

# Evidence-based practice and the evidence pyramid: A 21st century orthodontic odyssey

**Priti Subhash Mulimani**

*Melaka, Malaysia*

---

Organized evidence-based practice is said to have started in the medical field in the late 20th century. Its principles and usage eventually spread to other health sciences, including orthodontics. Although the conceptual foundations and basic tenets of evidence-based orthodontics are based on the classical approach of testing medical interventions, differences unravel as we encounter the ground realities in orthodontics, which are unique due to the length, complexity, and diversity involved in orthodontic treatment and research. How has this led to the evolution of evidence-based orthodontics and changes in its applications? Is it being translated to better clinical answers, treatment strategies, patient satisfaction, and information for orthodontists? What more needs to be done, considering the rapidly changing orthodontic scenario? This article aims to explore these questions to evaluate how evidence-based orthodontics has played itself out so far, so that it can continue to grow strong and stand up to the challenges of 21st century orthodontics. (*Am J Orthod Dentofacial Orthop* 2017;152:1-8)

---

**D**entistry as a profession has evolved through the ages of the expert, professionalism, and science and brought us currently into the age of evidence.<sup>1</sup> Evidence-based orthodontics (EBO) is considered to be an important contributor to the rapidly changing scenario of orthodontic practice in the 21st century.<sup>2</sup> Over the past 2 to 3 decades since its inception, concerted efforts have been made to implement EBO and change the perception and practice of orthodontics from just an art to an art and a science grounded in scientific foundations able to withstand the tests of scientific rigor and scrutiny. From exhortations in leading orthodontic journals, creating awareness through specialty conferences and meetings by professionals and orthodontic societies, to inculcating it into orthodontic education and training, all have played an important role.<sup>3-6</sup> EBO is still in its early stages, and the evolution, development, and organization of the orthodontic evidence base is

constantly being shaped and redefined by challenges of clinical applications and practical issues, an overview of which is provided in this article by following the trajectory of EBO from its origins to its most recent developments.

## Genesis of EBO and the evidence pyramid

Evidence-based practice emerged as an alternative to “expert-based,” “eminence-based,” or “opinion-based” orthodontics. Its modern day origin can be traced to the medical field, where the urgent need for testing efficacy, safety, and suitability of drugs for clinical application and formalizing rules for grading quality of evidence arose consequent to medical disasters such as the thalidomide tragedy and deaths from the application of untested procedures, products, or hypotheses in clinical practice.<sup>7</sup> As evidence-based medicine started gaining popularity in the 1980s, its principles spread to dentistry and orthodontics. The term “evidence-based dentistry” was first used in the article by Richards and Lawrence<sup>8</sup> in 1995. Although the first randomized controlled trial (RCT) in orthodontics on Class II malocclusion was reported by Jakobsson<sup>9</sup> in 1967, the beginning of the evidence-based orthodontic era is mostly associated with the National Institute of Dental and Craniofacial Research funding trials on the same topic in the late 1980s.<sup>10</sup>

A fundamental tool for evidence-based practice has been the evidence pyramid, which depicts the hierarchy

---

Department of Orthodontics, Faculty of Dentistry, Melaka Manipal Medical College, Melaka, Malaysia

The author has completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest, and none were reported.

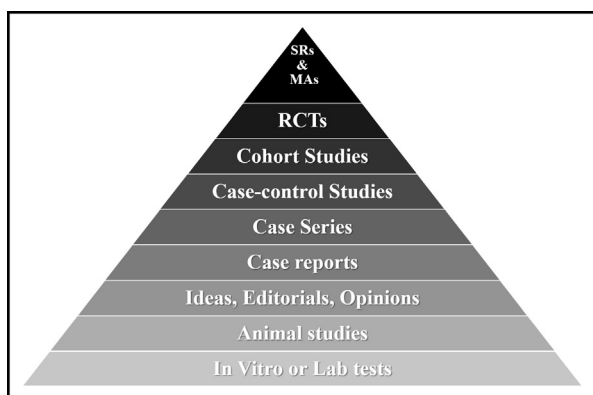
Address correspondence to: Priti Subhash Mulimani, Department of Orthodontics, Faculty of Dentistry, Melaka Manipal Medical College, Bukit Baru, Melaka 75150, Malaysia; e-mail, [mulimanipriti@gmail.com](mailto:mulimanipriti@gmail.com).

Submitted, October 2016; revised and accepted, March 2017.

0889-5406/\$36.00

© 2017 by the American Association of Orthodontists. All rights reserved.

