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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 coronavirus disease 2019 (COVID-19) pandemic. Reeves et al's[1] article 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, as most American within the healthcare system have their data recorded electronically. According to the Office of the National Coordinator for Health Information Technology report, as of 2015, 96% of nonfederal 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, 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 overseas territory located in the Caribbean. Moreover, 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 2 simple managing tools. The Clinical Informatics Team included a medical informatics doctor, an epidemiologist, an engineer specialized in interoperability, and a scientist specialized in modeling. The COVID Crisis Team included 2 infectious disease physicians, an emergency room physician, an intensive care unit physician, and a bed manager.

The aim of these tools was to (1) be able to build and implement them quickly with limited resources; (2) use our existing developing tools, or open-source alternatives if not available; and (3) be able to create and distribute real-time reports.

We managed to build 2 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, age, underlying diseases, and 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 in which 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 (eg, based on a smartphone application) because of our population characteristics (Martinique is one of the oldest French territories).

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.

Because our administrative data is fully digitized, we were able to link patients throughout the different systems with their hospital ID. Symptoms were mapped to the French International Classification of Diseases, 10th Edition when possible, and procedures were mapped to the French Procedure Terminology.

Both databases are implemented with WINDEV (PC Soft, Montpellier, France) because it allowed us to automatically integrate data from our hospital framework (all of our hospital software relies on the Oracle database management system [Oracle, Redwood Shores, CA]). We also used WEBDEV (PC Soft) 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 and extract structured data in comma-separated values 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 EHR 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 health care, especially in time of crisis.[5]

AUTHOR CONTRIBUTIONS

ES drafted the manuscript and helped designing the software. R-MT wrote the code for the software and reviewed the manuscript. EC-J helped designing the software and revised the manuscript. PG, CH, YB, HM, FN, SP-F, 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.

CONFLICT OF INTEREST STATEMENT

None declared.

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