EDITORIAL

The Role of Standards for Digital Health and Health Information Management

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It has been now more than two years that the (third edition of the) National Health Policy 2017 (NHP-2017) [1] of India has been notified. The NHP-2017 notes the importance of digital health and it will be elaborated further below.

The broad scope of **Digital Health** includes categories such as mobile health (mHealth), health information technology (IT), wearable devices, telehealth and telemedicine, and personalized medicine. Digital health is about electronically connecting up the points of care so that health information can be shared securely. This is the first step to understanding how digital health can help deliver safer, better quality healthcare. The proposed Global Strategy on Digital Health [2020-24] [2] from WHO is defining digital health as "*the field of knowledge and practice associated with any aspect of adopting digital technologies to improve health, from inception to operation".*

Digital health interventions are applied within a **country context** and a **health system**, and their implementation is made possible by a number of factors.[3] These include:

(i) the health **domain** area and associated content;

(ii) the digital **intervention** itself (i.e. the **functionality** provided);

(iii) the ***hardware, software and communication channels*** for delivering the digital health intervention; and, mediated within

(iv) a ***foundational layer of the ICT (Information and Communications Technologies)*** and enabling environment, characterized by the country infrastructure, leadership and governance, strategy and investment, legislation and policy compliance, workforce, **standards** and **interoperability**, and common services and other applications.

Therefore, for implementing digital health properly, it is of utmost necessity to purvey appropriate **Health Information Management** (HIM). HIM is the practice of acquiring, analyzing, and protecting digital and traditional medical information vital to providing quality patient care. It is a combination of business, science, and information technology.[4]

The Role of Standards for achieving Interoperability in Digital Health

The NHP-2017 advocates extensive deployment of digital tools for improving the efficiency and outcome of the healthcare system. The policy aims at an integrated health information platform or system which serves the needs of all stake-holders and improves efficiency, transparency, and citizen experience. Delivery of better health outcomes in terms of access, quality, affordability, lowering of disease burden and efficient monitoring of health entitlements to citizens, is the goal. Establishing federated national health information architecture, to roll-out and link systems across public and private health providers at State and national levels consistent with Metadata and Data Standards (MDDS) and Electronic Health Record (EHR)

Standards [5], will be supported by this policy.

To provide better and cost effective patient care, one needs to exchange healthcare information. For this to happen seamlessly, there is a dire need of Standards that facilitate this interoperability.

A Standard denotes the ability of two or more systems or components to exchange information (structural or ***syntactic*** interoperability) and to (meaningfully) use the information that has been exchanged (functional or ***semantic*** interoperability).

As the Government of India aims for Universal Health Coverage (UHC), the lack of skilled human resources may prove to be the biggest impediment in its path to achieve targeted goals. Therefore, the model curriculum handbook on health information management [6] has been designed with a focus on performance-based outcomes pertaining to different levels.

While a lot of efforts are being made towards smooth adoption of digital health in India, a significant amount of issues are yet to be sorted out. In another recent editorial [7] I have shown how the NHP-17 is well suited to provide the necessary boost to a digital health ecosystem in India. In India, people have tried to use some of the global Standards for exchange of health information as early as 2002. [8]

To give a boost to implementation of digital health in a countrywide manner, the draft **National Digital Health Blueprint (NDHB)** [9] was put up in the public domain for comments, and it also mentions a minimal set of standards to be used. It tries to define the standards required for ensuring interoperability within the National Digital Health Ecosystem. The broad categories for Standards mentioned are those for Consent, (Clinical) Content, Privacy and Security, Patient Safety and Data Quality.

Currently for epidemiological purposes, all countries send reports to the WHO using the ICD classification system (current version is ICD-10, while ICD-11 has been formally released last year and will be applicable from January 2022). However, for getting better insights into the clinical data, SNOMED CT (a clinical terminology system) is the globally preferred standard and India has been a country member of SNOMED International since 2014.[5] The basic differences of these two systems are summarized below.

- **ICD** (International Statistical Classification of Diseases) codes, from the WHO, have limited scope and granularity, summarizes and aggregates data into broad categories (for epidemiological purposes), and are **mono-hierarchical** (Each code is grouped into a single grouping) –
    - No links to body sites or causes
    - Groups multiple clinical meanings together using a single code
    - Does not always represent sufficient detail for clinical purposes
- **SNOMED CT** is broader in scope, more granular, allows data to be grouped and aggregated in different ways (**poly-hierarchical**), and to be queried, based on **Relationships** between the **Concepts**.

