

## Health Information Systems Adaptation and Flexibility in Extreme Situations: The COVID Effect

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### Abstract

In 2020, a pandemic forced the entire world to adapt to a new scenario. The objective of this study was to know how Health Information Systems were adapted driven by the pandemic of COVID. 12 CIOs of healthcare organizations were interviewed and the interviews were classified according to the dimensions of a sociotechnical model: Infrastructure, Clinical Content, Human Computer Interface, People, Workflow and Communication, Organizational Characteristics and Internal Policies, Regulations, and Measurement and Monitoring. Adaptation to the Pandemic involved social, organizational and cultural rather than merely technical aspects in private organizations with mature and stable Health Information Systems.

### Keywords:

Health Information Systems, Covid-19, Clinical Informatics

### Introduction

In 2020, a pandemic forced the entire world to adapt to a new scenario. On March 11th, the World Health Organization declared a pandemic caused by coronavirus [1]. As a result of this, in many countries a mandatory quarantine was declared [2].

In this context, Health Information Systems (HIS) faced a double challenge: they had a central role in the effective identification, reporting and analysis of cases and contacts [3]; and they had to allocate resources to ensure the continuity of clinical care [4]. The HIS had to adapt quickly.

The sociotechnical model (STM) proposed by Sittig et al [5] includes 8-dimensions that address the challenges involved in the design, development, implementation, use and evaluation of HIS. Addressing the challenges involved in this extreme implementation context, this model allows us to understand the magnitude of the adaptive process. In this paper the objective was to know how HIS were adapted, driven by the pandemic of COVID, in light of the 8 dimensions of the model.

### Methods

A qualitative study was conducted with semi-structured interviews with CIOs of healthcare organizations.

This research project was approved by the institutional ethics committee (CEPI #5278). The interviews were individual, through a video call platform following an interview guide, recorded for later analysis. The sample size was defined by saturation of the investigated contents following a convenience sampling. The textual material was analyzed through content analysis, according to the dimensions of the STM used as a theoretical framework.

### Results

From April to May, 12 CIOs from 11 healthcare companies based in Argentina and 1 in Uruguay were interviewed. Each interview lasted between 1 and 2 hours.

#### Hardware and Software Computing Infrastructure

The main adaptations were related to the accelerated and large-scale implementation of remote work, from which it was necessary to expand telecommunications services and reallocate resources to ensure that all employees can continue with their work. Regarding the safety circuits, the interviewees told that it was not necessary to make major changes, but rather that they kept the circuits on the already existing bases, reinforcing the training on the importance of maintaining good practices.

*"We recommend good practices for accessing confidential information from home"*

#### Clinical Content

Telemedicine was the main form of clinical care. Teleconsultations went from being the object of great resistance to being a solution requested from health institutions, both by health professionals and patients themselves.

*"Everything that is teleconsultation, before was a resounding NO, and now it has become salvation"*

#### Human Computer Interface

Few changes were required in the interfaces, necessary to enhance the new requirements. However, many users now were forced to use computer resources to carry out their tasks, mainly patients. In addition, there were changes in the ways of accessing them, mainly with regard to institutional users, the tasks flow to use a certain tool, its ergonomics in the interaction with the system, among others.

*"We did not have to make new interfaces, we tried not to modify it too much so as not to delay in this solution"*

#### People

All interviewees agreed that the teams worked outside of working hours, including on weekends and holidays, because it was a responsibility to meet the defined goals. They detected a greater recognition of final users about the importance of the systems area within health institutions. It can be thought that the pandemic generated an improvement in the perception of people towards the work of HIS teams. In addition, CIOs understand that the context favored the reduction of resistance to historically controversial projects. The context operated as a facilitator in the digital transformation of certain processes in which great resistance was observed.

*"The perception of digital transformation as a necessity is invaluable"*

### Workflow and Communication

Regarding Communication and Processes, the multi-channel approach, the preponderance of agile methodologies in project management, and the change of format in internal communication stand out. Regarding training and dissemination, multichannel was highlighted. Interviewees indicated that both the channels for communicating with end users and the format of the communications were diversified. Regarding internal communication, all meetings became virtual by teleconference, and communications took place through digital channels. The interviewees maintained that despite these changes, internal communication maintained the objectives and performance, and even in some cases, it was improved.

*"Virtuality facilitated presenteeism in meetings"*

### Internal Organizational Policies and Culture

There was agreement among the CIOs interviewed that the implementations in no case waited for the writing of new institutional policies, norms and procedures.

Regarding the planning of strategies in the face of the pandemic, in all the interviews there was talk of reprioritization of projects, which meant an adaptation of each organization with the available resources and an acceleration of key projects. Planning was always governed by the objectives of maintaining continuity of care, economic sustainability and capitalizing on changes in favor of digital transformation.

*"The most important objective was to maintain the continuity of care"*

### External Rules, Regulations, and Pressures

The external regulations were the starting point to generate all the adaptations but in no case were limiting. The main regulations that had effects on the HIS were the Decree of Social Isolation, the Resolution on Electronic Prescription, the flexibility of the requirements of the Work Risk Insurers for remote work and the coverage of certain teleconsultations.

*"We were adapting to the new regulations and they were accompanying us, but they were not a limitation"*

### System Measurement and Monitoring

As regards measurement and monitoring, according to what the interviewees told us, informal evaluations based on the perceptions of the actors involved were added to the already existing indicators. It is important to consider that the interviews were carried out when most of the changes were still in the process of being implemented, which is why many interviewees indicated that they did not yet have a formal evaluation of their projects.

*"We still do not have a final evaluation"*

### Discussion

Adaptation to the COVID19 Pandemic involved social, organizational and cultural rather than merely technical aspects, in private organizations with mature and stable HIS. A crucial characteristic of the HIS is their ability to adapt to different situations that imply changes in their dimensions, to guarantee the continuity of care or the provision of services to the institutions [6], without jeopardizing their economic model.

The context of social isolation can be thought of as a facilitator in digital adoption [7]. It has been seen in the interviews that

many of the HIS projects that previously offered the greatest resistance from health professionals, patients, administrative workers and other actors linked to HIS; since the pandemic, they have begun to be requested by them. This results in an improved perception of HIS by end users.

### Conclusions

Evaluating the adaptation of HIS to the pandemic using Sitig's sociotechnical model as a framework was useful for a more complete analysis and a better understanding.

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