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Evolving Dental Media: Implications for Evidence Based Dentistry

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The Evolving Dental Media: Implications for Evidence Based Dentistry

ABSTRACT

Evidence-based dental practice depends on effective access to relevant and credible information. Recent work addressing clinical information use has shown that both dentists and hygienists tend to rely most on “traditional” sources to seek out clinical information despite the advent of digital media. Over the past two decades, the rise of new digital media has challenged traditional, association-based media outlets. The causes and consequences of these shifts are much debated. The purpose of this article is to examine the relevant shifts in dental media and to reflect on those changes in light of wider debates. We review and map dental media by identifying important clinical information sources in dentistry. The contemporary dental knowledge media is a rich and ever evolving set of sources with a mix of traditional association based outlets and newer digital components. The evolution of these outlets will change how science and other evidence reaches chairside dental professionals.

Introduction

As the world becomes increasingly digital and the diffusion of information accelerates, staying current can become even more challenging. There is significant merit to understanding the interplay of information modalities to facilitate the transfer of knowledge and to decrease the 17 year science to clinical practice gap^{1,5-7}. Here we draw attention to both traditional as well as new sources of professional information in dentistry in an environment that is constantly evolving^{8,9,10}. The picture is one of traditional outlets adapting to the new demands of the digital age alongside an ever evolving and decentralized set of non-traditional new media.

Surveys of dental clinicians by Funkhouser et al.¹, Straub-Morarend and colleagues^{2,3}, and Botello-Harbaum et. al⁴ established that despite the advent of electronic media, dental clinicians rely most on “traditional” sources to seek out clinical information such as journals, colleagues, product representatives, continuing education – especially through textbooks^{1,2}, and at conferences. These studies reveal limited use of newer online resources. Despite these findings, each study pointed out that internet access in dental offices is growing and that younger and more recently credentialed clinicians use the internet more frequently than older dentists.

Mapping the information providers

We focus on U.S. media channels continually supplying current information to dental clinicians, including scholarly journals, news, and social media to understand how dental media has changed with the introduction of online sources of information. Thus we do not focus here on such important information sources as study clubs, professional meetings/continuing education, and influential colleagues.

We began our mapping by identifying the most read clinical information sources in dentistry as identified in Botello-Harbaum et al.⁴ (*JADA, General Dentistry, Compendium of Continuing Education in Dentistry, J Esthetic & Restorative Dentistry, Quintessence International, J Prosthetic Dentistry, Operative Dentistry, ADA News, Dentistry Today* and *Inside Dentistry*). We supplemented these traditional journal sources with corresponding sources for dental hygienists, and formal and informal electronic sources. Electronic media were identified with the help of our project advisory group comprised of chairside

dentists and hygienists, dental researchers, and dental professional association representatives. We then conducted a systematic search for blogs and other media publishing articles. We gathered information on start dates for publications using *Ulrichs* for print sources and the Wayback Machine internet archive for websites. Finally, we counted the number of articles published in 2015 in these sources.

Although the *American Journal of Dental Science* was first published in 1839, the story of modern dental media begins with the founding of the American Dental Association (ADA) in 1917. *JADA* was the first journal of this era, followed by *Journal of Dental Hygiene* and *General Dentistry*. Until the early 1990s, these journals, along with *Compendium of Continuing Education in Dentistry*, and *Dentistry Today*, all in print, were the primary channels that communicated advances to practicing dentists. Figure 1 illustrates this with timelines for each source. Starting in 1980, there is one bar for each source that begins in the year of founding and runs through 2016. Since *JADA*, *General Dentistry*, *Compendium* and *Journal of Dental Hygiene* were in existence before 1980, their bars run the full width of the graph. Bars are blue for print sources, orange for digital and mixed blue and orange for sources available both in print and online. We only include in the figure sources that feature clinically relevant information, not those focused solely on practice management.

