

# Can Orthodontic Informatics Combat the Pandemic Pitfalls?

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## Abstract

The largest public health crisis of our time, COVID-19 has recklessly squandered many of the channelized healthcare facilities globally with execution of newer guidelines over the standard architectural norms. There has been unparalleled use of smartphones and internet services to bear the major pitfall- social distancing- especially for elective treatment services. This demands a new paradigm shift from offline to online doctor-patient, student-educator, researcher-researcher operations. This articles provides an insight into potential role of orthodontic informatics to provide a combined platform to generate a learning system that routinely collects, correlates, and analyzes data for developing artificial intelligence programs, lab exploratory systems, clinical decision support systems and health-information exchange systems. In order to develop this system, orthodontic analytic communities as start-ups for developing user-friendly programs must be encouraged, where orthodontic informatics itself can be taken up as a didactic career source.

## Keyword

Clinical informatics, data analysis, electronic health records, orthodontic care

An estimated 4.1 billion people were using the Internet in 2019.<sup>1</sup> In 2020, the enigmatic COVID-19 pandemic overwhelmed health care services globally with the unparalleled use of smartphones and Internet services. Remote monitoring and telecommunication services have become a need of the hour to reduce the in-office visits.

Today, the hour demands a paradigm shift from information production (in the form of orthodontic records and research) to information utilization through mobile and Internet applications. A vast amount of data available is through electronic dental records as well as orthodontic research; yet, they are stored in the beanbags of cloud and individual server systems. Informatics, here, helps to generate a learning system that routinely collects, correlates, and analyzes data for its further exploitation at the end-user interface. As our patients have become more aware of evidence-based health care, this can certainly be worked to generate evidence-based answers.

## Orthodontic Informatics: How It Works?

With increased sources of digitization in orthodontics over the past 2 decades, the volume of data produced from the electronic orthodontic/dental record systems are also growing exponentially year by year.<sup>2</sup> The first step in dental/orthodontic informatics is to convert the gathered data to formulate

a big data pool. Dental health data repositories in several professional societies have been formulated across the world that generate a centralized data pool derived from electronic health records (EHRs). When combined with a knowledge base (in terms of machine learning, text interpretation, and knowledge engineering), these data pools can then be converted into database frameworks that can be further designed toward meeting specific health care objectives. By adopting standard architectural guidelines for performing activities—such as data gathering, pre-processing, data analysis, interpretation, and visualization—these diversified big data frameworks then need to utilize for the end user in the form of artificial intelligence programs, laboratory exploratory systems, clinical decision support systems, and health information exchange systems.<sup>3</sup>

Data analytics can thus help generate evidence-based support systems to answer basic questions about common clinical information and patient management problems.<sup>4</sup> In orthodontics, the golden opportunities with informatics thus include the following.

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1. **In clinical care:** Digital cache for all orthodontic records together with medical and dental records; collaborative care through real-time sharing and annotations; electronic dental records to work beyond replicating records; evidence-based orthodontics and patient management strategies; and clinical decision support system in remote areas.
2. **For orthodontic research:** Reusing clinical data for research studies; salvaging research data and scientific workflows; helping advanced computational methods for research.
3. **In orthodontic education:** Evidence-based approach to handling complex cases; leverage technology-mediated support for clinical teaching; reliable user-friendly programs for patient education.

## The Challenges

Orthodontic informatics still requires a revolution: Not only in the clinical practice, infrastructure, or the hierarchy of the protocol right from patient education and registration, to the final treatment rendered and posttreatment follow-ups but also the research strategy and information exchange among orthodontists. The key challenges include implementation in changing the current practice model from data collection to data pooling, resistance, and criticism from colleagues in data sharing, and lack of trust of some clinicians in evidence or research.

Some of the other technical challenges include ensuring interoperability in information systems; to secure user authentication and privacy issues; developing standards to ensure consensus among stakeholders; and to reduce the cost of digital services to ensure the maximum inflow of data.<sup>4,5</sup>

Legal challenges include manipulation of digital files/digital forgery, questionable efficiency, and legitimacy of digital signatures to validate dental records; the requirement and confidentiality of electronic consenting for patients, participants, researchers, and even clinicians for transfer or exchange of records.

Nevertheless, despite these challenges, informatics offers the contactless process to optimize the new norms set by the contagion.

## Recommendations

To respect the social distancing norms and combat the pandemic, orthodontic informatics plays an essential role

to convert the reliable scientific knowledge into evidence-based learning. With the suspension of international travel and restricted mobilization of persons, it is also essential to develop global universal access to orthodontic services through informatics in terms of both patient care and research. This includes start-up orthodontic analytic communities for developing user-friendly programs for the stakeholders. Also, there must be an updated information resource training for all students, researchers, educators, as well as clinicians. Overall, data analysts and orthodontics should work together hand in hand, and orthodontic informatics itself can be taken up as a didactic career source.

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