Striving for Excellence with Evidence-Based Dentistry

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With an explosion of published dental research, experienced dental practitioners may desire to update their clinical knowledge. Evidence-based dentistry provides a unique opportunity for dental practitioners to strive for excellence of scientific knowledge through evidence-finding processes that are not only simple, but have a significant potential to improve patient health care outcomes.

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Phrases such as "older and wiser" or "practice makes perfect" imply that the experienced clinician accumulates additional skills and knowledge over the years, resulting in improved quality of care. However, current evidence supports the position that there is actually an *inverse* relationship between years of experience and knowledge-based quality of care. A meta-analysis completed by Choundry et al[1] reported that of 62 published studies that measured clinician knowledge-based quality of care and time since graduation, 73% found practitioner performance declined over time. Only one study suggested improved performance (Fig. 1). In fact, it appears that as practitioners age they rely more heavily on patterns of recognition to treat disease than on analytical evaluation and care.[2] This nonanalytical diagnostic decision making, although considered efficient, leads to premature closure and is useful only as long as the science surrounding a disease or condition does not change. This is supported by standardized tests that reflect that clinicians perform better in areas in which the science has remained fairly constant and unchanging.[3]

However, science *does* change and gaps in clinical knowledge can emerge as rapidly as the science changes. Being able to self-assess deficiencies in clinical knowledge appears to be challenging for clinicians and the care that they perceive they are providing may not reflect the actual quality of care delivered.[4] A recent systematic review (SR) of practitioners' ability to self-assess their level of proficiency compared with external measures of their aptitude suggests clinicians have only limited ability to self-assess their deficiencies.[5] Interestingly, the authors of this SR noted those with the poorest ability to self-assess were also those who performed the least well in external assessments. Thus, it appears our health professions, including dentistry, have a curious vignette in which our practitioners may be experiencing a decline in knowledge-based quality of care as they age and yet are unable to self-assess their own deficiencies and level competency.

To compound this difficulty, dental practitioners who do evaluate their own deficiencies and wish to strive for excellence of knowledge are faced with a voluminous amount of literature to review more than any one busy dentist could be expected to appraise. In fact, in as late as 2002 there were nearly 460,000 dental articles published in English alone and retrievable within the MEDLINE database.[6] Even if a busy practitioner could review the vast quantity of literature that is published every year, it is unlikely that he or she would spend any significant time reviewing high-quality, reliable, well-designed, and properly analyzed research. There is a strong possibility that much of the published scientific literature may in fact be false.[7] Plagued by bias,[8] confounding,[9,10] and manipulation of statistics,[7] the quality of both medical and dental published research is far less than ideal. In a review of randomized controlled trials (RCT), Sjögren and Halling[11] reported a hefty 73% of dental RCTs scored less than a 2 according to the Jadah and colleagues'[12,13] quality assessment of RCTs scale (0-2 points = poor quality and 3-5 points = high quality) (Fig. 2). With other investigators reporting similar findings,[14] the challenge of delivering

