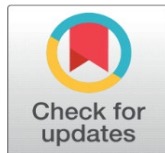


INNOVATING MEDICAL SCIENCE FOR SUSTAINABLE HEALTH SOLUTION: ANALYZING THE AYUSHMAN BHARAT SCHEME

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ABSTRACT

The paper attempts to analyse the multifaceted relationship between medical innovation and the implementation of government sponsored health insurance scheme 'Ayushman Bharat- Pradhan Mantri Jan Arogya Yojana' scheme in Achieving Sustainable Health outcomes. The study begins by describing the conceptual framework of medical innovation and sustainable health outcomes. Medical Innovation encompasses a spectrum of advancements, ranging from groundbreaking discoveries in Pharmaceuticals and medical devices to transformative developments in healthcare delivery systems and digital health technologies. Sustainable health outcomes, on the other hand, encompasses the holistic wellbeing of individuals and communities over time. It includes factors such as equitable access to healthcare, cost-effectiveness and environmental impact. The AB-PMJAY scheme launched by government of India in 2018 in all over India. The scheme based on the motive of Universal Health Coverage (UHC), which has been implemented to meet sustainable development goals (SDGs) and following the commitment, "Leave No One Behind". Its Ultimate aim is to achieve Sustainable health outcomes. The study examines the adoption of innovative medical technologies, treatments, and practices facilitated by the scheme, shedding light on their contributions to improved patient care, disease management, and overall healthcare sustainability on the basis of available data and previous studies. It is found in this analytical study that innovation in medical science like the use of AI in the medical field offers transformative opportunities to achieve sustainable health solutions by enhancing early disease detection, personalized treatment planning.

Keywords: Medica, Sustainable, Health, Scheme



1. INTRODUCTION

Healthcare sustainability is a critical goal for countries worldwide, especially for developing Countries like India. The Ayushman Bharat scheme, launched in 2018, represents a monumental step towards providing comprehensive healthcare coverage to India's economically vulnerable population. This research paper examines how the integration of medical innovations within Ayushman Bharat contributes to sustainable health solutions. The Ayushman Bharat scheme which is also known as Pradhan Mantri Jan Arogya Yojana (AB-PMJAY) is a enthusiastic scheme of the government of India which main motive is to provide health insurances worth rupees 5 lakhs per family per year. It covers up to 500 million people which belongs to most vulnerable sections of the society. The scheme has two components one is Health and Wellness Centre (HWCs), which focused on preventive, promotive and primary health care. Other component is PMJAY, which provide secondary and tertiary care hospitalization coverage up to rupees 5 lakhs per family per year. All human development and improvements in quality of life depends on innovations. They also question accepted societal

structures, norms, and treatments. In particular, advances in healthcare technology enable us to treat diseases that were once incurable or make better use of scarce resources. Improvements in the standard of treatment and quality of life are fueled by innovations in the health care sector, but these innovations also present a continual risk to the systems and healthcare practitioners. Medical advancement requires the development of new practices (such as innovative surgical methods), technologies (such as drugs, gadgets, and implants), and organizational frameworks (such as palliative medicine, which is a creative kind of healthcare). The notable increase in life expectancy and quality over the past century can be attributed to innovations in health care or related fields like nutrition and cleanliness. The global interconnection and proliferation of information and communications technology (ICT) have the potential to significantly accelerate human development, narrow the digital divide, and create awareness in the societies. This was highlighted in the 2030 Agenda for Sustainable Development, which was adopted by the UN General Assembly in resolution 70/1 (2015). Population health, protection from medical emergencies, and universal health coverage (UHC). Within the global health community, there is a growing consensus that leveraging digital and cutting-edge ICT strategically and creatively will be crucial to reaching the triple billion targets, which include healthy population, health emergency protection, and universal health coverage (UHC) for all. An enabling "Digital Health Platform (DHP)" to act as to address the dynamics of complex information interchange in the medical profession, a common digital health information infrastructure becomes necessary upon which digital health apps can be developed to provide consistent and effective healthcare delivery.

2. OBJECTIVES OF THE PAPER

- To understand the role of Innovation in Medical Science in achieving the sustainable health outcomes.
- To analyses the potentiality of Ayushman Bharat scheme with the help of innovative way to reach the sustainable health solutions.
- To outline some legal AI usage in the field of health sector.

3. METHODOLOGY OF THE PAPER

literature review has been done from research articles from journals and websites related with the area under study. Secondary data had been used.

