

Digital health and the challenge of health systems transformation

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Abstract: Information and communication technologies have transformed all sectors of society. The health sector is no exception to this trend. In light of “digital health”, we see multiplying numbers of web platforms and mobile health applications, often brought by new unconventional players who produce and offer services in non-linear and non-hierarchical ways, this by multiplying access points to services for people. Some speak of a “uberization” of healthcare. New realities and challenges have emerged from this paradigm, which question the abilities of health systems to cope with new business and economic models, governance of data and regulation. Countries must provide adequate responses so that digital health, based increasingly on disruptive technologies, can benefit for all.

Keywords: Healthcare; e-health; digital health; uberization; business and economic models; data governance

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Introduction

Recently, in several countries the taxi industry, a regulated service, has been disrupted by the advent of new competitive player. This new player is “Uber”, an Internet platform that allows a user to rent car transportation services via a smartphone application and an internet connection. Transportation providers are ordinary people who offer their own car for service via Uber. This same Uber is beginning to invest in healthcare sector. It already offers services of delivery and injection of the influenza vaccine by a nurse at people’s homes or at their workplace. To justify this service, Uber argues that according to reports less than 50% of American adults, and only 30% of adults aged 18 to 49 years, get vaccinated against influenza (1,2). This low rate is partly attributed to the constraints on availability, for professional reasons or family obligations, and limited accessibility to services (e.g., time and location). This said, in the near future, Uber could invest in other

countries historically rooted in a tradition of universal access to healthcare services. We speak of a “uberization of healthcare” (3,4).

New technologies are entering the ecosystem of health services, driven by unconventional actors that transcend geographical, cultural and regulatory boundaries. This disrupts established models of production and delivery of services and practices. With these new players, we are inevitably witnessing a phenomenon of “disintermediation”, accelerated by the proliferation of Internet platforms and connected objects. Disintermediation refers to deleting historical intermediaries in a supply chain by replacing them with others, often through digital intermediaries, which could lead to process and workflow redesign (5). In healthcare, this phenomenon translates into a risk of circumvention of traditional switches and intermediation models at the level of the production and the delivery of services. The abolition of these intermediaries results in the emergence of new intermediaries, but this time

difficult to identify (3). These new players produce and offer services in non-linear and non-hierarchical ways, by multiplying access points to services for people (6). With downloadable applications on smartphones, people can, for instance, monitor their physiological parameters, control their glycaemia and access to therapeutic and/or medicinal information without direct intervention of clinicians. The era of “Internet of things” is accompanied by major changes in the production and consumption of services, which challenges the ability of healthcare systems and current regulatory frameworks to adapt and evolve (6,7).

The purpose of this text is to explore some issues related to digital health, defined as “*use of ICTs to improve human health, healthcare services, and wellness for individuals and across populations*” (8).

Lag between technological, institutional and regulatory times

Currently, regulations governing health systems are poorly adapted to rapid technological changes. This can be explained by the fact that states proceed slowly when it comes to evolving their rules (9). Reference may be made, among others, to questions concerning the approval and certification of digital technologies, licensing of inter-jurisdictional practice, delegation of tasks, prescription or reimbursement of some mobile applications, teleworking of clinicians as well as remuneration of telehealth activities. For example, the Food and Drug Administration (FDA) needs 54 months on average to authorize the commercialization of a new medical technology (information disputed by the FDA) (4,10). A delay that is no longer adapted to new digital technologies that may become obsolete after 2 or 3 years. This situation could be explained by the fact that the regulatory agencies are used to homologate very “concrete” medical devices with well-defined impacts; something that the complex interconnections related to new digital technologies make almost impossible to predict (4).

Data governance

With the collection of an infinite number of data related to the behavior and health of individuals by new industrial players, one of the important challenges is to ensure transparent data governance. Because of the sensitivity of the data they have to manage and manipulate, these actors hold great power over information and become essential. Thus, health data are no longer restricted to

public authorities or to historical providers of services, such as physicians. This trend inevitably leads to a new relation of “information asymmetry” between industry and the States. So, an important question remains: are the data collected by these providers considered as personal data of a customer who uses a commercial service, or are personal health data? The nature of the response changes totally the perspective in terms of security, responsibility, time and place of storage, traceability, property and market value of such data. For example, to cite a real case, patients using an electronic health record marketed by a subsidiary of a phone company received advertising e-mails inviting them to buy phone subscriptions from the same company. The company has probably considered that patient data could be used as customer data from a traditional business activities.

Economic and financial considerations

Technologies are also making the borders between health and wellbeing increasingly porous. They transform the ways in which people perceive and manage their health and disease. That said, what should be supported by health systems and what shouldn't in order to ensure equitable access to healthcare services for the entire population (e-health democracy)? Many applications are also used with a perspective of health promotion and prevention, while the current reimbursement models are mainly based on disease management (volume *vs.* value or quality) (11). Moreover, regarding the reimbursement of healthcare services, digital applications could replace some existing models of care, which would make possible reimbursement by insurance in the same way as a conventional medical act or drug. Thus, there is a need of mechanisms that allow to take into account the value of the service associated with these technologies with respect to patient outcomes (12-14).