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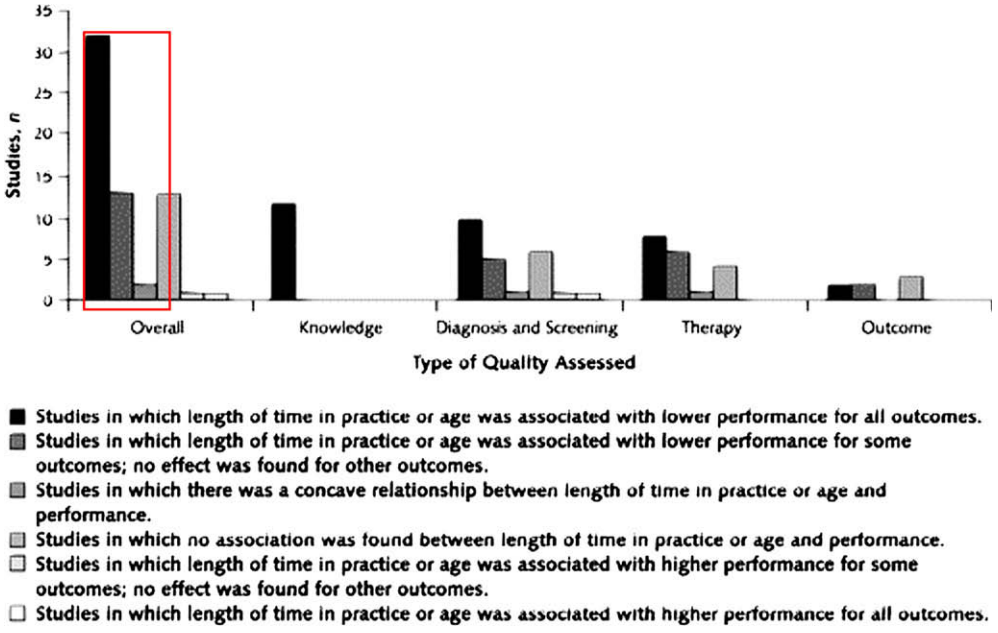

Fig. 1. Quality of performance related to clinician age.[1]

patient care in accordance with high-quality science has become increasingly clear and profoundly important.

In fact, much of our clinical care may not be delivered in accordance with the highest level of evidence. It is estimated that as little as 8% of clinical care is based on peer-reviewed and properly analyzed science.[15] One simple and obvious reason is that the research on any given topic simply has not been completed yet. However, there may be other forces at play. Patterns of dentist clinical decisions and treatments vary wildly among clinicians[16-18] and may be based on tradition,[19] personal experience,[20] or peer-to-peer input. Preliminary survey data from a Professional Product Review (PPR) survey from the American Dental Association (ADA) revealed that when practitioners are choosing a new product they rely more heavily on "input from peers," "hands-on workshops," "laboratory data on key attributes," and "expert opinions" before "published clinical studies."[21] As an example of this trend, preliminary data from the northwest practice-based research network PRECEDENT shows that an astonishing 32% of dentist practitioner-investigators recommended MI Paste (a casein phosphopeptide–amorphous calcium phosphate [CPP-ACP] complex derivative) for the treatment of dental hypersensitivity, although there has never been one published clinical human trial to date.[22]

Table 2. Frequency distribution of randomised controlled trials in dental (RCT-Ds) and medical research (RCT-Ms) per Jadad quality score (0–5 points), in 1999

	RCT-Ds			RCT-Ms		
Jadad Score	Number RCT-Ds	Cumulative Number	Cumulative (%)	Number RCT-Ms	Cumulative Number	Cumulative (%)
0	1	1	1.2	4	4	4.5
1	32	33	39.8	33	37	41.6
2	28	61	73.5	36	73	82.0
3	12	73	88.0	15	88	98.9
4	8	81	97.6	1	89	100.0
5	2	83	100.0	0	89	100.0

Jadad scores: 0–2 points indicate poor quality and 3–5 points indicate high quality. There were no significant differences between the number of RCT-Ds and RCT-Ms with poor and high quality (Mann-Whitney *U*, p=0.179). The frequency distribution of Jadad scores was positively skewed.

Fig. 2. Evaluation of quality of RCT in dental and medical research.[11]

The potential negative stakes of non–evidence-based health care are high and in most cases represent a waste in resources such as time and money, but occasionally and more significantly a patient's health and safety. As an example, there is a widespread belief among both medical and dental professionals that anticoagulation therapy such as warfarin sodium should be discontinued before routine dental treatment including extractions. However, a review of the literature found that this practice, based mostly on plausibility, has resulted in a tremendous number of serious embolic complications including death.[23,24] Highlighting again the severity of the consequences of non–evidence-based health care, a systematic investigation of adverse sedation outcomes in pediatric patients revealed that more than 30% of adverse events, mostly consisting of death, have occurred in the dental setting. Most of these deaths included an overdose of drugs including local anesthetic. These terrible adverse events might