

Health Informatics Support for Outbreak Management: how to respond without an Electronic Health Record?

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To the editor,

The world is facing an unprecedented health crisis in 2020 with the COVID-19 pandemic. Reeves et al. paper[1] underlined the importance of the Electronic Health Record (EHR) and health informatics in general to support outbreak management. They proposed several recommendations heavily-based on the EHR to help hospitals improve their response in this unique situation.

This article is extremely relevant for the United States, since most American within the healthcare system have their data recorded electronically. According to the Office of the National Coordinator for Health Information Technology (ONC) report, as of 2015, 96% of non-federal acute care hospitals and 78% of office-based physicians had adopted certified health Information Technology (IT).[2]

Thus, with a fully functioning EHR, the authors were able to implement screening tools to help proper triage, ordering tools for accelerated biology and imaging exams and even clinical decision support. All of those EHR enhancements followed COVID-19 monitoring guidelines set by institutions and were a major help for outbreak management.

The use of EHR as a potential public health tool has been studied for years[3] and with the COVID-19 pandemic, many institutions worldwide have tried to leverage its full potential to accelerate their response.

However, some health institutions are still struggling to entirely digitize their health data. In France, according to the French Office of Health Care Supply (DGOS, Direction Générale de l'Offre de Soins), only 70% of hospitals have a fully functioning EHR.[4] Therefore, how can the 30% left still be efficient during this pandemic?

Hospitals can still rely on classic outbreak monitoring, based on manual reporting and contact tracing, but with the scale of COVID-19, these techniques have shown their limitations, especially regarding real-time transmission of information.

For this reason, after initially using manual outbreak managing techniques at the Martinique University Hospital, we decided to develop an alternative solution. Indeed, our hospital is the only academic hospital in Martinique, which is a French oversea territory located in the Caribbean. Moreover, the Martinique University Hospital is one of the French hospitals without a fully functioning EHR.

Thus, the clinical informatics team and the COVID Crisis Team collaborated to develop and implement two simple managing tools. The Clinical Informatics Team included a medical informatics doctor, an epidemiologist, an engineer specialized in interoperability and a scientist specialized in modelling. The COVID Crisis Team included two infectious disease physicians, an Emergency Room physician, an Intensive Care Unit physician and a bed manager.

The aim of these tools was: i) to be able to build and implement them quickly with limited resources; ii) use our existing developing tools or open-source alternatives if not available; and iii) be able to create and distribute real-time reports.

We managed to build two databases in less than a week.

The first database (COVID-SAMU) is a triage database used for monitoring outpatient cases, with a phone call schedule based on national monitoring guidelines. The database has information on all outpatient cases, including their address, their age, their underlying diseases and their different symptoms. Sociodemographic data from patients with COVID-like symptoms are first automatically integrated from the hospital triage software. Then, we developed a web application where each clinician can fill specific forms to monitor COVID symptoms and their evolution at the time of each phone call.

We decided to heavily rely on this form of outpatient monitoring rather than self-reporting (for example, based on a smartphone application) because of our population characteristics (Martinique is one of the oldest French territory).

The second database (COVCHUM) is for hospitalized patients. This database also integrates the few digitized data available (administrative data, reimbursement claims and laboratory test reports). As for the COVID-SAMU database, we developed a web-application and COVID-specific forms for clinicians. In this case, we needed to be able to integrate quickly the most important data for COVID monitoring despite the lack of interoperability between our different digitized systems.

Since our administrative data is fully digitized, we were able to link patients throughout the different systems with their hospital ID (Identifiant Permanent du Patient, IPP). Symptoms were mapped to the French International Classification of Diseases, 10th edition (ICD-10) when possible, and procedures were mapped to the French Procedure Terminology (Classification Commune des Actes Médicaux, CCAM).