Presently mappings are available from to SNOMED CT to ICD-10 and its various adaptations. Therefore, if any system is SNOMED CT enabled, it is possible to

report according to ICD-10 or 11 as may be the statutory requirement for epidemiological and public health purposes. [10]

Another emerging standard for clinical and administrative information exchange is HL7 **FHIR** that has also been recommended in the NDHB draft. [9] The acronym FHIR alludes to F – Fast (to design and to implement), H – Health, I – Interoperable, R – Resources (Building blocks). “Fast” is relative – no technology can make integration as fast as we’d like. “FHIR” (pronounced “Fire”) is a fertile source of puns. As mobile technology is rapidly proliferating and advancing, FHIR has the advantage of being used for mHealth. SMART (Substitutable Medical Applications Reusable Technologies) on FHIR [11] is increasingly being adopted by many countries worldwide. Some examples of these SMART technologies include: OAuth2, OpenID Connect and HTML5.

As the hospital care shifts more and more towards home care and tele homecare, innumerable connected devices – wearables like IoMT (Internet of Medical Things) will need to be connected seamlessly. The IoMT is an amalgamation of medical devices and applications that can connect to health care information technology systems using networking technologies. [12] The International Telecommunication Union (ITU) [13] has adopted the Continua Design Guidelines (CDG) E2E (End to end) Reference Architecture, as proposed by the PCHA (Personal Connected Health Alliance), to connect through various interoperable standards: the personal health devices, person health gateways, health and fitness services, and healthcare information systems.

I have been tracing the evolution of health informatics and health information managers in making healthcare delivery more informed. [14-17] Further they also show the role of unlearning and relearning in effectively assimilating information [18] for better healthcare delivery. They can facilitate change management and capacity building (through training and retraining) that will take care of the most difficult, “People” component and to some extent the “Process or Workflow” components, leaving the technocrats to advance healthcare technology further.

In the Parliament, the Allied and Healthcare Professions Bill, 2018 was introduced in Rajya Sabha by the Minister of Health and Family Welfare, on December 31, 2018. The Bill seeks to regulate and standardize the education and practice of allied and healthcare professionals. [19] This bill includes Health and Information Management Professionals as one of the recognized categories. On a related note, the Union Cabinet has approved the restructuring of National Health Agency as "National Health Authority" for better implementation of Pradhan Mantri – Jan Arogya Yojana (Ayushman Bharat). [20]

Digital health and health information management are becoming today’s reality in India. Therefore, there is an urgent need to encourage the education and training of health information managers, with a particular focus on the role of standards for health information exchange. This will enable and empower them to successfully implement digital health interventions throughout India. This, in turn, will lead to better and more health information that can be analyzed for making informed decision and policy making to improve the health indicators of India.

Conclusions and Recommendations

While the NHP-2017 is bold in its thoughts and foresight, for facilitating digital health, a lot more needs to be done soon. As the HIM professionals are very well trained and suited to ensure that the health information and records of a patient are complete, accurate, protected and meet the desired and stipulated medical, legal and ethical standards. Therefore, all health information managers must be made aware of the role of Standards for interoperability, to ensure safe and smooth adoption of digital health in India, leading to informed and safer healthcare delivery.

List of Abbreviations

Acronym	Expanded Form
AB-PMJAY	Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana
CDG	Continua Design Guidelines
E2E	End to end
EHR	Electronic Health Record
EMR	Electronic Medical Record
FHIR	Fast Health Interoperability Resources
HIM	Health Information Management
HIT	Health Information Technology
HL7	Health Level 7
HTML5	Hypertext Markup Language 5
ICD	International Statistical Classification of Diseases
ICT	Information and Communications Technologies
IoMT	Internet of Medical Things
IT	Information Technology
ITU	International Telecommunication Union
MDDS	Metadata and Data Standards
mHealth	Mobile Health
NDHA	National Digital Health Authority
NDHB	National Digital Health Blueprint
NDHM	National Digital Health Mission
NHP or NHP-2017	National Health Policy 2017
PCHA	Personal Connected Health Alliance
SMART	Substitutable Medical Applications Reusable Technologies

SNOMED CT	Currently this is not to be expanded. Historically it stood for Systematized Nomenclature in Medicine – Clinical Terminology
UHC	Universal Health Coverage
WHO	World Health Organization

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