Starting the path of Digital Transformation in Health

Innovation in Digital Health: Conference proceeding

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I. INTRODUCTION

The digital transformation is a current global issue that involves different sectors and social fields. Health institutions have not been left out of this wave of transformation. The inclusion of information and communication technologies (ICTs) in critical clinical and administrative processes in the healthcare setting is becoming increasingly frequent (1,2).

The main goal of implementing ICTs is to ensure that information related to health care is accessible by the right person, in the right place, at the right time and in a safe manner, seeking to optimise efficiency, equity, access, safety and quality of health care. The inclusion of information technologies in the healthcare setting has ceased to be desirable and has become a necessity and a must (3).

The need to introduce the Electronic Health Record (EHR) as the main transforming project of hospitals and health centres is not currently discussed. This decision is usually a priority step towards the overall transformation of a country's healthcare system. In this scenario with fully computerised hospitals and EHR, it is possible to take advantage of a large amount of generated data to provide better clinical care. Likewise, the proliferation of mobile health (mHealth) allows the support of medical care through smartphones or tablets, benefiting from its associated characteristics, such as accessibility, portability, agility or ease of use. Mhealth encompasses activities from prevention and clinical diagnosis to the treatment of patients (4,5).Soon, it will be possible to manage the health of individual patients and analyse the health context of the population with a broader and richer vision applying the new techniques of predictive statistical analysis and the advancement of computer science to the flow of data generated by the patient, data from EHR and other external sources. However, it is essential to note that without interoperability standards, data governance models and, above all, without a comprehensive digital strategy, the immense flow of information generated becomes impossible to manage.

In this sense, digital transformation is not a simple change (6). It is not just a question of the modernisation of medical infrastructures or technologies. It is a continuous and complex process, multidimensional, linked to social, economic and technological factors that transcend the walls of hospitals. It implies a change in the mentality of the whole process of care, placing the patient at the centre of this transformation.

When it comes to tackling the digital transformation in a country, we are faced with multiple challenges that range from budgetary limits to achieving acceptance of health professionals who should be and feel like protagonists. Similarly, it is important to involve patients in this transformative movement whose ultimate goal is to improve their care.

In this scenario, with the publication in the Official Gazette of the Resolution 189/2018 the National Ministry of Health of Argentina has launched the National Strategy of Digital Health 2018-2024, an essential milestone- that marks the path towards obtaining interoperable information systems that facilitate the recording of information during contact with the patient and allow sharing of information between the different levels of care and jurisdictions (7).

In this transformation process, the training of the health team and technical assistance to advance in its implementation is paramount.

Within this framework, the Institute of Clinical Health Effectiveness (IECS), the Division of Health Science and Technology of Harvard University and the Massachusetts Institute of Technology (MIT) in collaboration with the Program of Technological Innovation in Public Health of the School of Medicine of the University of Buenos Aires (UBA) decided to organise the conference Innovation in Digital Health as an opportunity to develop local capacity.

II. THE CONFERENCE

Innovation in Digital Health was held on May 11 and 12, 2018 at the School of Medicine of UBA. This event was supported by both the Ministry of Health and the Ministry of Modernization of Argentine. This scientific event was aimed at health professionals, students, computer scientists and engineers working in the field of health information and communication technologies.

The leading conference's goals were

• To provide participants with a learning opportunity that is hands-on and interdisciplinary

• To provide participants with international exposure and collaboration

• To foster research and innovation in digital health.

For two days, 30 experts participated in the different lectures and workshops that were part of the agenda. The collegiate team was formed by 15 international guest and 15 local representants. International experts were part of MIT; two came from Albert Einstein Institute (Brazil), one from Clinic Hospital (Spain), two from Harvard University, one from Standford University and one from Guanajuato University. Local speakers represented research, academic and government area.

The opening speeches of the conference were given by the Minister of Health, Adolfo Rubinstein MD; the Dean of the Faculty of Medicine (UBA), Prof MD Ricardo Gelpi, and the Director of the Department of Research in Chronic Diseases of the IECS, Vilma Irazola MD. After the opening ceremony Alejandro López Osornio MD, representative of the Ministry of Health introduced the National Digital Health Strategy in Argentina and Daniel Abadie MD from the Ministry of Modernization presented the Digital Strategy for health in the public sector, highlighting the value of innovation and technology applied to public health to create products focused on the citizen.

The different conferences and workshops addressed the main problems, challenges and opportunities faced by health organisations in the process of digital transformation, the application of Big Data in health as well as the development of health strategies based on MHealth. The schedule of the conferences and workshops, as well as the speakers and chairs, are described in **table 1**.

