborn deaths in the world. To address this issue ACCESS Health International and the public health insurance program in Andhra Pradesh, Aarogyasri Health Care Trust, introduced a program called Safe Care, Saving Lives for improvement in quality. The program targeted to reduce the neonatal and perinatal mortality rate by fifteen percent over a four-year period through quality improvement. ACCESS Health International's team of quality improvement experts developed a Quality Improvement Kit for Safe Care, Saving Lives and addresses and focuses on the three major causes of neonatal mortality: sepsis, birth asphyxia, and complications due to premature birth. During the four-year program, in its first year, the Safe Care, Saving Lives program helped thousands of newborns in intensive care units across the two Indian states. ACCESS Health is now working with several other state governments who are attempting to replicate the program.

HR Policies

- ACCESS Health International provides flexible environment for employees and when new employees join this organization, orientation given to them on the first day. HR head address them and guides them about various policies and programmes of organization.
- Proper training program organized by senior leadership and make them understand about work, work culture. So that they can gel well in the organization.
- There is a policy of reimbursement, any money spent by any employee on any of the official work are reimbursed by providing them a template every month which employees have to fill in order to get the reimbursement
- There is a policy of Sexual harassment in which separate team including one lawyer handles all the issues, if required
- ACCESS health international provides Health insurance to its employees, if any of the employees are admitted to the hospital
- There is some flexibility towards employees, and they are allowed to work one day from home out of 5 working days.
- They also hire employees on the contractual basis for one year.

Communication Channels

- ☐ In ACCESS Health International, there are different types of Communication channels with customers
- ☐ Different market experts, organization leaders, entrepreneurs and stakeholders all involved into various events like conferences, webinar, summit to communicate with customers
- ☐ Facebook, LinkedIn, Twitters are the social platforms to share information and exchange experiences among different customers
- ☐ Annual conferences and Annual meet to provide platform for different new researches and share ideas, information among different experts.
- ☐ Interviews with experts to understand the challenges in health domain and act accordingly to deal with this.
- ☐ There are many other communication channels which include Seminars, Contracts, Publications, Brochures, Presentation, Emails etc.

Expenses and Revenues

Expenses	USD	Revenue	USD
Program related Expenses	65,62,972	Individual/Others	40,32,670
Management and General Expenses	730975	Governments	1,447
Fundraising Expenses	2,60,953	Corporations	2,50,000
Foundations	97,54,341		
Total Expenses	\$7,554,900	Total Revenue	\$14,038,458

Contribution towards Covid – 19

There are number of events going at this time of crisis to curb the outbreak of Coronavirus

1. Dr William Haseltine had a conference call with the Common Good on 6th Apr 2020 to discuss “The Medical Response to Coronavirus”
2. ACCESS Health hosted web training program for public Health Experts with China's National Health Commission, the China Primary Health Care Foundation on 2 April 2020.
3. Health Futures webinar: Business Responses to Covid-19 conducted on 24 Mar 2020 to understand best strategies for health and wellness of employees.
4. On 12 Mar, 2020 there was a long live discussion was done with Tech Care for all about the “ Covid - 19-preparing for pandemic” which includes how should health system respond to this pandemic, what measures health providers should take, etc.
5. Webinar on “Technology for pandemic preparedness and Response” conducted on 6 Mar 2020.

“All people no matter where they live, no matter what their age, have the right to access high quality and affordable healthcare and to lead healthy and productive lives”

References

- <https://www.linkedin.com/company/access-health-international/about>
- <http://fintechforhealth.com/>
- <https://accessh.org/wp-content/uploads/2017/09/ANNUAL-REPORT-2017-Finalcompressed.pdf>
- Telephonic communication with employee of Access Health International

Digital Health

(Current Program of ACCESS Health International)

ACCESS Health International is a non-profit think tank with advisory group focused on improving access to high quality and affordable healthcare to everyone. Multiple number of programs have been undertaken by ACCESS health International to improve healthcare system. All the programs are dedicated towards providing affordable and quality healthcare to people.

Digital Health, ACCESS Health Digital One of the current programs of ACCESS Health International is Digital Health contributed towards improvement of healthcare system.