The dental media landscape began to change around 1990 when traditional print sources added digital versions. *Compendium* and *General Dentistry* became available online, followed soon after by *JADA* and *Dentistry Today*. On the figure, the bars for each turn from solid blue to mixed blue-orange when online versions became available. Around the same time, the *Journal of Dental Hygiene* converted from print to online only, thus its bar turns from blue to orange.

From the mid to late 1990s more fundamental changes occurred as new media were founded. These were largely electronic and so colored orange in the figure. The first were two forums: the *Internet Dental Forum* and *dentaltown*. Soon after, *dentaltown* started a print magazine, and its bar turns from orange to mixed orange-blue. Although another print magazine was founded in 2005, *Inside Dentistry*, the bulk of new entrants in the mid-2000s were new types of media, including for example, *Dr. Bicuspid* and independent blogs such as *Emmott on Technology and The Digital Dentist*. Also founded around this time, though not shown on the figure were news aggregators such as *Huffington Post Dental Health*, and *Dentapress*.

Figure 1 Dental Professional Media Development Timeline

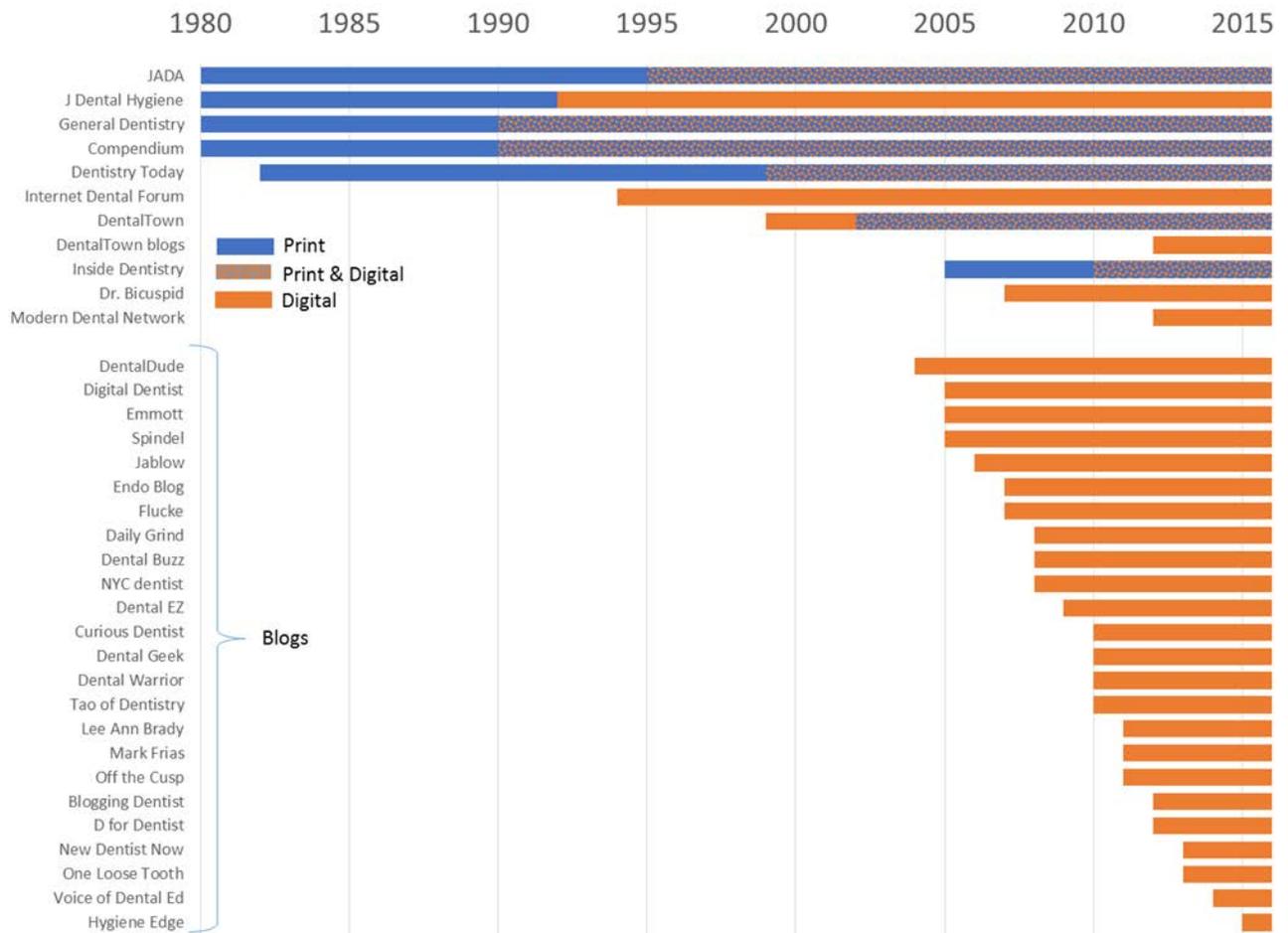
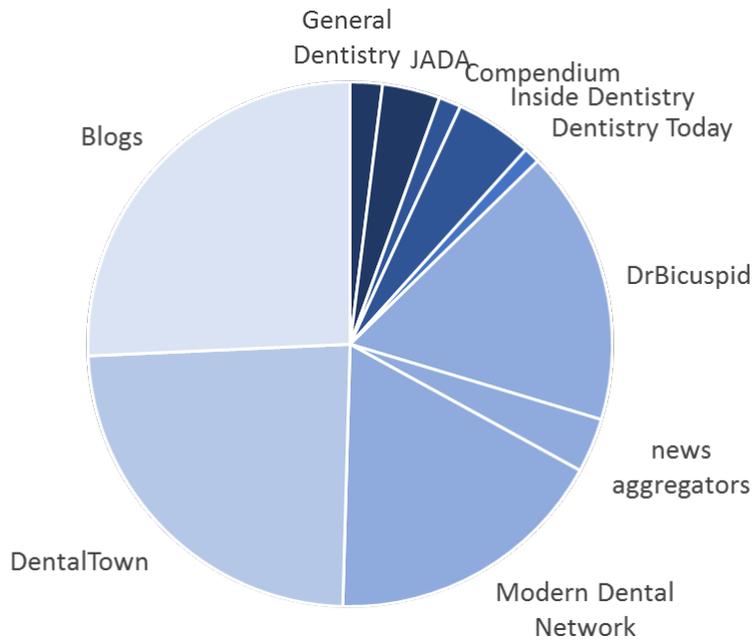


