

E+HEALTH A UNIQUE FRAMEWORK FOR APPLICATION OF AI IN HEALTHCARE-EXTENDED ABSTRACT

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PROLOGUE

In February 2004, the Author J.L.Gandhi, in his capacity as Director, Asian Business School, was invited by the Organizing Committee of the 4th National Conference on Medical Records MEDRECON 2004 organized jointly by the Medical Records Association and the Medical Records Dept. Of National Institute of Mental Health and Neuro Sciences (NIMHANS) Bangalore, to deliver the keynote address on February 20, 2004, which was titled “Transforming Healthcare Through Electronic Health Records”. (scanned copy of the keynote address enclosed at the end of this abstract)

At that time, Electronic Health Records were a relatively new concept and the keynote address delivered by the author, although well-received by the assembled audience consisting of Doctors, Medical Administrators, Medical Records Officers, and support staff of leading hospitals, was very visionary and spelt out a number of prophetic predictions including the emergence of “a new era of human evolution created by the fusion of carbon-based and silicon-based intelligence or **bionic convergence** the convergence of biological revolution with the information revolution, of biology with electronics.”

In early 2008, the 53-nation Commonwealth launched the world’s first international e-health initiative across countries and continents, in an attempt to

harness its members’ evidentially extraordinary appetite for high-tech with health-friendly governance, potentially offering fast-track opportunities to poor people spread across the Commonwealth through the e-health focus. According to Mr. Ernest Massiah, the Head of Health at the London-headquartered Commonwealth secretariat, which organizes health ministers’ annual meetings in Geneva, India with its universally acknowledged techie skills can play role to foster south-south cooperation in the health sector. (source TOI May 17, 2008)

Despite the early efforts of many countries across the world to adopt e-health as a means of inter-country cooperation in the health sector, namely a coordinated response to outbreaks of infectious diseases and timely preventive measure to vulnerable sections of the population, a disaster of un-imaginable proportions occurred in the year 2019-2020 referred by the Covid-19 pandemic which created a Global crisis resulting in the shutdown of travel and tourism for a period of more than 2 years and tremendous loss of life; as of 15 October 2025, there have been reported 7.1 million confirmed COVID-induced deaths worldwide and it is now widely accepted that COVID-19 pandemic is the worst worldwide calamity experienced on a large scale in the 21st Century, making the Covid-19 death toll the highest seen on a global scale since the Spanish flu and

World War 1.

Present status of e-health adoption in India is quite impressive with almost all states having created E-health initiatives and the adoption of UHID (Unique Health Id) being issued to all patients registered with hospitals and healthcare agencies. Under the E-health initiative, the Ministry of Health and Family Welfare, Govt. Of India has launched the Ayushman Bharat Digital Mission (ABDM) which aims to develop the backbone necessary to support the integrated digital health infrastructure of the country. It will bridge the existing gap among different stakeholders of the Healthcare ecosystem through digital highways.

What is eHealth?

The term eHealth stands for electronic health. In other words, electronic (health) care. This is a catch-all term by which we mean all forms of digital care. We are not talking about EHR (Electronic Health Record), but mainly about innovative applications with digital tools.

In addition, the term mhealth is also becoming more familiar. This stands for mobile health and refers to digital care by means of mobile devices. So this is part of eHealth.

Types of eHealth applications in hospitals

Most eHealth applications are mobile apps and Web applications. Apps are downloaded onto a mobile device and web applications are opened from the browser. The use of robotics is not included in eHealth.

Much of eHealth is patient-centered: asking questions, informing and monitoring. But there are also

applications that support the work of hospital staff. Think, for example, of eHealth applications that help with diagnosis or step-by-step plans: these apps provide (standardized) suggestions or tasks for the next step in the care process. This saves a lot of time.

EHealthplus Initiative of Hongkong SAR (Special Administrative Region) Govt. The Hongkong SAR (Special Administrative Region) has rolled out a five-year plan of eHealth+ with a new commitment of HK\$1.4 billion in July 2024 for implementing a plan to transform eHealth from a health record sharing system into a comprehensive healthcare information infrastructure that integrates multiple functions of healthcare data sharing, service support and care journey management with four strategic directions:

- One Health Record
- One Care Journey
- One Digital Front Door to Empowering Tool
- One Health Data Repository

The eHealth+ will incorporate an integrated service platform to facilitate care coordination, cross-sector collaboration, health management and health surveillance through the following nine core functions:

- eBooking/eReferral
- eIdentification/eAuthentication
- eImaging/eLaboratory Report
- eMedication
- eMedical Certificate
- Portable eHealth Record

- eHealth Manager
- eHealth Tracker
- eHealth Life

In addition, a chatbot service “Ah Kin” is provided on the eHealth website, which helps to handle simple enquiries from the general public, supporting the use of English, Traditional Chinese and Simplified Chinese.

All these actions are intended to support every key stage or touchpoint of the care journey from building health awareness and scheduling appointments to receiving follow-up care as well as continued monitoring consistent with patient-centric principle and the four strategic directions laid out earlier.