Areas where innovation in medical science contributes to sustainable health solutions:

1) Telemedicine and Telehealth

Telemedicine involves using digital technologies to deliver medical services remotely. This innovation increases access to healthcare, specifically in rural and underserved areas, and reduces the required for physical travel. It also enables continuous monitoring of chronic conditions and timely interventions, which can enhance patient outcomes and reduce cost of healthcare .

2) Electronic Health Records (EHRs)

Patients' paper charts' digital version is known as (EHRs). They facilitate the easy sharing of patient information among healthcare providers, improving coordination and reducing errors. EHRs enhance the efficiency of healthcare delivery, streamline administrative processes, and support data-driven decision-making.

3) Wearable Medical Equipment/Devices

Heart rate, physical activity, and sleep patterns are just a few of the health parameters that are monitored by technology that we can wear, such as smartwatches and other fitness gadgets. These gadgets help people to take care of their health and supply useful information that allows medical professionals to monitor patients from a distance and make deft judgements.

4) Machine Learning (ML) and Artificial Intelligence (AI)

Personalized medicine, planning for treatment, and medical diagnostics are all being revolutionized by AI and ML. With the help of these technologies, large data sets can be analyzed to spot trends, forecast disease outbreaks, and create customized treatment schedules. AI-driven diagnostic technologies increase the speed and accuracy of ailment identification, improving patient outcomes.

5) Genomic Medicine

Genomic medicine uses to guide healthcare decisions based on an individual's genetic information. It enables personalized treatment plans and the development of targeted therapies for diseases like cancer. This approach improves the efficacy of the treatments and reduces side effects, contributing to improved health outcomes and sustainability.

6) Point-of-Care Diagnostics

Point-of-care diagnostics involve conducting tests of patient care at the time and place. These rapid and often portable diagnostic tools enable immediate decision-making and treatment, which is crucial for managing infectious diseases and emergencies. They reduce the need for extensive laboratory infrastructure and expedite care delivery.

7) Regenerative Medicine

Regenerative medicine includes therapies that restore or replace damaged tissues and organs, often using stem cells or bioengineered materials. This field helpful in treating conditions that at present have very limited treatment alternatives, for example spinal cord injuries and heart disease, potentially reducing long-term healthcare costs.

8) Health Information Technology (Health IT)

Health IT systems, such as health information exchanges (HIEs) and integrated health management platforms, facilitate the secure sharing of health data across different healthcare settings. These systems improve care coordination, reduce redundancies, and enhance the overall efficiency of healthcare delivery.

9) Sustainable Medical Devices

Innovations in medical device design focus on sustainability, including the use of biodegradable materials and energy-efficient technologies. Sustainable medical devices reduce environmental impact and promote resource conservation, aligning with broader public health goals.

10) Public Health Surveillance and Big Data Analytics

Big data analytics and advanced public health surveillance systems monitor and analyze health trends, enabling early detection of disease outbreaks and informed public health responses. These innovations help in managing and preventing epidemics, ultimately reducing the burden on healthcare systems.

11) Vaccines and Immunotherapies

Innovations in vaccine development, such as mRNA vaccines, have revolutionized the response to infectious diseases, exemplified by the rapid development of COVID-19 vaccines. Immunotherapies helped the body's immune system tackle diseases like cancer, offering new treatment avenues and improving patient survival rates.

12) Digital Health and Mobile Health (mHealth)

Mobile health applications and digital health platforms offer tools for health education, disease management, and patient engagement. These technologies support preventive care, chronic disease management, and health literacy, leading to better health outcomes and reduced healthcare costs.

4. AYUSHMAN BHARAT SCHEME'S POTENTIAL TO INTEGRATE INNOVATION IN MEDICAL SCIENCE TO FOSTER SUSTAINABLE HEALTHCARE SOLUTIONS IN INDIA

In order to assist the country's integrated digital health infrastructure, the Ayushman Bharat Digital Mission (ABDM) has organized efforts to create a Digital Health Platform (DHP) in India. Since ABDM is medical system neutral, Ayush systems have been included into the infrastructure.

Figure 1



Source The ABDM Ecosystem. National Health Authority (NHA), Government of India

1) Telemedicine and Digital Health Platforms

Ayushman Bharat has embraced telemedicine to narrow the gap between healthcare providers and patients, especially in rural areas. Teleconsultations allow patients to access medical advice and services remotely, reducing the need for travel and improving timely care. Digital health platforms and mobile apps are used for booking appointments, accessing health records, and receiving follow-up care.

2) Health and Wellness Centers (HWCs)

The scheme has established over 150,000 Health and Wellness Centers (HWCs) across the country. These centers focus on preventive healthcare and wellness, offering services such as screenings for non-communicable diseases, maternal and child health services, and basic diagnostics. The HWCs aim to reduce the burden on secondary and tertiary care facilities by addressing health issues at the primary level.