Background

In 2007, the Government of India introduced a National Health Policy which set universal health coverage as a goal. National Health Policy – The Policy includes as its goal the attainment of quality level of health for all at all ages, with preventive and promotive healthcare orientation in all development policies. This led to the launch of health insurance program called Pradhan Mantri Jan Arogya Yojana (PMJAY), also known as Ayushman Bharat and it promises to provide free health coverage to bottom 40% poor and vulnerable population at the secondary and tertiary level. It helps Indian citizen to access equitable and efficient healthcare, available anytime and anywhere. To achieve the universal health coverage with the help of digital technologies and to support the efforts of the government, ACCESS Health launched a new program called **ACCESS Health Digital**

Objective

The main Objective of this program is to act as a catalyst and provide support the Government in transformation of healthcare system. To make the healthcare system accessible and affordable, it is required to deploy digital technology successful in the healthcare system. ACCESS Health Digital provide different strategies for digital health initiatives of access Health. The main intent of this to support the government and facilitate coordinated pathways to achieve the goal of rationalised and sustainable Universal Health Coverage. ACCESS Health Digital is developing new best approached with their digital team to fill the gaps between healthcare providers, payers, and the government. ACCESS Health Digital developed a wide-ranging strategy with continuous research, advocacy and strategy advisory services which provide new way for Indian Health system to leverage any innovation in technology and transform into digitally driven healthcare system

Impact of ACCESS Health Digital

ACCESS Health Digital developed a six-pillar digital health strategy towards transformation of health system. The Government recently launched National Digital Health Blueprint (NDHB) validates the six-pillar strategy that ACCESS Health advocated for. ACCESS Health digital continues to work closely with government of India to improve strategies and implement new ideas and taken new steps for the development of new digital strategy of India.

Roles and Responsibility in ACCESS Health Digital

- Pankaj Gupta- Head, Digital Health- Dr Pankaj Gupta is responsible for implementing digital technology in healthcare system and introducing digital health across all programs and activities in India. Main responsibility is to establish digital health

partnership with government and the public and private sectors as well as with research and development organizations. He has contributed in healthcare for more than two decades and worked in the field of pharmaceutical technology field and has held leadership roles in Asia, the United States and Canada.

- Krishan Bhardwaj – Digital Health Architect- Responsible for work on the design of integrated health insurance system for Universal Health coverage and developing health data dictionary and providing national registries for India Health domain.
- Priyanka – Digital health Specialist - Responsible for developing and implementing digital health strategies. Providing technical support for different technologies being used across all initiatives and health domains. Also responsible for implementing functional design for technology-based components
- Ved Prakash- Digital Health Specialist- Responsible for providing technical expertise on design and development of digital health solutions across projects.
- Apoorva Sharma, Digital Health Specialist - Responsible for technical implementation, designing and providing solutions for NDHB building blocks based on microservices architecture for Digital health for ACCESS Health India.

Digital Health, Fintech for Health - Fintech for Health is to provide digital financial services to help people so that they can afford and access health.

Donors and partners of this program- MetLife Foundation.

Background

Due to huge amount of out of pocket spending on healthcare is one of the greatest threats to financial system of all the people around the world. In 2019, ACCESS Health had partnership with MetLife foundation to create a Fintech for Health Innovation Platform to assist people pay for and access the care they need, when they need it.

Objective

This platform is focused on six market across Asia: Bangladesh, china, India, Malaysia, Nepal and Vietnam. The program objective is to improve engagement between Fintech and health tech, generate knowledge of best practices and implementation of health projects and facilitate partnership among different sectors to provide financial solutions for healthcare industry. These projects will be tested and scaled to help people pay for and afford the care they need, using digital financial services and a financial inclusion approach. The platform will also encourage cross-sectoral innovation in healthcare access and affordability and get involve in research on best practices of models that require finance services and healthcare innovations.

Impact

Over three years, this program has enabled the cocreation and launch of 9 projects for 5 lakhs of low- and moderate-income people among all the 6 countries- Bangladesh, china, India, Malaysia, Nepal and Vietnam.

