Potential of Health Informatics Towards Centralized Electronic Health Records Approach

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Abstract

The need for a health information system is felt across major healthcare service and would also enhance the developing global health agenda. Especially around the Universal Health Coverage and Sustainable Development Goals. Information related to public health is collected from population-based surveys, disease surveillance systems, hospital information systems, family health surveys. The last decade has experienced a greater shift towards electronic health systems as the key source of information for public healthcare systems. Progress of Health Information systems can also be measured along with the sustainable development goals along with the universal health coverage models. The scope of health informatics spans beyond only the medical practitioners and covers the entire social fabric of the society. It involves not only the health sectors but is interdisciplinary in nature. This study explores the potential of health informatics in meeting the growing information needs during the COVID-19 pandemic. Library and Information Science professionals play a major rule in acquiring, organizing, managing and disseminating information. As the information needs of users evolve so has the information access patterns. Health informatics is a crucial domain to leverage especially to reduce the information load during the pandemic.

Keywords:

Health Informatics, Sustainable Development Goals, COVID-19, Coronavirus, Universal Health Coverage, Cloud Infrastructure

1. Introduction

Information is used in the health sector and includes many stakeholders, ministries, donors, state and district level managers and global agencies. The overload of health data requires relevant strategies and information use for information technology systems that are deployed to gather insightful understanding from those datasets. Improving the quality of data,

streamlining and standardizing data sets have the potential to build better dashboards for visualization and analysis. The healthcare sector upon integration of information technology in to the work processes of healthcare providers, conversations around data, and communities of practice and it has the potential work in an integrated manner following the people, process and technology approach. The people, process and technology approach covers three key aspects which act as the framework for developing health management information systems.

2. Universal Health Coverage and Information Support

World Health Organization's Assembly Resolution in 2008 with the goal of Primary Health Care- "Now More than Ever" led to stakeholders assessing the key challenges in terms of highlighting informatics support on the measurement of services. The role of Health Management Information systems aids in assessing the socio-political aspects of nations. It reflects the proportion of group fallings outside the health coverage schemes offered by the state. As stakeholders who require the highest level of intervention. Traditional Health Management Information Systems, when combined with the insurance-based systems, can enhance the coverage of the Universal Health Coverage and would help in identifying the populations with lower coverage.

3. Health Informatics and Progress towards Sustainable Development Goals- Goal 3 - "Good Health and Well Being"

Sustainable Development Goals by the United Nations Organization given in the year 2015 comprises of 2015, it consists of 17 goals. Out of the 17 SDGs, only one is dedicated directly to health i.e. Goal 3- "Good Health and Well-being" that ensures healthy lives and promotes wellbeing for all age groups. Goal 3 has several sub-goal or targets covering specific areas. Seven other SDGs also relate to the social determinants of health and well-being. "Goal 3 has nine targets each of which underlines a significant challenge in the health informatics domain and as a means of implementation, achieves universal health coverage including financial risk protection, access to quality healthcare services, affordable essential medicines and vaccines for all."

Several informational requirements and challenges emerge out of the targets which comprise of the improved cause of death reporting, development of robust CRVS data, Improved inputs from disease surveillance systems, improved quality of information from service delivery

points of both primary and secondary healthcare services and need for better intersectional reporting.

3.1 "Health Data Collaborative for International Partnerships for Health Information and Tracking Health-Related Sustainable Development Goals"

World Health Organization launched the 'Health Data Collaborative' along with several partners development organizations, agencies, countries, and donors in March 2016 it was a joint effort towards the effort to work alongside the countries to improve the quality of their health data and to track the progress towards the health-related sustainable development goals. These partnerships explicitly aim to improve health data by strengthening the health information systems of countries. A longer-term goal of the 'Health Data Collaborative' aims to use common investment plans for strengthening Health Information Systems across countries by the year 2024.

The approach covers establishing a network of working groups in order to address technical challenges. The Health Data collaborative produced tools, templates and data standards for the management of public health records, hospital data management, and information systems. It would work on the lines of Health Metrics Networks that were built to address the Health Information Systems followed by a country-specific strategic plan.

