Compelling issues for adoption of e-health

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Information and communication technologies (ICT) are leading to a progressive blossoming of automation in the health sector. This development of 'e-health' is occurring not only in libraries, business offices and the management of assets, but also regarding patient administrative data, instrumentation and diagnostic equipment, departmental systems, and patient care, continuing a trend that began in the laboratory and spread to clinical care areas. The ubiquity of interactive communications and networks of producers, suppliers, customers, and clients has made possible novel applications oriented to the functional interconnection of professionals and the integration of clinical care processes. These applications can achieve the efficient delivery of information and services, including remote monitoring and direct care, and endeavour to provide a response to many health sector needs. Adoption of ICT, however, involves both optimistic and cautionary implications for the future of health practice. Determination of most appropriate implementation solutions demands a judicious approach to requirement analysis of each particular health system organisation and governance model.

Most ICT solutions use internet-based technologies to rethink, redesign, and rework how businesses and public services operate. The essence of e-health, as in e-commerce, is reliable transaction delivery in a fast-changing environment involving people, processes, and an operational or business infrastructure. Frequently, e-health is equated to telemedicine; however, the latter term should be more appropriately applied only to the use of ICT for remote clinical consultation, case review, and second opinion.

E-health applications address a range of healthcare challenges:

- Standardised information exchange and networking: information needs to flow between healthcare facilities, levels of care, and caregivers, assisting in forecasting demand and responding to it.
- Improvement in care-level links for consultation, logistics and quality assurance.
- Disconnection in care provision, the overlapping of responsibilities, and wasteful use of resources.
- A wide variety of expectations about greater access to healthcare and information, telehealth services, second opinion, communities of practice, evidence-based decision support, reduction of errors, consumer-oriented information, and health promotion.
- The requirement for custom-built products and services (individualisation of care) and real-time delivery (to improve customer satisfaction).
- The growing need for professional continuing education and the bridging of the 'know-do gap'.
- The need to keep evidence-based explicit knowledge up to date.

Strengthening health systems through ICT works for greater equity, solidarity, quality of life and health, and ultimately contributes to the goal of poverty reduction. This role is captured in the UN Millennium Development Goals Target 18: 'In co-operation with the private sector, make available the benefits of new technologies, especially information and communications.'

E-health addresses new healthcare trends by facilitating individual information capture, data mining, and concomitant access by multiple stakeholders.. It promotes evidence-based decision making and continuity in the relationship between provider and client, and increases client participation. In particular, it supports the partnering of providers, insurers and clients, and brings about transparency and co-operation among healthcare providers, breaking down the barriers between independent professional roles.

Challenges

Most existing health information systems are inadequate in terms of the new models being deployed in health reform initiatives. In addition, the health sector has not kept pace with the momentum experienced in recent years by other productive segments of society in embracing ICT.

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Even in developed countries, public and private applications have evolved in a patchy and inefficient way, with a limited number of standardised data-related definitions and processes supporting only a restricted number of operational requirements. In order to reap the full benefit of ICT deployment in complex environments it is necessary to have a clear definition of goals and effective collaboration among stakeholders. This will lead to appropriate technology infrastructure, systems integration, and standards allowing rapid adaptation to changing technologies and continuous measurement of performance metrics.

Vendor-driven expectations have too often overshot their target – overestimation of results and unfounded expectations are frequent pitfalls – a common error being to regard technology by itself as an answer for the logistical, administrative, and knowledge management problems of healthcare.

ICT development issues

Organisational and governance enablers

At the governance level, there is a need for the understanding of infrastructure issues and agreement on needs and priorities. Continuity of action must be coupled with the development of national policies and a regulatory framework aimed at the reduction of the impact of external factors, implementation of standards, and guidance of the organisational changes required for the deployment of ICT solutions. Strategies must be developed for the standardisation and cost-effective use of technology and information.

Planning must also include the managerial issues and changes in work patterns and procedures which are inevitable, as is an increased documentation workload for staff and direct healthcare professionals. Other issues to be addressed include training, physical security and confidentiality of patient-related data.