ACCESS Health India Perspective towards how digital technology drive access to healthcare

Indian Healthcare system is fragmented, the country is too diverse and large for single unified system. The states are responsible for arranging and providing health services to their residents. State can independently take their decision and show better outcomes. Digital technology is a binding force between three major stakeholders in health sector namely Payer, Provider and People. The National Health Insurance program called Ayushman Bharat is becoming the melting pot for public and private healthcare and emerging as the biggest driver for digital health. Digital technology is driving many aspects of life. Technology driven transformation has already been carried out in sectors like Banking, Education, e-Governance, Mobile, Telecom. Healthcare is likely to go through a transformation with digital solutions and innovations.

Digital Technology is required to standardize all operations in healthcare system. There must be standard protocols and procedure while treating, diagnosing and testing. There is a need of central Registries with Unique Identification of patient and reference data dictionaries to standardize diagnosis, prognosis, radiological exams, laboratory tests, procedures and drug prescriptions. This should be shared and made available amongst all healthcare providers to maximize the benefit and reach. India, where out-of-pocket health spending was 69.1 percent of the total health expenditure. It must be handled intelligently while distributing the financial burden with the help of insurance to enable healthcare access for all. To provide insurance across diverse population and simultaneously process claims with higher success rate, there is a need of high-end technology in this domain. We need a Standardized Claims format. The TPA market in India requires XML based standard claims wrapper object that makes system easily communicate with Hospital HIS/EMR world and Health Insurance world in a Standardized format.

Globally, winds of change are evident. Digital technology has drastically changed the way of Health insurance business. Start-ups based on AI are working on Metadata driven billings, claims, fraud detection, Claim Adjudications and providing discharge summary. In India, many sectors have already advanced in technology like Telecom, Fintech. Now Healthcare is the sectors which is taking shape and digital Healthcare system improve the health status.

References

- <https://accessh.org/>
- <https://www.linkedin.com/in/drpankajgupta/>
- <https://www.linkedin.com/in/accesshdigital/>

Comparative Study- Barriers in adoption of Telemedicine

Introduction

Health is a basic human right and to make the healthcare system accessible and affordable, it is necessary to deploy digital technology successfully in the healthcare domain. Telemedicine is one of the platforms driven by technology that enables easy access of healthcare services for everyone. World Health Organization defines Telemedicine as “*The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities*”. Different approaches used for Telemedicine include audio, video, text, Email, SMS. There are four main elements of Telemedicine – to provide healthcare service to remote areas, to use information communication technology, better health outcomes, support healthcare system. Telemedicine is the need of hour in order to achieve affordable and accessible healthcare for everyone. Categories of Telemedicine include Telenutrition (Remote consultation by Nutritionist), Telenursing (Nursing services with information and technology), Telepharmacy (delivery of pharmaceutical care via telecommunications), Teledentistry (remote dental care), Teleneurology (Neurology care using mobile technology), Telerehabilitation (Rehab services using telecommunication), Telecardiology (ECG can be transmitted through mobile) and many more. Telemedicine has different barriers and opportunities. Different measures have been taken worldwide to fight against the barriers of Telemedicine. Telemedicine has immensely contributed towards providing health services across various geographies amidst Covid-19 crisis.

Objective

To study the comparative analysis of various barriers encountered while adopting Telemedicine across 5 different countries.

Methodology

We have carried out a systematic and detailed review of available literature. Search strategies were used to identify studies regarding use of Telemedicine in disease management of last 10 years. This search included ProQuest, Google, PubMed, reports from national government regarding guidelines of Telemedicine (NITI Aayog). We have included 5 different variety of articles. Relevant search terms containing combination of Telemedicine or Telehealth, Barriers, Challenges were used.