III. THE ATTENDEES

A total of 204 participants attended the conference; 45 % (92/204) were females. The majority of the attendees were professionals (184/204); only 9.8% (20/204) were students who belonged mostly to the medical informatics career [45% (9/20)]; 25% (5/20) to clinical specialities and 20% (4/20) to the research area.

Most professionals' participants developed their activities in executive level and health management (29%), 16% were healthcare practitioners, and only 9 % were data scientists, medical informatics or engineers. Regarding their affiliations, members of academic institutions were the most frequent group (31%) that participated in the conferences, 24% belonged to industry and 13% to government institutions.

IV. CONFERENCES AND WORKSHOPS

72 % (147/204) of attendees participated in the workshops (147 on day 1 and 131 in day 2). A minority of the enrolled audience (23%) attended only the lectures. The number of participants in the different workshops according to their academic degree is shown in **figure 1**.

The attendance to the workshops varied according to the profession of the participants. Researchers were most interested in the workshop about tools for collaborative research using health data and design of digital health solutions for usability and sustainability. Instead, participants with leadership role were more interested in the workshop "Decision trees with applications to health care data."

In the survey conducted at the end of the event, 90% of respondents rated the event as excellent - very good (7-9/10 in all cases), 70% considered it interesting. Additionally, 90% of the attendees said they were interested in other activities in the future. The qualification given to the program was graded as excellent or very good by 90% of the participants, as well as the guidance provided by tutors.

Table 1 Conferences, Workshops and speakers

Conferences	Speakers-Chairs
1. From descriptive to predictive, the path of digital transformation in a highly complex hospital	Daniel Luna. MD *Hospital Italiano de Bs. As*
2. Use of mobile technology to address cardiometabolic conditions and other NTDs in Latin America: challenges and opportunities	Andrea Beratarrechea MD *Chronic Disease Research Department (IECS)*
3. How to use REDCap	Alvaro Ciganda. *Statistics, Data Management and Information Systems Unit (IECS)*
4. Public Health Technological Innovation Program	Marina Rojo. MD/ Marina Ridao. MD *Department of Public Health. Faculty of Medicine (UBA)*
Workshops Day 1	
1. Tools for collaborative research using health data.	Tom Pollard, Felipe Torres (MIT) - Marina Ridao (UBA).
2. Promoting entrepreneurial spirit for health care and biotechnology	Leo A. Celi (MIT), Guido Davidzon (Standford U), Federico Pedernera, Domingo Liotta - Marina Rojo (UBA).
3. Building world-class data collection tools	Ariel Fernández (IECS) and Eric Winkler (MIT).
4. How to transform an innovative idea into a project financed	Andrea Beratarrechea (IECS), Marina Rojo (UBA), Kathy Morley and Michael Morley (Harvard U).
Workshops Day 2	
1. Introduction to clinical medicine for the data scientist.	Leo A. Celi (MIT); Guido Davidzon (Standford U), Rafael Martinez (Guanajato U) and Marina Ridao
2. Design of digital health solutions for usability and sustainability.	Patrick McSharry (Harvard U); Kenneth Paik (MIT) and Diana Saimovici (Ministry of Modernization)
3. Decision trees with applications to health care data.	Alistair Johnson and Miguel Armengol (MIT)
4. Creation of an electronic database of health records for research.	Lucas Bulgarelli (Htal Isaelita Albert Einstein); Rodrigo Deliberato (Albert Einstein U); Antonio Nuñez (Hospital Clínico San Carlos, Spain) and Matias Said (Hospital el Cruce, Buenos Aires)

Table 1 Innovation in digital health: conferences, workshops and speakers with their respective affiliation