4. World Health Organization's Health System Framework for Health Information Management

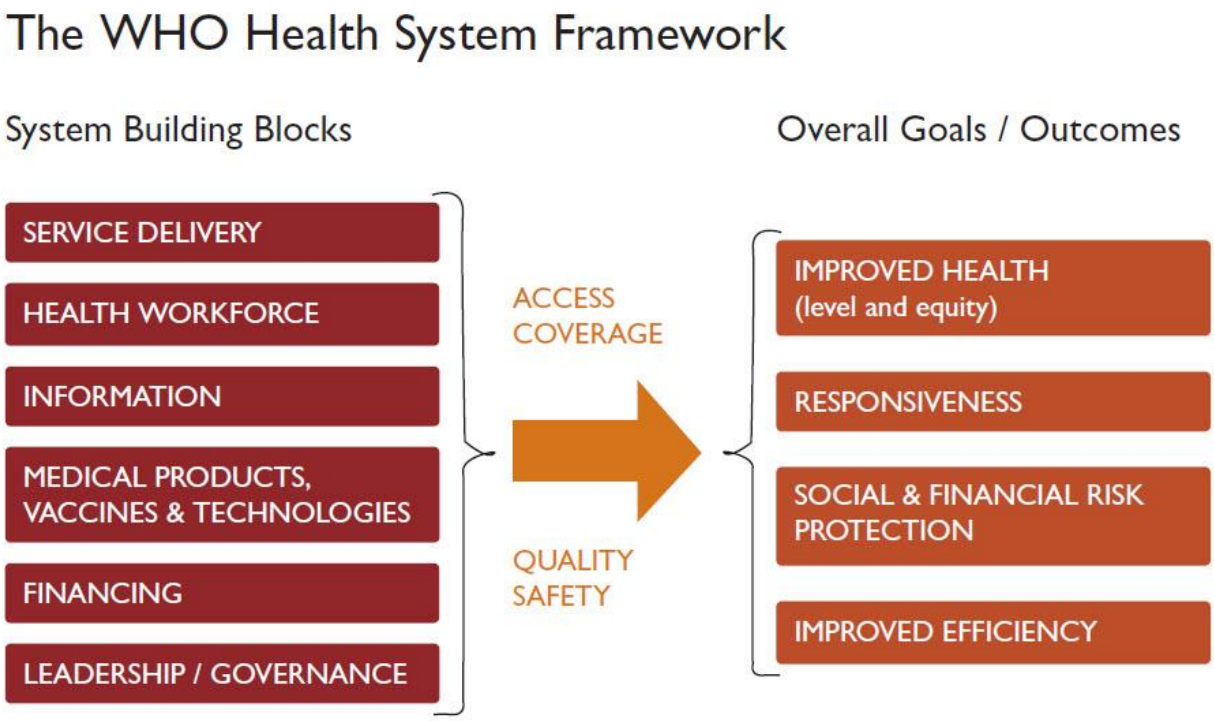

Figure1 : World Health Organization's Health System Framework

Source: WHO, Everybody's Business: Strengthening health systems to improve health outcomes-WHO's framework for action. Geneva, World Health Organization

The above image describes the framework for action for health systems. It has been described based on the pillars. The system comprises attributes such as Information, Medical products, vaccines, and technologies, financing, leadership, governance, service delivery, and health workforce. Based on access coverage and quality safety improved health, responsiveness, social and financial risk protection followed by improved efficiency. The outcomes are related to populations and imbibed in an entire chain of hospitals, primary healthcare facilities and the healthcare system at a larger scale.

5. Data Sources for Health Informatics Systems

The major sources of data for Universal Health Coverage (UHC) and Sustainable Development Goals (SDG) are from household surveys, facility-based medical care data from large hospitals and insurance claims data, primary health care provider data that involves records of health events and civil registration and vital statistics (CRVS) i.e. which refers to the nation wise registry of birth and death records which may also include migration records.

5.1 Restructuring Data Sources

The below table describes the restructured data sources along with the elements and subsystems-

Table 1: Restructuring Health Data Sources

SN	Type of Data Source	Elements of Data Structures
1	Household Surveys	Cost of Care Studies Access to Care surveys Health Examination Surveys
2	Primary Healthcare data	Health Centres, Family welfare surveys and community care databases, Household surveys
3	Hospital Related Data	Clinical records Patient databases
4	Civil Registration and Vital Statistics	National and Regional Surveys

The above table defines the restructured data sources, four types of data structures can be re-structured, ranging from household surveys, primary healthcare data, hospital-related data, and civil registration and vital statistics. Each of these sets comprises data structures that can be divided into several data structures.