3) E-Hospital System

The e-Hospital system is a digital initiative that links hospitals with a common IT platform, facilitating easier access to medical services and streamlining administrative processes. This system helps in managing patient data, hospital resources, and provides a unified platform for healthcare providers to collaborate.

4) Aadhaar-based Identification

Ayushman Bharat utilizes India's Aadhaar system for the identification of beneficiaries. This ensures that the right individuals receive the benefits and helps in maintaining an accurate database. The use of Aadhaar also simplifies the verification process, reducing fraud and errors in beneficiary identification.

5) Artificial Intelligence (AI) and Machine Learning (ML)

AI and ML technologies are being explored to enhance diagnostic accuracy and predict health trends. These technologies use to analyze big datasets to specify patterns and provide insights that help detection of disease at a very early stage and treatment plans accordingly. AI-powered tools are also used to improve the efficiency of healthcare delivery and manage resources better.

6) Public-Private Partnerships (PPPs)

Ayushman Bharat encourages public-private partnerships to enhance healthcare delivery. Private sector involvement brings in expertise, technology, and investment, which are essential for scaling up healthcare services. PPPs can also help in the deployment of advanced medical technologies and infrastructure in underserved areas.

7) Health Insurance Innovations

The scheme includes a significant health insurance component, covering over 500 million individuals. Innovations in health insurance, such as cashless treatment, pre-authorization of claims, and a transparent claims process, ensure that beneficiaries receive timely and adequate care without financial burden. The use of technology in processing claims and maintaining transparency is a notable innovation in this regard.

8) Data Analytics and Health Information Systems

Data analytics are helpful in monitoring and evaluating the performance of the Ayushman Bharat scheme. Health information systems gathered data and later on analyze that to provide insights into healthcare utilization, outcomes, and areas needing improvement. This data-driven approach helps in making informed policy decisions and improving service delivery.

Figure 2



Source Ayush Grid: Digital Health Platform

The system is connected with ABDM, enabling A-HMIS to perform registration and follow-up visits, as well as generate Ayushman Bharat Health Account Numbers (ABHA) for the patients. This is a prime example of Ayush's conscientious integration with the national digital health platform, ABDM.

9) Capacity Building and Training

Continuous training and capacity building of healthcare workers are essential for the effective implementation of the scheme. Innovative training methods, including online courses, virtual simulations, and mobile-based learning, are employed to keep healthcare providers to be aware with the updated practices and innovations.

5. USING AI TO ADDRESS THE AYUSHMAN BHARAT ISSUES

Enabling cashless transactions at various stages which is an example of the success of the usage of AI for Ayushman Bharat (Bakshi et al., 2018). Patients are able to receive care in any hospital in an emergency. They also get alerts from the recommendation system, which provided a list of the top hospitals to visit in order to get a diagnosis for their symptoms. Regarding the doctors, an internet channel was now available for them to obtain patient information. Regarding the doctors, an internet channel was now available for them to obtain patient information. Patients now feel less stressed, the transaction system is easier to use, and getting the necessary treatment is made easier. Additionally, all transactions are cashless thanks to AI. Ayushman Bharat is now dealing with a number of strategic management issues, including managing the data of all patients and people registered in the programme, reducing costs, strengthening data security, and boosting the standard of treatment. In order to improve the services, the Indian government has introduced deep learning, machine learning, and artificial intelligence.

Applying innovation in medical science involves several legal considerations, often centered around ensuring patient safety, protecting intellectual property, complying with regulatory requirements, and addressing ethical concerns. Here are key legal points of view:

1) Regulatory Compliance:

- **FDA and Other Regulatory Bodies:** Medical innovations, such as new drugs, devices, or therapies, are subject to stringent testing and approval procedures overseen by authorities like the European Medicines Agency (EMA) in Europe, in the United States, the Food and Drug Administration (FDA), and comparable

organizations globally. Before inventions are put on the market, these organizations make sure they are secure and functional.

- **Clinical Trials:** Conducting clinical trials involves strict adherence to regulations concerning the design, conduct, and reporting of clinical research. Ethical considerations, patient consent, and safety monitoring are crucial aspects regulated by bodies such as Institutional Review Boards (IRBs).

2) Intellectual Property (IP):

- **Patents:** Innovators often seek patents to protect their new medical technologies, drugs, or processes. With the help of patents, inventors can control how and where their discoveries are used for a set amount of time usually 20 years after they are created.
- **Trade Secrets:** Companies might also protect certain aspects of their innovations through trade secrets, ensuring competitive advantage without public disclosure.