Human factors: awareness, skills, and leadership

People are central to the creation and use of e-health products and services. Changes of strategies, structures, and form of service delivery must be accepted by direct care professionals – they must adapt, learn new skills and competences and, above all, acquire and commit to new mindsets and attitudes. Required skills include computer and web technologies, as well as the organisational and managerial competences and leadership necessary for the changes in working methods and job roles. It has become necessary to understand the functional capabilities of e-health technologies, integrated patient management and electronic health records, epidemiological networks, and telecare; and to be aware of the associated legal, ethical, and economic issues.

Standardisation

The automation of processes and services is not feasible without data standards that allow communication through open access internet-oriented software languages. Core difficulties in setting these standards concern the low definition level of contents (deliverables), failure to determine the objectives and functionalities desired for applications, and conflicts in defining minimum data sets for operational management and clinical decision-making. Standards development and implementation is a slow process and may require concerted regulatory action.

Technology distribution, access, and utilisation

The multiple-step interactive processes of innovation and adoption require constantly changing resources and skills, involving a wide range of actors and interests operating under different goals, incentives, and timelines. Those processes exhibit dead ends, feedback loops, multi-directional interactions, parallel developmental paths, and unintended consequences.

Technological innovation and adoption – characterised by uncertainty, search, exploration, financial risk, experiment, and discovery – take place in an established social and cultural environment. Besides issues of technology access, effectiveness, and appropriateness, there are questions related to the social, ethical, and economic impact of technological innovation, including class, educational, and cultural divides.

In the wider electronic marketplaces, particularly in developing countries, areas of concern include:

- Difficulties in regulating offshore business
- The dominance of global communications by a few countries and corporations
- 'Market capture' by strong, organised and well-funded health provider organisations, some of international nature.

Probably the most serious negative impact of the introduction of technological innovations in the health sector is the focus of attention on technology without proper assessment of its effectiveness and its role and impact in the relationship between patient, communities, and care providers.

Security and privacy

The data protection of health records against intrusion, unauthorised use, data corruption, intentional or unintentional damage, theft, and fraud is a universal concern and a high priority issue in most countries. Given the sensitive nature of healthcare information and the high degree of dependence on trustworthy records, issues of reliability, security, and privacy are of particular significance. There is, however, ambivalence about privacy because of the potential benefits of community access to personal information. Unfortunately, since regulation and legislation often lag behind technology, privacy is generally addressed in reactive rather than proactive mode.

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Investment and continuity

Joint investment and development involving users, governments, academic and financing institutions and agencies, technical co-operation agencies and industry interests is seen as necessary. Partnerships with the informatics industry are fundamental and, in the case of general informatics tools, the industry practically drives the solutions.

Government action

Government involvement in health ICT development and deployment should address six priority areas:

- Promotion of education, training, and national planning capacity in information systems and technology
- Convening groups for the implementation of standards
- Providing continuity of funding
- Ensuring the equitable distribution of resources, particularly to places and communities considered by private enterprise to provide low profitability
- Protecting security, privacy, and intellectual property rights

- Overcoming the jurisdictional barriers to co-operation, particularly when there are conflicting regulations.

Lessons learned in developing countries

- The health sector has not taken advantage of the range of ICT opportunities as effectively as other social sectors, and has been conspicuously underrepresented in national technology development policies and plans. Public health authorities invariably declare the criticality of information for decision-making and informed action, but repeatedly fail to follow up with commitment, resources, and sustainable engagement.
- Notwithstanding the fact that for the past 25 years the use of computers and telecommunications in healthcare has been a constant item of development agendas, the health sector has addressed the concept with shifting degrees of enthusiasm.
- As a counterpoint to the passiveness of the public sector, private providers and managed care groups recognise the role of ICT to boost productivity, efficient use of diagnostic services and consultations, maintenance of integrated records, reduction in the number of specialists, and attaining economies of scale.
- The lack of involvement of public sector stakeholders in the use of ICT gives cause for concern. There is a clear danger that by failing to adopt ICT solutions the public sector may become incapable of competing with the private operators, and may hasten the reduction and even the demise of public services.
- Public projects take long to implement, cost more, and deliver less than planned. Projects are underfunded, use obsolete technology, have a restricted vision of requirements and opportunities, and frequently resort to providers with limited experience and staying power.
- ICT metrics provide an important tool for the gathering of consistent and comparable information about the implementation of diverse systems in a wide range of configurations and environments. However, readiness to incorporate ICT is difficult to measure since a country or organisation may be ready to assimilate some, but not all, technological components and applications.
- Policy development is often a long evolutionary process. Developing countries may require direct assistance in the definition of policies and strategies as well as with the establishment of the appropriate regulatory environment.