Figure 1. Distribution of workshop attendance according to the participants' academic degree. The workshops were:
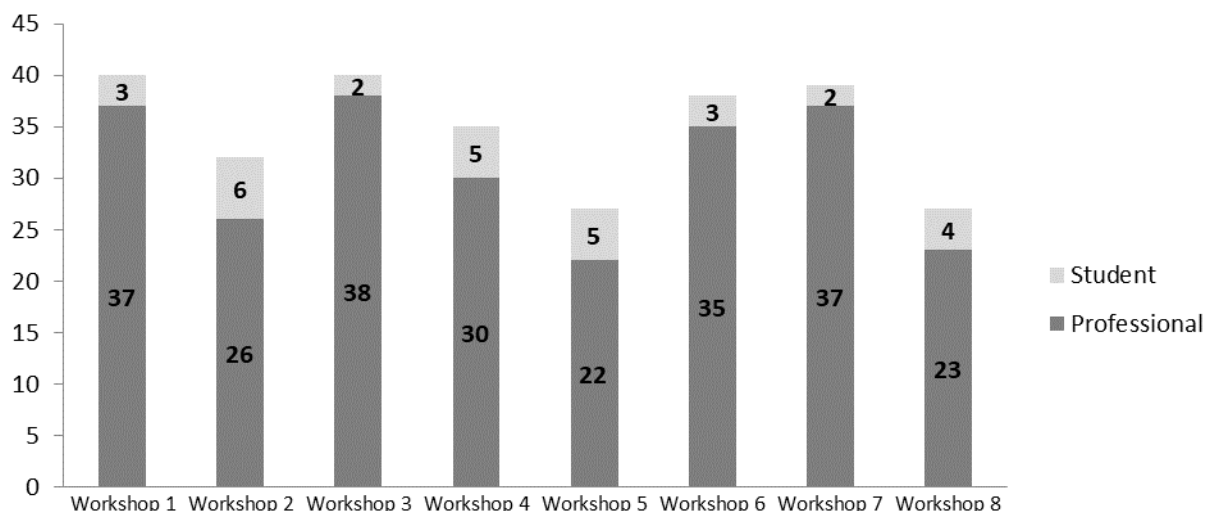
Workshops 1.Tools for collaborative research using health data; 2. Promoting entrepreneurial spirit for health care and biotechnology; 3. Building world-class data collection tools; 4. How to transform an innovative idea into a project financed; 5. Introduction to clinical medicine for the data scientist; 6. Design of digital health solutions for usability and sustainability; 7. Decision trees applied to health care data; 8. Creation of an electronic database of health records for research.

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V. DISCUSSION

EHealth, defined as the application of ICTs to health and health care systems to improve quality of life, efficiency in service delivery, and the economic and social value of health, has become a potential for improvement in health systems (8). The appropriation of ICTs requires specific skills or competencies that people must acquire and develop.

In this scenario, local argentine authorities, in collaboration with international partners with a particular interest in leveraging mobile health technology to improve health care delivery in

resource-constrained settings, have organised the Digital Health Innovation Conference. The event was an initiative of IECS, the Division of Health Science and Technology of Harvard University and the Massachusetts Institute of Technology (MIT) in collaboration with the Public Health Technological Innovation Program (School of Medicine. UBA). This first edition 2018 focused on two significant themes: Big data applied to health and development of health strategies based on Mobile Health. It had the support of the Ministry of Health and the Ministry of Modernization of Argentine in line with the launch of the National Digital Health Strategy.

For two days, more than 20 national and international experts, representatives from the Argentine government and the academic world participated in the event, in collaboration with members of MIT and prestigious personalities from the Harvard School of Public Health. The main objective of the conference was to build capacities for the use of tools that allow the processing of massive data (Big Data) as well as to develop skills for the design and implementation of strategies based on mobile health.

The meeting aroused great interest in the local scientific community; as demonstrated by the high attendance; 204 participants from different affiliations and professions had the opportunity to interact with the specialists and share experiences during the interactive session. The favourite activity was the eight workshops; 72% of the participants attended to them and worked interactively using their notebooks guided by the mentors.

The presentation of the main tools for collaborative research using health data and data collection instruments were favourite themes. These two topics generated the most considerable interest in attendance (40 attendees in each of the workshops), especially among graduate professionals. Also of interest in this group were the workshops that dealt with the design of sustainable health solutions and the application of decision trees in health.

Surprisingly, the students were most interested in those workshops focused on achieving financing for project sustainability and how to promote entrepreneurship, and there is scarce literature on the necessary digital competencies and the situation of the health workforce in the world and especially in the region.

Health professionals currently working in the Argentinean health system present a wide range of ages, including several generations of digital natives, for whom digital competencies could also be a problem (9). Digital competencies include a wide range of skills ranging from using a computer or other devices to browse the Internet and search for information. Other themes were related with content development, social networks participation, learning and teaching in virtual environments, and finally, more specific aspects linked to the use of health information systems such as the generation of EHR and knowledge production through artificial intelligence (10,11).

The high degree of response and concurrence demonstrates the interest of the health team and the current need to provide training instances, especially in the form of workshops that facilitate interaction with experts.

To reduce quality gaps in health care, it is necessary to implement information systems that identify the characteristics and needs of the population, allow with longitudinal and comprehensive monitoring of people throughout the health system, and provide innovative

tools to health professionals and patients for the intelligent management of information. With this vision and in order to ensure the success of the digital health strategy, it is essential to strengthening human resources by creating new spaces for training health personnel throughout the country, including representatives of all branches of health care and technology. Without a doubt, the success of the implementation of the national digital health concept will depend on the support and continuous training of all stakeholders.

VI. CONCLUSION

ICTs are recognised as a key element for the development of innovation of health care processes and the improvement of the efficiency and quality of care in health systems. In this setting, the skills of healthcare professionals are essential factors that impact digital health strategies. Undoubtedly, the policies that achieve greater participation and commitment of the different actors of the system, more considerable training of users and better change management will be those that will have more chances of success.

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