Figure 1 graphically illustrates the explosion in dental media in recent years. Compare the simplicity of the situation in 1980 of 5 print sources with the greater than 30 print and electronic sources publishing today. The traditional sources are outnumbered, and have become a small part of the information stream. Others produce far more content. Figure 2 displays the number of articles and posts published in 2015. In total, these sources published over 6,400 articles, of which 8% were in traditional sources. The blogs vary the most in size with six publishing fewer than 10 posts in 2015, while the six largest published 100-300 articles each, the same size as the journals. Dentistry Today and Inside Dentistry together publish 400 articles per year. While Dr. Bicuspid, *dentaltown* and Modern Dental Network posted more than 1000 articles each. It seems unlikely that each source offers unique information. In fact, news aggregators (not shown on the figure) seem to mostly re-post material from elsewhere.

Bloggers differ in their approaches with some posting information based on their own experiences, as well as press releases, and/or commenting on information originating elsewhere.

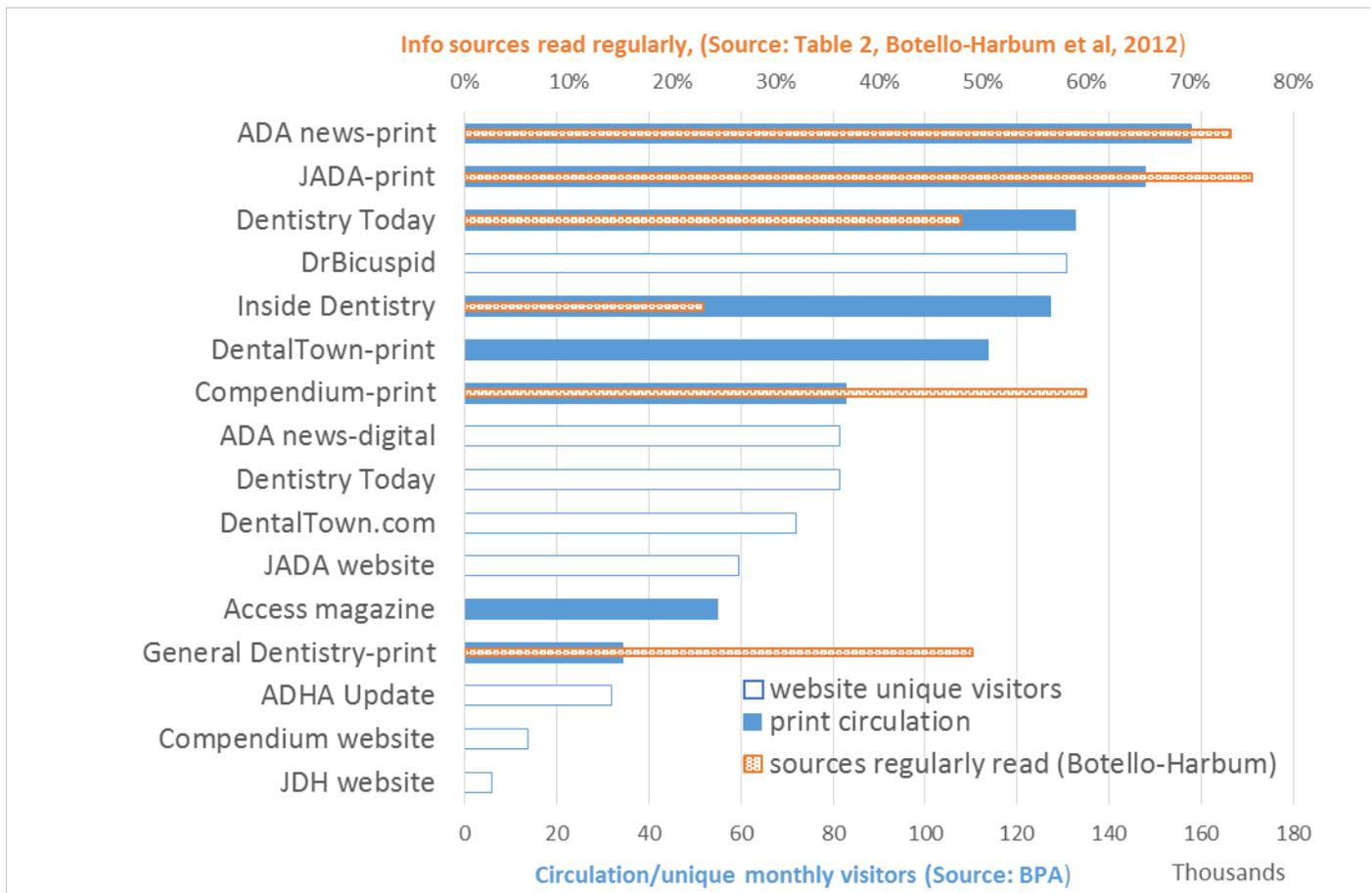
Figure 2 Number of articles/posts in 2015



Indeed, sources vary not only by how much they publish, but also in the attention they receive. Figure 3 reports two measures of attention based on prior research in Botello-Harbaum et al.⁴ (share of survey respondents who read a source regularly) and our own compilation of data (circulation/unique monthly visitors). Journals and websites are listed in descending order of circulation and, for websites, unique monthly visitors. Circulation figures for print sources are plotted as solid bars in blue, and number of visitors for electronic sources are shown as outlined bars, both against the bottom axis. These data are compiled by BPA Worldwide, a non-profit auditor of audience claims by publishers, and we obtained them from the 2015 media kits of each publication. In orange, and plotted against the top axis, are Botello-Harbaum et al's⁴ figures for the share of survey respondents who read a source regularly. *JADA* and *ADA news* in print are the most widely circulated and widely read sources, confirming the centrality of the leading professional organizations in print information dissemination. Two magazines, *Dentistry Today* and *Inside Dentistry* have similar circulation but *Dentistry Today* has a substantial lead in the amount of attention recipients pay to the content according to Botello-Harbaum et al.⁴. Overall, print circulation figures are higher than website unique visitors. However, as we all know, receiving

