

Perspective

Are Dental Students Ready for Nextgeneration Healthcare?

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Research and technology have changed our life style and the Internet becomes less of a privilege but a necessity to access information and the latest world news. It is hard to imagine nowadays students without smart phones that allow instant access the Internet to validate the information taught in classrooms. The modern technology has also impacted the healthcare system including the clinical practice of medicine and dentistry. The recent completion of the "Human Genome Project" allows the identification of many genetic factors that cause or increase risk for congenital and late-onset diseases [1,2]. Consider the potential significance of the Precision Medicine Initiative, a project funded by the US government to monitor the clinical history and data of one million individuals, as well as fully sequencing their entire genome using the NextGen Sequencing Technology [3,4]. These innovative research projects will make it possible to move at a much faster pace toward the era of personalized medicine.

It is probably accurate to say that physicians and dentists are trained to diagnose diseases and treat patients with drugs that might fit all patients with similar conditions. On the hand, personalized medicine, in which therapy is designed based on an individual's genetic makeup, is a healthcare model designed to care for an individual with specific accommodations made to that patient or a cohort of patients with similar genetic conditions. Ideally, personalized medicine will allow physicians and dentists to select medication most effective for a particular individual, and would also give practitioners the knowledge of diseases the patient may be at risk for and allow them to tailor prophylactic care to avoid these diseases altogether. Eventually, there would be more certainty in a patient's treatment, because a practitioner would be fully conscious of the genetic-based disease that the patient could be at risk for and what treatments that should be performed and avoided. This could lead to the diagnosis of diseases before they reach a more advanced, irreparable stage. Furthermore, the NextGen Healthcare approach will have implications for daily interactions in practice, and for medicolegal ethics and businesses (for example, how insurance companies choose to deal with patients that are more likely to develop chronic diseases).

An important question that must be asked is whether dental students are prepared for the Next Generation Healthcare. To answer this question, four dental students who participated in an elective course called "Evaluation and Presentation of Scientific Research" reflected on the current pre-doctoral dental education and discussed the importance of research and technology to prepare them to become the future practitioners. All students have agreed that research is important to give them a deeper insight to understand, analyze and think critically when facing challenges in new medical or dental cases. Research teaches student show to find answers to questions, to critically appraise the sources and to effectively implement the results to patient care. Without research, there is no evidence-based dentistry or personalized medicine. As future practitioners, it is important that dental students understand how and why organizations such as the American Dental Association (ADA) and American Heart Association (AHA) set their clinical practice guidelines based on the best available research evidence, and how peer reviewed and reproducible data is gathered and analyzed to form these guidelines. In addition, dentists should know how to select appropriate dental technologies and materials for use in their offices based on scientific evidence. Increased exposure to research also teaches dental student how to discern reliable study design and analysis from biased ones, and allows continued development of novel approaches and therapies to prevent and treat diseases.

While requiring all students to participate in bench research is unrealistic, every dental student should be required to participate in research by some means, whether a systematic review or clinical data analysis or bench research, to understand how research can apply to dentistry. Research and basic sciences should also be incorporated into the clinical curriculum the same way that clinical applications are incorporated into basic science courses. Students should be able to understand why techniques or procedures are done in order to become better clinicians. Research allows students and practitioners to understand the most current knowledge and practice contemporary dentistry. Without research being applied in clinic, a clinician could be performing outdated procedures that could be replaced with better and possibly easier techniques. It is through incorporation of evidence-based techniques that prevents dental professionals from becoming mere classical dentists and assists them in developing superior diagnostic and therapeutic capabilities.

Lastly, course work on NextGen technology and interpreting the results of the experiments could have a positive outcome. It is evident that healthcare is trending towards personalized medicine, and the dental practitioner may have to interact with patients undergoing personalized treatment or even screen and identify patients who may benefit from personalized medicine. It is imperative that students and currently practicing professionals are educated in this topic. Without understanding where the future of healthcare is headed, it will be

difficult, if not impossible, to be successful in the dynamic field of medicine and dentistry.

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