Review of Literature

S. NO	Study	Author	Methodology	Result	Conclusion
1	Successes and challenges in the	El-Mahalli, Azza Ali, MD,	Cross Sectional Study: Total	Majority of Patient adopting telemedicine	Respondents were interested in learning and how

	implementation and application of telemedicine in the eastern province of Saudi Arabia	PhD; El-khafif, Sahar Hafez, PhD; Al-Qahtani, Mona Faisal, PhD	252 participants at KFHU Hospital to determine the perception regarding benefits and challenges of Telemedicine	were male, Not affected by demographic characteristics, Implementation more among health professionals those with more than 20 years of experience	to implement Telemedicine; For participants adopting Telemedicine, most frequent barrier was lack of knowledge
2	Crossing the Telemedicine Chasm: Have the U.S. Barriers to Widespread Adoption of Telemedicine Been Significantly Reduced?	Cynthia LeRouge1,* and Monica J. Garfield2	Systemic Review of different barriers and advancement of Telemedicine		Adoption of Telemedicine can lead to improvement in health status, lower costs and provide greater equity in healthcare delivery system.
3	Telemedicine: The legal framework (or the lack of it) in Europe	Vera Lúcia Raposo	Systematic review		It is difficult to make common framework for Europe for Telemedicine due to several disparities
4	Barriers and opportunities to implementation of sustainable e-Health programs in Uganda: A literature review	Kiberu, Vincent M; Mars, Maurice; Scott, Richard E	A structured online Literature review of e-health in Uganda	Most of the m-health Application were piloted as a part of NGO projects	Conclusion- For implementation of e-health, better planning and structured approach is needed. for example, strategy and need readiness assessment.
5	Telemedicine in India:	Chandwani, Rajesh K;	Systematic Review		Telemedicine is a platform which

	current state, challenges and opportunities	Dwivedi, Yogesh K			can improve quality, affordability and access of healthcare for all.
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Telemedicine in Saudi Arabia

Implementation of Telemedicine in Developing countries like Saudi Arabia is highly effective because of lack of healthcare professionals, financial problems and lack of resource availability. Telemedicine is providing platform for large population to avail health services at affordable price. Along with the huge opportunities come various barriers, some as given below

- Lack of knowledge about services
- Lack of availability of information through public channels like seminars, webinars
- Unaware, how to use store and forward technology
- Technically challenged staff

Telemedicine in USA

In USA, Telemedicine has already revolutionized health care field and many new advancements in technologies are shaping the future. Insurers are also providing support to telemedicine but still there are many barriers in telemedicine –

- Legal Standards
- Finance
- Resistance to change
- Technology investment
- Resistance from provider
- Overdependence on clinicians

Telemedicine in Europe

In Europe, Telemedicine provide several benefits for both patients and healthcare providers. It has played a big role in development of medicine in Europe and provided platform for remote group collaboration. Also, remote practitioners have been able to provide quality services to patient. Despite these benefits, we observe some barriers

- No specific regulation/ Legal regulation on Telemedicine
- Trust issues on Telemedicine
- Complexities of technology

Telemedicine in Africa

Telemedicine is effective in providing services with reduced cost & flexible access but there are multiple barriers challenging its growth –

- Lack of planning in implementation

- High Cost involved in internet bandwidth
- Financial Issues

Telemedicine in India

In India, there is a disease burden on society due to less manpower, infrastructure in health system; Telemedicine is effective platform for providing better treatment, diagnosis. Many patients who availed telemedicine in India at All India Institute of Medical Sciences, Delhi have expressed satisfaction with the services in terms of time and money. It has been used in India at a large scale. -Barriers observed in India –

- Issues in policies made by Govt and no standardization of Data Privacy Policy
- Issues at the resource level
- Socio-culture issues
- Infrastructure lack in broadband

Comparative analysis of different barriers of Telemedicine in 5 Countries

Countries	Different Barriers
Saudi Arabia	Lack of knowledge about services, Lack of availability of information through seminars, webinars, Unaware, how to use store and forward technology, Technically challenged staff
Africa	Lack of planning in implementation, High Cost involved in internet bandwidth
Europe	No specific regulation on Telemedicine, NO trust on Telemedicine, Legal regulation, Complexities of technology
USA	Legal Standards, Finance, Resistance to change, Technology investment, Resistance from provider, Overdependence on clinicians
India	Policy formulation issues, Resource development & allocation issues, Socio-cultural issues, Lack of infrastructure in internet, Data Privacy

