Laboratory informatics in covid-19 pandemic era

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Editorial

Data and information technology is a key component in responding to covid-19 disease and is an effective way for informing personnel, resource management, and inter-intra organizational communication. During the pandemic, technology-based tools enable organizations to facilitate the widespread information dissemination, real-time tracking, meetings and daily activities virtualization and telemedicine visits for patients, physicians, and other health care providers as a major risk group of Covid-19. In response to pandemic conditions, hospital leaders can use clinical informatics to assist in decision making, medical care virtualizing and workflows defining. Among them, the informatics team is considered as a supporter and facilitator in providing new care methods, helping to track and predicting the impact of relevant data.

The laboratory context is also affected by the current situation. The increased demands for laboratory results during the Covid-19 pandemic had exceeded the clinical laboratory tests capacity that led to significant pressure on laboratory staffs and infrastructures. Whereas, this is an undesirable condition when laboratories are forced to process daily large numbers of biologically samples, and delays in experiments directly lead to undesirable decision making, therefore, clinical laboratories face challenges that require specific capabilities in laboratory information system (LIS) to ensure safe and reliable tests. In this way, the role of clinical decision support systems (CDSS) on the effective use of laboratory services is prominent, which are used in different preanalytical, analytical and postanalytical stages of diagnostic tests. While, items such as computerized order entry, managing samples, test ordering, computerized sample entry, automated triaging, and real-time sample tracking are used in postanalytical and preanalytical stage; automated validation and reporting, sample registration, tracking, epidemiological reporting, searchable databases and daily summary statistics are applied in the post-laboratory stage. Also, there is a variety of CDSSs laboratory capabilities including reflex testing, in which the test results automatically lead to another test, and auto-verification features that leads to automatic results based on creating rules, automatic correction process and descriptive analytical algorithms. Using of CDSS in laboratory tests that their values had a high clinical impact on patient care is one of the most important and challenging aspects of providing laboratory services and failure to timely report could had diverse effect on patient care. Actually, this process requires a CDSS for identifying critical values, validating results, contacting with provider, and documenting the response that can take hours manually. Furthermore, recording laboratory instructions and patient demographic results allows the laboratory to monitor services and provides alerts for patients. For example, monitoring testing process to track non-testing of hemoglobin A1c (HbA1c) to warn the clinician or the patient or implementing CDSS systems that announce the medical personnel when the patient's parameters rise the life-threatening conditions.

The other capabilities of CDSSs are for reducing unnecessary laboratory tests. According to the results, more than 11% of the ordered tests were duplicate and unnecessary and could be eliminated. In order to solve this problem, user and system approach are proposed. In the user approach, different types of directing, physicians and other users' education and strategies to reduce the unnecessary test orders are provided. In the system approach, implementing various computer interventions and CDSSs are presented which warn users about unnecessary items in the order entry process. Finally, with the comprehensive use of computers in healthcare, artificial intelligence capabilities can also be used to create CDSSs that eventually lead to improve patient outcome. For example, setting up an automated laboratory test recommendation tool based on EHR data, identifying and flagging prescriptions for inappropriate dosages or drug combinations and presenting alerts to providers or abnormal laboratory test results.

In general, according to condition ahead in the field of Corona virus and increasing the workload and demands for processing large volumes of samples in laboratories, the necessity to implement CDSSs in the laboratory setting and use of artificial intelligence in this area are needed. This issue requires participating health informatic professionals to determine the needs and design of these systems.

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