EHealth Exchange USA

eHealth Exchange USA (ehealthexchange.org) headquartered in Virginia, USA, is a “Network of Networks” facilitating exchange of health information among providers, regional and state HIEs (Health Information Exchanges), public health authorities, payers, and federal agencies, including optional onramps to Carequality and TEFCA™ (Trusted Exchange Framework and Common Agreement) catering specifically to following Use Case Scenarios:

- Treatment/Care Coordination
- Encounter Alerts
- Task Based Exchange
- Clinical Data Exchange CDex
- Prior Authorizations
- Payer Data Exchange PDex
- HEDIS (Healthcare Effectiveness Data and Information Set) Reporting
- Public Health Reporting
- Electronic Case Reporting ECR
- Electronic Case Investigations ECI
- Adverse Event Exchange
- Electronic Lab Reporting ELR
- Syndromic Surveillance Notifications
- Prescription Drugs Monitoring Program PDMP
- Immunization Notifications
- Research
- Social Security Benefits Determination
- Individual Access to Health Information
- Life Insurance Applications
- Image Share

WORLD HEALTH ORGANIZATION (WHO) GUIDANCE REPORT 2021

Ethics and governance of artificial intelligence for health: WHO guidance. Geneva: World Health Organization; 2021

The WHO guidance on Ethics & Governance of Artificial Intelligence for Health is the product of eighteen months of deliberation amongst leading experts in ethics, digital technology, law, human rights, as well as experts from Ministries of Health. While new technologies that use artificial intelligence hold great promise to improve diagnosis, treatment, health research and drug development and to support governments carrying out public health functions, including surveillance and outbreak response, such technologies, according to the report, must put ethics and human rights at the heart of its design, deployment, and use. The report identifies the ethical challenges and risks with the use of artificial intelligence of health, six

consensus principles to ensure AI works to the public benefit of all countries. It also contains a set of recommendations that can ensure the governance of artificial intelligence for health maximizes the promise of the technology and holds all stakeholders – in the public and private sector – accountable and responsive to the healthcare workers who will rely on these technologies and the communities and individuals whose health will be affected by its use.

Key ethical principles for the use of AI for health

The six principles for the use of AI for health are summarized below:

- Protecting Human Autonomy
- Promoting Human Well Being and Safety and the Public Interest
- Ensuring transparency, explainability and intelligibility
- Fostering responsibility and accountability
- Ensuring inclusiveness and equity
- Promoting AI that is responsive and sustainable

Overview of the report

This report is divided into nine sections and an annex.

Section 1 explains the rationale for WHO's engagement in this topic and the intended readership of the report's findings, analyses and recommendations. Sections 2 and 3 define AI for health through its methods and applications.

Section 2 provides a non-technical definition of AI, which includes several forms of machine learning as a subset of AI techniques. It also defines “big data,” including sources of data that comprise biomedical or health big data.

Section 3 provides a non-comprehensive classification and examples of AI technologies for health, including applications used in LMIC (Low & Medium Income Countries), such as for medicine, health research, drug development, health systems management and planning, and public health surveillance.

Section 4 summarizes the laws, policies and principles that apply or could apply to the use of AI for health. These include human rights obligations as they apply to AI, the role of data protection laws and frameworks and other health data laws and policies. This section describes several frameworks that commend ethical principles for the use of AI for health, as well as the roles of bioethics, law, public policy and regulatory frameworks as sources of ethical norms.

Section 5 describes the six ethical principles that the Expert Group identified as guiding the development and use of AI for health.

Section 6 presents the ethical challenges identified and discussed by the Expert Group to which these guiding ethical principles can be applied: whether AI should be used; AI and the digital divide; data collection and use; accountability and responsibility for decision-making with AI; autonomous decision-making; bias and discrimination associated with AI; risks of AI to safety and cybersecurity; impacts of AI on labour and employment in health care; challenges in the commercialization of AI for health care; and AI and climate change.

The final three sections (7,8, and 9) of the report identify legal, regulatory and non-legal measures for promoting ethical use of AI for health, including appropriate

Governance frameworks. Recommendations are provided.

Section 7 examines how various stakeholders can introduce ethical practices, programmes and measures to anticipate or meet ethical norms and legal obligations. They include: ethical, transparent design of AI technologies; mechanisms for the engagement and role of the public and demonstrating trustworthiness with providers and patients; impact assessment; and a research agenda for ethical use of AI for health care.

Section 8 is a discussion of how liability regimes may evolve with increasing use of AI for health care. It includes how liability could be assigned to a health-care provider, a technology provider and a health-care system or hospital that selects an AI technology and how the rules of liability might influence how a practitioner uses AI. The section also considers whether machine-learning algorithms are products, how to compensate individuals harmed by AI technologies, the role of regulatory agencies and specific aspects for LMICs (Low- & Medium-Income Countries).

Section 9 presents elements of a governance framework for AI for health. “Governance in health” refers to a range of functions for steering and rule-making by governments and other decision-makers, including international health agencies, to achieve national health policy objectives conducive to universal health coverage. The section analyses several governance frameworks either being developed or already matured. The frameworks discussed are: governance of data, control and benefit sharing, governance of the private sector, governance of the public sector,

regulatory considerations, the role of a policy observatory and model legislation and global governance of AI. Finally, the report provides practical advice for implementing the WHO guidance for three sets of stakeholders: AI technology developers, ministries of health and healthcare providers. The considerations are intended only as a starting-point for context-specific discussions and decisions by diverse stakeholders. While the primary readership of this guidance document is ministries of health, it is also intended for other government agencies, ministries that will regulate AI, those who use AI technologies for health and entities that design and finance AI technologies for health.

In summary, AI systems should be designed to minimize their environmental consequences and increase energy efficiency. That is, use of AI should be consistent with global efforts to reduce the impact of human beings on the Earth’s environment, ecosystems and climate. Sustainability also requires governments and companies to address anticipated disruptions in the workplace, including training for health-care workers to adapt to the use of AI systems, and potential job losses due to use of automated systems.