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e-Health: Opportunities and Critical Issues for the Patient and for Health Services

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By digital health (e-Health) is meant as all the tools and services that use information and communication technologies (ICTs) to improve prevention, diagnosis, treatment, monitoring and management of health-related issues and to monitor and manage lifestyle-habits that impact health. The evolution toward increasingly digitized health and health care represents a revolution in the way health is protected and health services are delivered.

To give an idea of this heterogeneous and growing set of instruments, one, aware that they are undergoing continuous transformation, can only take a descriptive approach and formulate a few of the most significant examples.

Telemedicine, which consists of remote diagnosis, treatment and monitoring of patients, is the first manifestation of the digital health phenomenon, its original and still current pillar.

Digital health, however, has expanded to other areas of medicine and healthcare.

One of the most forward-looking frontiers are digital therapies or "digiceuticals", that are therapeutic interventions whose "active substance" is a software, a digital tool.

Also not to be forgotten are the contribution to medicine and healthcare of algorithms, which are becoming increasingly advanced through machine learning and artificial intelligence techniques. Algorithms intercept the phenomenon of "big data", that incredible amount of digital information, characterized by unprecedented volume, speed and variety, which is the chosen terrain for their operation. Algorithms have computational and predictive capabilities unimaginable to a human.

Algorithms can analyse radiological images and provide diagnoses very quickly; they can also make accurate predictions about the course of diseases.

Looking at current events, the use of algorithms has proved crucial in the fight against the Covid-19 pandemic.

Artificial intelligence and big data are the most important allies of precision medicine, an emerging approach to treating and preventing disease, which takes into account genetic, environmental, and lifestyle variability in the individual patient.[1] Precision medicine enables therapies tailored for each individual and therefore more appropriate, effective and efficient, while containing the risk of adverse or undesirable events.

Digital health also consists of a range of tools aimed at improving health services, in particular by simplifying the relationship between healthcare facilities, professionals and citizens.

Let us think of the electronic health record, the "digital health identity card of the individual citizen"[2] and of the other examples of dematerialization in healthcare, like the electronic medical record or e-prescription. Part of digital health care are also electronic reservation systems for access to health care services, which are helpful in reducing waiting times.

In addition, the important role of health data in many of these tools should not be forgotten and will be further enhanced (for both primary and secondary uses) by the European Health Data Space.

In this issue of Erdal, we aim to represent the phenomenon of digital health with as broad and inclusive a view as possible, giving space to its various manifestations and showing the variety and pervasiveness of the phenomenon.

Sometimes e-Health tools will be the subject of a devoted reflection, dropped into the specifics of a national reality, as in the case of articles on telemedicine, on the electronic health records or on digital therapies. Sometimes an overview of the main e-Health instruments will be provided, especially in those papers that provide a

[1] See the definition given by the U.S. Food and Drug administration: www.fda.gov/medical-devices/in-vitro-diagnostics/precision-medicine.

[2] In these terms see G. Polifrone, *Sanità digitale. Prospettive e criticità di una rivoluzione necessaria*, Milan, Lswr, 2019, 11.

general picture of the development of digital health in particular countries.

The essays that make up this issue are intended to stimulate a balanced analysis on the different sides of the application of ICTs to health care, highlighting advantages and criticalities, potentials and uncertainties, in order to avoid the risk of incurring techno-optimism or techno-pessimism.

The reflections unfold on two planes: both the impact of digital health on the role played by the sick person with respect to his or her own health and course of care, an issue that also involves the doctor-patient relationship, and the impact on welfare systems.

Regarding the first aspect, e-Health is certainly an exceptional tool for patient empowerment.

The concept of empowerment takes on a significant declination in health care where patient empowerment is defined as the "process of personal development whereby the patient/individual is endowed with knowledge, skills and awareness that enable him/her (in whole or in part) to self-determine in relation to his/her own health".[3]

First and foremost, e-Health creates the preconditions for such empowerment: in fact, it opens up unbelievable possibilities for access to health care services.

Secondly, it seeks to provide answers to instances that are increasingly becoming part of the demand for health services: the need for direct and immediate health information; the request for direct management of one's own data and the various diagnostic and therapeutic options available, which allows greater control on one's own health; the demand for a more direct and informal, as well as faster relationship with health professionals or, more in general, with health facilities.

However, there are also problematic aspects. Let us think of the risks related to privacy, data quality and security of a data-driven medicine and healthcare, issues that regard both the individual and the digital health system as a whole. Some scholars have also underlined the issue of patient self-vulnerability that may result from the availability of personal clinical data even without the mediation of the physician.[4] This issue can be made even more serious because nowadays people can freely turn to the web for medical or supposed medical services and for buying drugs without the guide of an expert physician.

Another critical matter is the de-humanization of the physician-patient relationship, that can be iconically expressed through the image of the "robot-doctor".[5]

Moreover, one cannot forget the possible discrimination arising from the digital divide, due to which access to and informed use of tools are conditioned by factors such as age, socio-economic status, etc.

The analysis of the impact of digital health on welfare systems moves from the consideration that digital health does not only pertain to the field of health care delivery, but also encompasses political-administrative processes that relate to e-Health.[6]

In the various articles of this issue the topic is always approached from a multilevel perspective, aimed at investigating the influence of the European Union, despite the absence of specific competencies on health, and delving into the situation at the national and sub-national levels.

E-Health is an engine for modernization and greater efficiency of health systems, which can make a significant contribution in addressing what is now the key problem of health services in different countries: sustainability.

However, we will see that the development of digital health is characterized by numerous implementation problems and proceeds in "variable geometry" with significant differences between countries and between areas within the same country. Often the performance and organizational problems that plague health services, affecting the patients' health, are "reproduced" in the difficulties and delays in developing digital systems.

[3] On the impact of digital health on patient empowerment see E. Bellio, L. Buccoliero and A. Prenestini, *Patient web empowerment: la web strategy delle aziende sanitarie del SSN*, in *E. Cantù* (ed.), *L'aziendalizzazione della sanità in Italia: rapporto Oasi 2009*, Milan, EGEA, 2009, 413 et seq.

[4] See A. Pioggia, *Il Fascicolo sanitario elettronico: opportunità e rischi dell'interoperabilità dei dati sanitari*, in R. Cavallo Perin (ed.), *L'amministrazione pubblica con i big data: da Torino un dibattito sull'intelligenza artificiale*, Rubbettino Editore, Soveria Mannelli (CZ), 2021, 222.

[5] See R. Balduzzi, *Cinque cose da fare (e da non fare) in sanità nella (lunga e faticosa) transizione verso il post-pandemia*, in *Corti supreme e salute*, 2020, 353.

[6] For this observation see N. Matteucci and N. Marcatili, *E-health ed evoluzione dei sistemi sanitari. Un'analisi empirica sull'Europa*, in G. Vicarelli e M. Bronzini (eds.), *Sanità digitale. Riflessioni teoriche ed esperienze applicative*, Bologna, il Mulino, 2019, 51.