Otherwise, new Internet healthcare platforms are within the sphere of the digital economy (15). These actors are there as part of an economic activity “as another”, which questions the transparency in the nature and destination of healthcare systems financial flows. This last point is expected to have important implications on political economy, especially through the disintermediation on the provision of care and services value chain (4). E-health investments are estimated to reach US\$ 410 billion in 2022 (16), and these new intermediaries will have a strategic role. The importance of the regulatory role of States remains vital, but less obvious as these new intermediaries become increasingly globalized. The type of governance

that should be applied to digital health is critical because it affects the identity of the ultimate payer and the leeway that States (as regulators) want to keep in this ecosystem (11).

Perspectives

Digital technologies are changing the ways of producing and delivering services. They are somewhere on the same scale of disruption as the discovery of antibiotics (17). This technological change is also accompanied by modifications and developments in our expectations for health and well-being. ICTs are transformational at all levels, which implies changes that could challenge the pre-established organizational and professional equilibrium.

Digital health could acquire a disruptive nature in its ability to question practices and production models of existing services. This characteristic unavoidably enrolled it in a situation of conflict or incompatibility with some models, processes, activities, and even cultures (18). This phenomena is further complicated by our decreasing capabilities to anticipate changes and the form they will take (19). Indeed, digital health is proposing new ways to produce and deliver services that differ from historical models based mainly on hospital and have shown their limits, especially with chronic diseases and aging of the population [2 billion people over 60 years in 2050, against 900 million today (20)]. For example, a better use of digital technology could generate efficiency gains of approximately 6% to 10% for the British health system, or 17 to US\$ 28 billion annually, while improving the quality of services (21).

Many mobile applications can be transformed into a microscope, stethoscope, electrocardiogram or camera with diagnostic quality, and with levels of performance and precision comparable to traditional medical devices (4,10). The difference is that anyone with a smartphone, and a sufficient level of literacy, can use them. These applications could contribute to the active involvement of patients in their own care and monitoring. They would then become more proactive and autonomous in their choices, search and sharing of healthcare information. This new context requires the development of more services centered on people, this by considering their subjectivity, environment (physical, social, cultural or spiritual), mode and quality of life as well as their constraints and preferences.

Each country has its own failures in the adventure of the computerization of the healthcare system (e.g., “Healthcare.gov” in USA, “HealthSpace” in United Kingdom and “Personal Health Record” in France). These failures are

partly due to the lack of a systemic and strategic vision that integrates the complexity of new realities, needs and expectations of recipients, in addition to the processes, procedures, practices and operations specific to the healthcare ecosystem. Indeed, the digital transformation is less a question of technology than of strategy, vision and the development of new skills to work, collaborate, but also to experiment (22,23). Unfortunately, amongst many new technologies implemented, only a few have real strategies and policies devoted to innovation. The ability to integrate the complexity characterizing the healthcare sector has often been lacking, especially with the dominance of vertical actions, which served to perpetuate the silos. Partitioning is the enemy of collaboration, creativity and innovation.

The issue of the capability of health systems to be part of such transformations is a critical question, especially when it comes to reconfiguring or restructuring of existing models, but also in developing associated new skills and abilities, which we can call “production capabilities” (24). ICTs imply that organizations and health systems will develop new skills and capabilities to cope with unforeseen changes in technology, but also the needs and expectations of citizens.

Health systems have been slow to identify and understand the potential, but also the challenges, of digital health. This situation could be explained by the fact that decision-making is more shaped by past experiences and less focused (or sensitized) on the challenges of the future. The obvious wave of connected objects and mobile technologies implied going through a transitional phase that could be synonymous with questioning of some of the professional and organizational negotiated orders (25). Changes that are naturally inherent to the emergence of a new ecosystem could cause a break with the current care ecosystem, with a new type of mediation eventually.

The advent of technological actors, like Uber and others, is symptomatic of a gap between the needs and expectations of citizens and healthcare systems’ capacity to respond. Citizens are trying to search for services, even via unconventional models, hoping to be taken care under conditions that respect their reality, constraints, expectations, context, and quality of life. Here, it is clear that the models of production and supply of traditional services have shown their limits. As for the taxi industry, the new players bring with them a number of changes, even major upheavals in the health sector. However, they may present real defects, dangers and risks for consumers, professionals, organizations and health systems, but at least

they have the ability to innovate and offer services that meet people's needs and expectations. Indeed, if these new players exist, it is because there is a void somewhere with respect to the good care of patients, especially in terms of satisfaction and expectations.

Conclusions

Digital health could be the keystone of a successful reform of healthcare systems for improved efficiency and effectiveness for the benefit of the people. However, one condition for optimizing the potential of ICTs may also be to abandon many practices and models of service, often marked by disciplinary, corporate and organizational silos as well as laws and regulations that are no longer in tune with the reality. Health systems should, because of their social responsibility, be actors (and not spectators) of the ongoing digital revolution. If this technological shift is missed, the emergence of parallel health systems, borne by new actors, is inevitable.

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Footnote

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