Conclusion

In this review, different barriers have been identified by different countries while adopting and implementing Telemedicine. Barriers while handling technology among health professionals is a major prevalent issue. Concentrated efforts should be dedicated towards improvement of resources and socio-cultural aspects. There must be standard guidelines for Telemedicine & its operation across all participant countries. Lack of broadband infrastructure especially in rural area is also one of the major Technological barriers. Some of the Telemedicine usage during the crisis of Covid-19 has helped people all over the country to receive effective treatment, diagnosis at the time of home isolation. In all the fields of healthcare, in case of emergency services, Disaster management, Disease management,

Epidemics, Pandemics- Telemedicine has significantly contributed in resolution of problems at hand. All countries should formulate effective Privacy policy for both users and providers in the Telemedicine landscape. This will help us overcome the barriers which we face worldwide today.

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Narrative Report - How Artificial Intelligence contributed in tackling COVID-19 Pandemic

1. Introduction

COVID-19 was first reported in December 2019 at Wuhan, China and has since spread globally and resulted in a global pandemic. It is a new virus to which immunity has not been developed yet. That means more people are susceptible to infection, and some will suffer severe outcomes. With the increase in crisis, companies and researchers are getting involved in research all over the world to understand the challenges of this virus and to develop a cure for it. Artificial Intelligence (AI) is playing a vital role in fighting against this battle. For example during the early outbreak of virus, China has focused on AI like face recognition to track the infected patients mapping with their travel history, AI based robots to deliver essential like food and medicine, drones to disinfect public places and audio messages for public to encourage them to stay at home¹. There are multiple ways other countries are using AI techniques to support COVID crisis such as X-Ray scanning, risk assessment, drone-based delivery etc. AI has also been used to discover new molecule or drug to find out the solution to escape through this crisis. AI based system namely α satellite is processed to assess risk of infection at community levels and to collect data like number of cases, death etc². AI enhanced thermal cameras also being developed for detecting fever and infected fever³. We have dearth of medical professionals, doctors, and infrastructure to handle the current situation. In all AI have already contributing a lot in distributing the burden of healthcare industry. And there is a strong belief among researchers that AI is providing contribution and provide more solutions in this battle with Coronavirus⁴.

2. Objective

To study the contribution of Artificial intelligence in tackling the Covid-19 Pandemic

3. Methodology

A systematic secondary research method and detailed review of available literature has been done. Search strategies were used to understand the contribution of Artificial intelligence in tackling Covid-19. This included searching ProQuest, Google Scholar, PubMed. Inclusion criteria includes articles of last 3 months and exclusion criteria include articles before COVID. Search terms used were combination of Artificial Intelligence or AI AND/OR Covid-19/Coronavirus

4. Results

4.1 Covid-19

COVID-19 is an infectious disease of respiratory system caused by Coronavirus. COVID-19 is short for coronavirus disease 2019. The virus is spread mainly through respiratory droplets of produced when an infectious person while coughs or sneezes. It is highly contagious. Currently there is no cure or no vaccine for COVID-19, but researchers are continuously working and taking measures with the help of digital technology to tackle Covid-19

pandemic⁵. According to WHO - All top technology companies has provided support in order to fight the COVID-19 pandemic. Digital health technologies provided solutions in screening of population, infection tracking, and resources allocation based on priority and designing based to responses by targeted⁶.

4.2 Artificial Intelligence

Artificial Intelligence (AI) It Is the intelligence of computer system which is required to perform task which require human intelligence like face and voice recognition, visual recognition and decision making. Machine Learning (ML) - It is subset of AI. In ML, computer uses algorithm to learn from datasets of past examples and to make prediction about new data⁷. Deep Learning- It is subset of ML. It allows computer system to ingest vast amount of raw data to understand, learn and discover hidden patterns, associations in the data⁸.