something does not mean reading it, so circulation says nothing about attention whereas visiting a website implies some intentionality on the part of the visitor and suggests some reading is done in a visit. Websites may be available to all, but again popularity varies, with *DrBicuspid* having a substantial lead in number of visitors over *ADA News*' website and *dentaltown*. *DrBicuspid* has visitor numbers as high as the circulation numbers for many print sources. This hints that professional organizations may not dominate the digital information flow to the same degree they dominate print.

Figure 3 – Importance of dental information sources – circulation and survey data



Discussion

Based on the review of print and online resources, we see an emerging new era of dental media. In the old era, a limited number of print journals often associated with professional societies were founded and developed. The contemporary era exhibits a proliferation of information sources relevant to the practice of dentistry and dental hygiene. Even journals have grown more complex, increasing from 46

journals in 2003 to 83 in 2012 with the number of articles growing to about 10,000 per year¹¹. All the journals have online versions, and *Journal of Dental Hygiene* has only an online version. Meanwhile, electronic media have proliferated. To explore the implications of this new media landscape, as far as they can be understood today, we draw on studies of new media and of dental information.

1917-1999 Traditional Channels

Information search and acquisition in knowledge-based professions such as dentistry have traditionally been characterized by processes where a great deal of information is provided to the clinician without a clear request or search^{2, 13}. A few central organizations, the ADA and editorial staff on their journals, for example, decided what information was useful to generate, and then provided it to practicing professionals^{14, 15}. Figure 1 suggests that this traditional system characterized the pre-internet age, before the 1990s. During this phase, a few conduits of print information dominated distribution, primarily published by the core professional associations such as the ADA, AGD, and the ADHA. These gatekeepers decided which information went forward, and which did not¹⁵⁻¹⁷, while upholding values, such as credibility. Skilled gatekeepers and professionals put a high value on credible, accurate information, and play a key role in ensuring that their readers are not burdened with junk and fluff. Print, and the associated editorial work are expensive, and membership dues supported production and as a side effect restricted access to information.

Widespread access to the internet for the general public in the 1990s began to change information access and search¹⁶. While many traditional outlets were transitioning from paper to either hybrid or digital forms during this time, professionals and scholars were uncertain about new digital only venues and debated their realities, value, and desirability¹⁷. As shown in the middle portion of Figure 1, while traditional outlets expanded into digital formats for their existing channels, others created entirely new forms of electronic dental media. The first sign of the digital age reaching dentistry was the founding of the *Internet Dental Forum* (IDF) in 1994, a discussion forum by and for dentists. The ADA mounted a website in 1995 including on it information from *ADA News*. *Dentistry Today* followed a few years later and mounted a website in 1999, the same year *dentaltown* began. The founding of *dentaltown* (and later *hygienetown* and *orthtown*) signaled the beginning of a new era of heightened competition for the attention of dentists.

2000-present Media ManifoldThe expansion of digital modalities and the rapid growth of number of dental information sources after 2000 mirrors broader developments in which “wave upon wave of newly saturating media” flow over us. This has been framed as the “media manifold”¹², a concept that focuses attention on the multiplicity and variety of the current information landscape, in contrast to the prior state where the costs of print set implicit limits on the flow of information. In the media manifold there are many opportunities for individual dentists to contribute and dynamic, interactive, and interrelated interactions are likely to occur¹⁸. We identify three key characteristics of this new phase.

