EDITORIAL

Reinventing Electronic Health Records During COVID-19:
Better Patient Data and Faster Research by Restructuring Electronic Health Record Systems

The COVID-19 pandemic has created an urgent and universal need for new data [1]. Attempts at rapid data accumulation have highlighted flaws in the current Electronic Health Record (EHR) systems regarding accurate and usable patient data. While some data, such as number of inpatients with COVID-19, has been collected fairly easily, more detailed information on the effect of COVID-19 on specific patient populations and clearly tracking the impact of different treatments on patients has proven difficult due to the pandemic chaos and complex record systems.

Electronic Health Record (EHR) systems facilitate patient care, physician communication, and research-oriented data collection by allowing immediate and off-site access to patient records. However, these systems have also created new types of errors in patient record keeping, often at the point of care [2]. Additionally, different systems have complicated the ability to derive important data elements from these records, most commonly in narrative, text-based records. In physician attempts to decrease time needed to fill out patient visit notes, many use the copy and paste function, leading to numerous errors in patient reports [2]. Furthermore, one single department may use several different structures for similar note types, thus making it difficult for coordinated care team members to quickly ascertain important information. These new record keeping systems have also imposed new burdens on research staff who collect data for registries and other studies, as data elements are often not consistently included in the same location for different records or may be recorded inaccurately by physicians as they copy and paste text into the primary visit note [2, 3].

Shifting point of care data entry away from text-based records to structured reporting minimizes inaccuracies, facilitates intra- and inter-departmental communication, and decreases the burden on research staff or physicians collecting data [4, 5]. As opposed to typing into a blank text document, structured point of care data entry provides quick questions for the provider to click through. For example, the physician may be shown a field to input specific values, such as weight, or make selections from pre-determined lists, such as a list of diagnoses, instead of typing it in. Structured reporting will further improve the ability to utilize artificial intelligence (AI) as patient data will be automatically collected in a consistent, computer-friendly way [5, 6].

The urgent need for accurate data on COVID-19 patients to provide patient care is a pressing matter, especially as we may be only just beginning to see long-term implications of COVID-19 and do not yet know the extent of the impact of COVID-19 on current pregnancies, for example, or long-term reproductive health. While this data requirement could be alleviated by focusing efforts on data collection, the burden is heightened due to current stress on physicians and the significant decrease in hospital budgets that have led to some reductions in research staff. Furthermore, systems for data collection, such as specialty specific registries, must be created to collect quickly evolving data elements not captured by general hospital reporting, further delaying the accruement of potentially lifesaving information. While some data collection may be focused on COVID-19 status as the primary indicator, patient comorbidities create subpopulations requiring unique data elements. For example, COVID-19 women's health physicians may need to track additional variables for patients with hypertension in pregnancy or gestational diabetes. Thus, by implementing structured, uniform point of care data entry systems, one can quickly collect more accurate, AI-ready data and more rapidly adapt to changing situations.

TOOLS TO IMPROVE DATA ENTRY AT PATIENT POINT OF CARE

Many tools already exist to facilitate structured point of care data entry systems. Information technology and database personnel can provide invaluable input not only in producing a proposed system but also in thinking through the different ways data may be collected and stored. They may also have suggestions in ways to report out the most usable and accurate data, known as clean data. In order to make this partnership the most effective, it is important that both healthcare personnel and information technology professionals are interested in collaboration.

Walking through clinical workflows and discussing the importance of critical data elements with information technology professionals can prove invaluable in creating logical data storage systems and can lead to suggestions from the data specialists that physicians may not have thought of. Data teams may also have ways to improve the usability of the computer software interface and reduce redundancies across data capture. It is also important that data teams keep in mind the efficiency of the system and the speed at which the data can be handled by servers. In this way, building a collaborative environment is essential for optimal system design.

Specific tools for improved data collection include user-friendly EHR design and utilization of branching logic, which asks certain questions based on previous answers. This is accomplished by following existing workflows and simplistic data collection, such as the use of yes-or-no buttons, known as radio buttons. To reduce the burden on physicians, data elements may default to a given value based on usual practice or previously entered patient information. Data elements, such as current height and weight, should auto-populate into reports. Text based forms can be generated using specific data elements collected then automatically incorporated into a pre-formatted sentence structure, reducing data burden for physicians. Specific selections,

such as presence of comorbidities, may prompt further selections and simultaneously affiliate the patient with the appropriate department of a given comorbidity. Data element selection options should be carefully thought through, identifying the simplest yet most accurate form of data reporting [2-4]. For example, a diagnosis list for infertility may include specific nuances and thus sometimes require a longer list of options. However, the primary diagnosis list should be shortened using categories of similar diagnoses to both facilitate utilization of the data and reduce inaccuracies in selecting a similar, yet inaccurate, diagnosis at the main level. Once selected for a given patient, these diagnoses can auto populate into both current and future reports.

RECOMMENDATIONS

Structured point of care data entry systems will improve patient care communication by providing consistently clear, structured reports. Unique data fields can be incorporated for specific patient populations, different departments, or procedures. Structured EHR systems will also facilitate larger research projects by reducing secondary entry through clear coding of data elements at the point of care, thus minimizing the need for more complicated analysis of records by research staff.

Developing clear, user-friendly, structured data storage systems with logical labels allows data to be easily utilized for quality improvement and research [2-4]. For registries and collaborative projects, data can be translated directly from the structured EHR system and uploaded to other data collection platforms.

Switching EHR systems is a slow and expensive process, and thus is not necessarily a good solution. Instead, one can create these structured point of care entry systems in an institution's current EHR system. If the current EHR is not modifiable or not user-friendly, creating a web-based platform with information technology professionals is a good option that allows further customization.

CONCLUSION

Reinventing EHR systems towards structured point of care data entry will lead to better patient care and more effective resource utilization and research. It will also increase the usability of data for AI and lead to more accurate medical records and data collection. Furthermore, such work will facilitate both outcome tracking and collection of follow-up data as longitudinal data automatically becomes part of the hospital database. COVID-19 has highlighted the need for the structured point of care method of data collection. Focus on shifting to this data entry system will prove invaluable in understanding the impact of COVID-19 in ways that will reduce the burden of the pandemic on both emerging hotspots as well as areas preparing for new waves of the disease.

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