4.3 Contribution of Artificial Intelligence during COVID-19

To combat COVID, AI focuses on disease tracking, its prediction, medical image processing, diagnosis of patient. It can also be used by creating alerts, making people more aware and social controlling through internet⁹. Following are the ways AI can help to fight against COVID-19

(a) Quick Detection of COVID-19

AI can analyze the symptoms and other red flags and thus alarm the patients and the healthcare authorities and help in the early detection of disease. AI is helpful in diagnosis with the medical image processing by using image of X-rays, CT scans and MRI of human body parts. Deep learning Techniques has already been in use and changed the scenarios of research field. Deep machine learning can be applied to detect the COVID-19 patients with the help of computer vision and medical image processing. Deep neural network model "nCOVnet" is being developed that can analyze X-ray images of lungs and conclude if a person is positive for the virus or not. To support this, an advanced level of medical image processing is required Convolutional Neural Networks (CNN) have been greatly helpful to carry out this analysis. It is fed with large number of healthy lung images and trained on it. Also, similarly it is trained on coronavirus infected lung images. This enables the machine to learn and differentiate between the two¹⁰.

(b) Contact tracing of the individuals

AI can help analyze the level of infection by this virus identifying the clusters and hotspots and help in contact tracing of the individuals. AI can predict the future course of the disease and help in further planning according to this.

(c) Prediction of number of cases

AI technology can track and forecast the nature of virus from the current available data and can predict the number of cases and death in given region. AI can help in predict the most vulnerable regions, people, locations and this would help in further planning and taking measures accordingly¹¹.

(d) Vaccine development using AI

AI program called Search algorithm for Ligands which AI capabilities to sift through the trillions of compounds and determine which would be good candidate as vaccine adjuvant. This approach would shorten the vaccine development. While vaccines for SARS-CoV-2 already entered human trial. An AI-based approach could help screen compounds to be used as potential adjuvants for the SARS-CoV-2 vaccine, along with screening new compounds based on modelling of potential mutations to the novel coronavirus. This will help us be prepared to develop vaccines as the virus potentially mutates¹².

(e) Development of drug using AI

AI based drug research can be done by analyzing data on COVID-19. It is useful for drug design testing and development. Technology can make the process of drug testing faster and less time taking which may not be possible by a human¹³. To enhance the study and development of potential SARS-CoV-2 antiviral drug, a team is using the AI-equipped IBM supercomputer SUMMIT. A computational model of spike(S-protein) of SARS-CoV-2 to study its interaction with human ACE2 receptors¹⁴.

(f) Reducing the workload using AI

During this time of Crisis, there is a huge burden on Healthcare workers. AI is used to reduce workload among doctors. It helps in early detection, diagnosis and treating at early stage using digital technologies. AI can impact future patient care and address more potential challenges which reduce the workload of the doctors¹⁵.

(g) Public communication using AI based approach

AI powered chatbots playing a major role in clinical scenarios and can advise more people than a manned call Center, Vibot and Vivibot- this chatbot was advertised through social media platform like Facebook and was deployed in messenger of Facebook. To provide clinical information to the public, deploying chatbots through media service such as Facebook Messenger is a faster way rather than setting up hotlines¹⁶.

(h) Prevention of disease

Computer vision is a branch of AI which understand the image automatically. In a simulated environment using computer vision with depth images helpful for hand hygiene audits and preventing the disease with proper measures. incorporation of real-time feedback into AI based apps to bring behaviour change¹⁷.

5. Way Forward

During this time of crisis, when it is mandatory to bring the solution at a faster pace to fight with the coronavirus. AI is an important weapon used in the battle against coronavirus. Although Artificial intelligence has significantly provided solution in healthcare and has made tremendous contribution in it. If we follow other compliance factors like handwashing, Social distancing and wearing mask, protect ourselves, follow Govt rules & regulations and apply AI, we can definitely defeat coronavirus. Moreover, further research is required in this field to control Coronavirus and provide solution to everyone.

6. Conclusion

It is a useful tool to detect the disease and help in monitoring of infected patients. By using techniques of deep learning and machine learning, it can predict the disease and provide solutions. It can track the number of cases by using AI based algorithm. AI can help reduce burden on healthcare workers. AI is not only helpful in treating the patient but also in monitoring health of the patients. AI can make a tremendous contribution in making treatment regimens, preventing measures, and development of drug and vaccine.

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