3) Data Protection and Privacy:

- **HIPAA and GDPR:** The Health Insurance Portability and Accountability Act (HIPAA) In the United States establishes guidelines for patient data security which is known as ‘The Health Insurance Portability and Accountability Act (HIPAA)’.while the European Union’s General Data Protection Regulation (GDPR) imposes very strict guidelines on data privacy and protection, especially with regard to health data.

4) Ethical and Legal Standards in Research:

- **Informed Consent:** Getting consent from patients participating in clinical trials or using innovative treatments is a legal and ethical necessity. It must ensure that patients should be fully informed about the risks and benefits’ potentiality of the innovation.
- **Ethical Review:** Research involving new medical innovations must undergo ethical review to ensure that it complies with accepted ethical standards and does not exploit or harm participants.

5) Liability and Malpractice:

- **Product Liability:** Manufacturers of medical innovations can be held liable if their products cause harm due to defects or inadequate warnings. Legal claims might include strict liability, negligence, or breach of warranty.
- **Medical Malpractice:** Healthcare providers implementing new medical technologies or treatments must do so within the standard of care. Failure to do so might result in malpractice claims if patients suffer harm as a result.

6) Market Access and Reimbursement:

- **Pricing and Reimbursement:** Legal frameworks often influence how new medical innovations are priced and reimbursed. Innovators must navigate complex regulations regarding insurance coverage, government healthcare programs, and reimbursement policies.

7) Global Considerations:

- **International Regulations:** Medical innovations intended for global markets must comply with regulatory requirements in multiple jurisdictions, each with its own set of laws and standards.
- **Export Controls and Trade Regulations:** Exporting medical innovations may be subject to export controls, trade regulations, and international agreements.

8) Ethical Considerations in AI and Data Use:

- **AI in Medicine:** The use of artificial intelligence (AI) in medical innovations brings additional legal and ethical challenges, including algorithmic transparency, accountability, and potential biases.
- **Big Data and Analytics:** Innovations involving big data analytics must address issues of data security, consent, and potential misuse of information.

There are a lot of companies throughout the world that are or will be legally positioned in the medical industry to assist physicians and patients in various ways.

- **Ada:** Ada is a machine learning chatbot that provides a means of having face-to-face conversations and providing advice with patients. The application and the patient discuss the issues and symptoms the patient is facing. Which results, the chatbot provides pertinent feedback and provides knowledgeable information for online consultation.
- **Lunit:** Medical artificial intelligence software company Lunit is committed to eradicating cancer and expanding the frontiers of medical intelligence. Innovative AI-powered cancer therapy and diagnostic solutions that can save lives and save time are developed and made available by Lunit. It uses deep learning and 3D visualization to detect diseases like colorectal and airway cancer that are not reported. An accuracy of 83% to 86% is the target.
- **Aira (San Diego):** It helps those with vision impairments see. A smart glass that uses artificial intelligence to perceive the world more clearly. It can do basic tasks for the blind, such as reading.

Many more examples are there.

6. CONCLUSION

Ayushman Bharat is an example that how the use of medical innovation is helpful to create sustainable health solutions. By using digital technologies, public-private partnerships, and data-driven approaches, the scheme aims to provide comprehensive and equitable healthcare to millions of Indians. The continuous integration of innovations will be key to addressing healthcare challenges and ensuring the long-term sustainability of the Ayushman Bharat initiative. "Innovation in medical science" refers to the combination of cutting-edge medical technology, revolutionary discoveries, and digital communication that has gradually blended with providing best practice healthcare. According to the Director-General, Executive Board, WHO, Geneva, digital health is defined as "the broader field of knowledge and practice associated with the development and use of digital technologies to improve health which, at the same time, expanding to the concept of eHealth with a wider range of smart devices and connected equipment for consumers, also involving the usage of AI, big data, genomics, and robotics in the healthcare delivery system." In order to significantly change the health outcomes through increased digitization of health systems and services, a vision that enhances cross-sectoral collaborations, innovations, and research and development must be developed. Additionally, investments in governance, institutional capacity, and workforce capacity must be made in order to support the necessary changes in digital systems. For the proper use of digital systems in the healthcare delivery sector, a number of considerations should be made, including patient safety, cost-effectiveness, patient engagement, Data security (confidentiality, integrity, and availability), ethics, interoperability, intellectual property, privacy, and cost-effectiveness.

CONFLICT OF INTERESTS

None.

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