6. Centralized Electronic Health Record Approach

As per the centralized electronic health record approach a single electronic health record for every person stored on one national server for all service providers, users, and diseases. They need to be standardized to be able to extract the necessary public health information in uniform formats. A National E-Health Authority has been proposed for the purpose of storage, standardization, and exchange of electronic health records for patients in India. A centralized electronic health records repository of all the citizens will ensure that the health history of the patients would be across the world. Centralized EHR also has threats related to data privacy and security of confidential information. The capacity of hospitals and healthcare centers also need to be established wit due capacity of staff and human resources. A strong regulatory and legal framework needs to be developed to support the centralized electronic health record approach.

7. Cloud Infrastructure and Health Data Management

National Web-based systems make use of the cloud space and have become feasible and led to a vast network. Improved connectivity has led to global outreach. The servers with the Ministry of Health can act as the national level databases. Appropriate models can be adapted to host applications for beneficiaries and stakeholders. The key opportunities for implementing cloud-based platforms are as follows-

- Transitions in the models of effective healthcare delivery
- Support Reactive models of healthcare
- Cloud-based platforms address the challenge of scale for large datasets.
- Low-cost software solutions can be used
- Effective surveillance of diseases

Challenges for implementation of cloud-based platforms for health data management are as follows-

- Privacy and security
- Confidentiality of personal information
- Data threat
- Training and capacity building of stakeholders
- Ownership in case of national portals and health records
- Lack of infrastructure to support cutting edge technologies

8. Health Data Standards Setting in India

The use of Health Information Systems was catalyzed in the public health system by the National Rural Health Mission (NRHM). The design, implementation, and use of various information systems for health management took place from 2005-2012. Several other roles played by this system were disease surveillance, mother and child tracking, immunization, e-tendering and procurement of drugs, logistics and more. The need for integration and standardization of data was felt. The Committee for standards of Electronic Health Records and Metadata and Data Standards Committee was set up in 2013 by the Ministry of Communication and Technology under the National e-Governance Plan (NeGP). Large datasets of above 1000 data elements had been yielded and formatted into 39 entities. These datasets served as the common minimum data elements for the development of information technology applications for various health domains and to facilitate interoperability among various applications.

8.1 Case Study 1- Health Management Information Systems and Human Resource Management Information Systems in Bihar, India

Interoperability between the human resource management information systems (called iHRIS) and the HMIS has been established in Bihar. State Health Society Bihar in collaboration with IntraHealth International and National Health Systems Resource Centre(NHSRC) India. Integration was done for the purpose of comparison and analysis of human resource data with service delivery data for decision making process. The workflow process consisted of mapping common data elements and standardizing their definitions, hierarchies using specific and exchanging data using specific solutions and cross sectional dashboards. Several challenges faced includes the differentiation of ownerships of systems led to large mismatch of data in the organization unit and hierarchies.

Source: Sahay et. al., "Public Health Informatics-Designing for Change-A Developing Country Perspective, 2017, ISBN-978-0-19-8758778-8.

8.2 Case Study 2- Information Communication Technology Reforms in Tamil Nadu, India

Tamil Nadu has had several public health reforms integrated with the use of information communication technology applications. Some of these reforms included primary health centre online systems, institutional service monitoring report, pregnant and cohort monitoring system of Tamil Nadu and Hospital Information System in Tamil Nadu's public hospitals. It comprises electronic medical record systems which aims at providing improved clinical care and aggregates summary reports from the hospitals of the state.

Source: Sahay et. al.,"Public Health Informatics-Designing for Change-A Developing Country Perspective, 2017, ISBN-978-0-19-8758778-8.

9. Developing an Interface for Health Informatics

Health Informatics systems are integrated with clinical informatics and far beyond. They have the capacity to build the entire public health system. A well-defined interface can meet the information needs at a greater level. There are several advantages of the health informatics interface. It offers ease of recording and continuity of care. A continuum between clinical and population based approach can be achieved. Access to care can be ensured along with patient rights and autonomy in clinical care. Digitalization of clinical health records would lead to an aggregated analysis and might be viable as a digital primary record.

Conclusion

Several arguments upon the use of centralized Electronic Health Records for an entire nation have been taken up as it's not considered desirable and efficient. ICT support for transforming healthcare systems has been traced and it has been observed to successfully support the allocation of primary healthcare services. A decentralized architecture for strong coordination between governance and intersectional coordination is the need of the hour. Success stories and pilot projects can be taken as source of reference in order to study the interdisciplinary field of health informatics across the world. The future roles of health management systems comprise more advanced, complex and resource intensive systems. An urgent need to develop a strong Health Informatics approach is the need of the hour. Information systems play a major role for decision making, evidence-based decision making, decision support systems, expert systems and others. Diverse healthcare challenges can be met by leveraging the potential of health informatics technologies.

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