<http://dx.doi.org/10.1016/j.ajodo.2017.03.020>

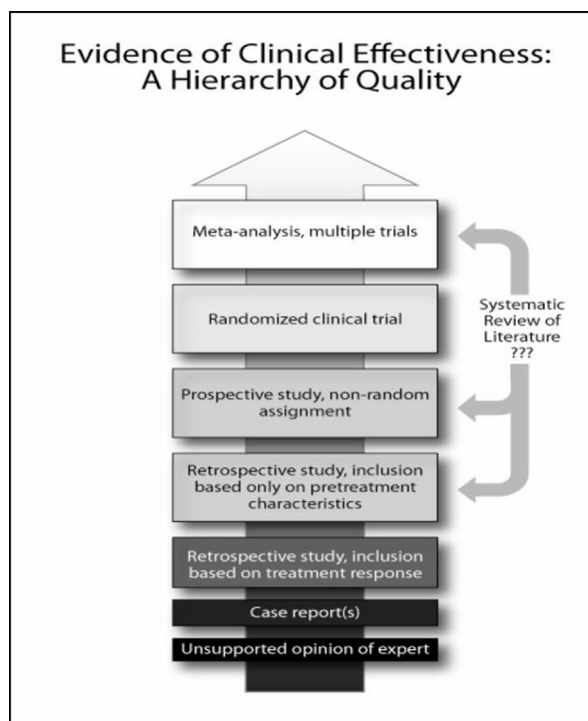


**Fig 1.** The pyramid of evidence: systematic reviews, meta analyses, RCTs. SR, Systematic reviews; MA, meta-analyses.

or levels of evidence from lowest to highest (Fig 1). The levels of evidence were originally described by the Canadian Task Force on the Periodic Health Examination<sup>11</sup> in 1979 to develop recommendations based on evidence in the medical literature. Sackett<sup>12</sup> developed these further into the evidence pyramid.<sup>13</sup> Levels of evidence are arranged in increasing order of internal validity (rigor or freedom from bias) from bottom to top, with in-vitro and animal studies placed at the lowest level, followed by opinions, case reports, observational studies, RCTs, systematic reviews, and meta-analyses at the tip, representing the highest level of available evidence (Fig 1).

#### Evidence pyramid: beyond traditional hierarchy

The evidence pyramid with its origin in evidence-based medicine gives the highest importance to the RCT study design as the best method to generate reliable and unbiased evidence. The discrete and well-delineated axis of disease-pathogenic agent / process-pharmacologic intervention in medicine lends itself well to the RCT study design. However, in orthodontics, the etiology of malocclusion is complex and multifactorial; treatment modalities are multiple, appliance-driven, and operator-dependent; and treatment effects are simultaneous, cumulative, and gradual. These create concerns of complexity, ethics, length of time required to complete orthodontic treatment, posttreatment follow-up, impracticality, and cost. Hence, it is not possible to conduct RCTs for all questions in orthodontics. This has led to the exploration of more pragmatic models; one of them is the “hierarchy of quality in the evidence for clinical outcomes in orthodontics” of Proffit<sup>14</sup> (Fig 2), which departs from the traditional hierarchy in 2 important ways: by giving greater recognition and weight to good retrospective or



**Fig 2.** Hierarchy of quality in the evidence for clinical outcomes in orthodontics.<sup>14</sup> Reproduced with permission.

nonrandom prospective studies, and by questioning the validity of poorly conducted systematic reviews.

#### Consideration of nonrandom study designs

Calls for integrating evidence from study designs other than RCTs and reducing overemphasis on RCTs have been made in literature by Bondemark and Ruf,<sup>15</sup> Meikle,<sup>16</sup> Johnston,<sup>17</sup> Baumrind,<sup>18</sup> and Ionnaidis et al.<sup>19</sup> Indiscriminate inclusion of nonrandom study designs increases uncertainty and decreases confidence in the resulting evidence. Hence, for nonrandom study designs to be considered as sources of reliable evidence, they need to fulfil the 3 criteria for good quality studies: (1) have well-defined patient groups with selection based on pretreatment characteristics and receiving specific treatments, rather than a variety of treatments; (2) account for all patients included in the study for analysis and reporting and not just the successful ones; and (3) use appropriate methodology and statistics.<sup>14</sup>

As the extraction-nonextraction pendulum has swung in orthodontic history, it seems so is the randomized-nonrandomized studies pendulum swinging in the present. RCTs and nonrandomized or retrospective studies are not to be viewed as mutually exclusive, incompatible, or invalidating of each other. Studies at every level engender their own utility and

Download English Version:

<https://daneshyari.com/en/article/5637470>

Download Persian Version:

<https://daneshyari.com/article/5637470>

[Daneshyari.com](https://daneshyari.com)