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- Insurance and reimbursement should insulate providers and patients from the immediate financial consequences of the use of expensive technologies.
- Many external factors constrain development efforts and are heavily influenced by political and social priorities. Governments and providers may not be in full control of how they channel technologies, or in which markets they will be able to deploy them once they are developed.
- Skills are the most expensive and least elastic resource and the major obstacle in developing countries. Success in the deployment of e-health applications depends on the right mix of skills and commitment to data management responsibilities in all functions at all levels, creating an additional burden to the already demanding professional workload.
- Resistance to change has become rooted in certain professional roles – the introduction of ICT in healthcare disrupts traditional structures and hierarchies. Frequently, professionals are unwilling to collaborate in recording and exchanging patient data, with concomitant distrust for off-site data storage and access control.

- Knowledge brokering is a much-needed solution linking research evidence to action. Most existing knowledge is based on repositories of technical and scientific literature; only recently have efforts begun to develop resources linked to practice and evidence-informed decision making, making compulsory the use of clinical guidelines and performance indicators.
- Haphazard development of 'islands' of innovation is typically associated with 'centres of excellence', usually in an academic environment, isolated from national, regional, and local approaches.
- Lack of information about projects, methodologies, technical solutions and their impact is a major problem. Demonstrating cost-effectiveness of new technologies is especially challenging, since well-designed and randomised controlled trials are not feasible. There have been only sporadic attempts to collect project information through limited surveys or case studies. The World Health Organization recently established a Global Observatory for e-Health; and, in the region of the Americas, the Observatory for the Information Society in Latin America and the Caribbean (OSILAC) is a joint initiative of the United Nations Economic Commission for Latin America and the Caribbean and the Institute for Connectivity in the Americas of the International Development Research Centre of Canada (IDRC), with support from the European Commission @LIS Programme. Data from those sources is however very limited.

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- Speeding up adoption depends on the presence of factors such as incentives, competition, return on investment, and regulation. Governments must establish mechanisms to create or secure markets for new technologies, thus reducing the risks involved in R&D and improving the chances of a satisfactory return on investment in ICT for the private health subsector.
- Governments and regulatory bodies have the rationale, the power and the opportunity to improve competitive conditions by promoting standards, lessening network externalities at the community level, and sharpening the private-market competition among providers.
- Governments must address in a comprehensive manner many national and transnational issues. A major hindrance is that the current health sector organisational structure and national regulatory framework in developing countries are not adapted to problem-oriented, interdisciplinary, rapid-response collaborative technical work, and the concomitant political, regulatory, and managerial tasks.

International co-operation

Priority areas for international technical co-operation include needs assessment, technology evaluation and selection criteria. Cross-border challenges are particularly pressing due to the growing number of national, international and non-governmental actors. Intangible e-health products and services offered by foreign providers, such as investment, insurance, knowledge dissemination, and healthcare applications, present possible challenges to developing countries of flight of capital, tax evasion and employment reduction by offshoring. The result can be the 'capture' of the health market by overseas organisations, and 'cultural colonisation'.

International trade aspects of e-health form a critical and urgent area still to be addressed by the World Trade Organization and regional trade blocs.

International technical co-operation and multilateral agencies must join national and international authorities to call for the financing of long-term projects by multilateral institutions. Consistent with these objectives, those agencies should promote and support technical co-operation between countries, and foster the use of appropriate technology and knowledge assets.

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