Both databases are implemented with WINDEV[®], because it allowed us to automatically integrate data from our hospital framework (all of our hospital software rely on Oracle[®] database management system). We also used WEBDEV[®] to develop the web-based applications, because we wanted to be able to deploy them hospital-wide in a very short time, even with a very small team. Finally, both COVID databases allow to perform queries using Structured Query Language (SQL) and extract structured data in comma-separated values (CSV) form, which helps us create real-time reports.

We still wanted to comply as much as possible with health IT guidelines. As a result, we focused on interoperability, standardized terminologies and automatic data collection when possible. We also implemented simple rule-based Natural Language Processing algorithms to be able to extract unstructured data from clinical notes.

Despite our limited resources and our lack of an existing adequate informatics framework, we managed to implement relatively simple tools, which helped us improve our ability to rapidly respond to the evolving situation.

The electronic health record is an essential tool for COVID-19 management, but even without it, we can still develop alternative solutions that can tremendously help hospitals with limited resources and without state of the-art health IT. We should leverage these solutions to help reduce the impact of the digital divide in healthcare, especially in time of crisis.[5]

CONTRIBUTORSHIP

ES drafted the manuscript and helped designing the software. RMT wrote the code for the software and reviewed the manuscript. ECJ helped designing the software and revised the manuscript. PG, CH, YB, HM, FN, SPF, SA and AC gave all clinical recommendations, tested the tool and reviewed the manuscript. AC and MD helped with the software design and reviewed and revised the manuscript.

COMPETING INTERESTS

The authors have no competing interests to declare.

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Health informatics support for outbreak management: How to respond without an electronic health record? *J Am Med Inform Assoc.* 2020 Nov 1;27(11):1828-1829. doi: 10.1093/jamia/ocaa183. 10 EA 4537, French Institute of Health and Medical Research, Fort-de-France, Martinique. 11 CIC-1424, Centre Hospitalier Universitaire de Martinique, French Institute of Health and Medical Research, Fort-de-France, Martinique. 12 Department of Clinical Research and Innovation, Centre Hospitalier Universitaire de Martinique, Fort-de-France, Martinique. **Keywords:** COVID-19; digital divide; electronic health record; health informatics; pandemic. **Publication types:** Letter. Health informatics is revolutionizing the practice of health care, and redefining health care careers Learn more about this growing field. **Improve the health of entire populations (for example, by using data to predict and even prevent outbreaks of disease in a particular geographical area). Enable health organizations to deliver care more cost effectively. The widespread use of health care technologies and data management has allowed many health care specialties to utilize health informatics in ways that work best for them, meaning there is no "one size fits all" understanding of the field. Here is a closer look at some of the primary subdisciplines that fall under the umbrella term "health informatics."** **Global Health Risk Framework: Resilient and Sustainable Health Systems to Respond to Global Infectious Disease Outbreaks: Workshop Summary (2016). Chapter: 4 Strengthening Information Management Systems. Get This Book.** **Suggested Citation:"4 Strengthening Information Management Systems." National Academies of Sciences, Engineering, and Medicine. 2016. Global Health Risk Framework: Resilient and Sustainable Health Systems to Respond to Global Infectious Disease Outbreaks: Workshop Summary. Washington, DC: The National Academies Press. doi: 10.17226/21856. —. Can electronic medical record systems transform health care? Potential health benefits, savings, and costs. *Health Affairs*, 24(5), 1103–1117. doi:10.1377/hlthaff.24.5.1103. Jha, A. K., DesRoches, C. M., Campbell, E. G., Donelan, K., Rao, S. R., & Ferris, T. G. et al. (2010). Use of electronic health records in U.S. hospitals. **Meaningful use and meaningful curricula: a survey of health informatics programmes in the USA. *International Journal of Electronic Healthcare*, 7(1), 1–18. doi:10.1504/IJEH.2012.048666. Kuhn, K. A., & Guise, D. A. (2001). **Organizational aspects of health informatics: managing technological change. New York: Springer-Verlag. doi:10.1007/978-1-4757-4184-1. Maojo, V., & Martin-Sanchez, F. (2004).******