Characteristic 1: Traditional Providers Adapt

At the center of the media sit the traditional juggernauts of the dental research community represented by the array of *peer*-reviewed research publications catalogued in the Web of Science and PubMed. The vast majority of clinical research is published and available via these resources. Beyond this core are key medical journals such as the *Journal of the American Medical Association* and the *New England Journal of Medicine*. These sources have grown in number and size (page count), and have become easily accessible online to those with subscriptions, library access, or membership in the ADA.

In most professions, professional associations support innovation and diffusion within their community^{19, 20}, and this is certainly true within dentistry. The ADA, AGD, and ADHA print sources remain, alongside electronic versions as well as blogs, Twitter feeds and/or Facebook pages. Traditional dental organizations have responded to the increase of information providers in the system through an expansion of the mechanisms used to communicate. However, the professional organizations are notable for expanding only into new media via electronic versions of their content streams and notifications about content they are posting. These modalities keep the same information curation and publishing characteristics of print media, though with access and search made quicker and easier in the digital archive. Professional organizations thus missed the chance to become central to the online conversation between dentists, a position that *Dr. Bicuspid*, *IDF* and *dentaltown* now occupy, see below.

Characteristic 2: Newcomers

In comparison to print, electronic media are notable for their lower distribution costs. The cost to produce a good article may be the same, but the cost of mounting that article on a website is almost nothing whereas printing and delivering a paper copy costs a great deal²¹. Therefore, the barriers to entry are lowered in electronic media, and digital dental publishing entrants proliferated. The

proliferation of media exacerbates known issues of information overload²². The coping strategies for overload such as reducing the messages to which one is exposed or reducing the attention paid to each message creates challenges for authors seeking to penetrate the barriers established by potential readers.

Heightened competition for attention exacerbates a tension between two central characteristics of professional information sources: utility and credibility²². Utility encompasses ease-of-use, accessibility, relevance, and timeliness. Credibility refers to perceived trustworthiness, authority, reliability, and lack of bias²³. On the one hand, utility has been vastly increased through the accessibility of information as well as timeliness. While both traditional and new media have taken advantage of this benefit, new media have gone further in leveraging user oriented content, such as forums, to increase their relevance. On the other hand, the credibility of new media is much debated²⁶. The gatekeeping role formerly performed by a few large central organizations is negated and many voices can now reach dentists without being vetted to ensure accuracy. Also in the competition for attention accuracy may be neglected. Individual bloggers have the potential to emerge as influential resources²⁴, and readers may find them more credible than traditional sources²⁵. However, danger exists when an influential person provides outdated, or in the worst case -wrong, knowledge and information that appears current²⁷. Of these two central characteristics ease-of-access tends to count for more than credibility for most users²³, but credibility remains an important concern for those engaged in medical care.

Characteristic 3: Linkages

Finally, interconnection has become another core characteristic of new media with the advent of interactivity, in particular discussion forums. Media, including dental media, has evolved from the traditional one- to-many dissemination system to “a many-to many, actor to actor world in which [dental professionals]... pull from and collaborate with one another.....(where there is) mass collaboration...”¹⁴. A centralized media has become decentralized.

Dentists link with one another through online forums and blogs. It has long been acknowledged that all professionals seek information from their friends and colleagues, and not necessarily in a systematic way^{15, 22}. Who is asked and relied upon for information depends on an array of factors such as ease of access, proximity, trust/past success, time constraints, and characteristics of information needed^{15, 22, 28}. Studies have shown that information exchanged in homogenous groups is perceived as highly credible²⁹.

Online discussion forums such as *dentaltown*, *Dr. Bicuspid*, and *the Internet Dental Forum (IDF)* bring together such groups. The forums seem particularly important for dentists, overcoming some of the isolation of individual practice through online communities, and taking a long standing study club model to the digital space^{30,31}. Dentaltown's motto, found at the bottom of their webpage is: "with dentaltown . . . no dentist will ever have to practice solo again."

Conclusions

Existing scholarship has illustrated how dentists and hygienists *seek* information, but not how information sources *provide* it. We have highlighted the extent and volume of exchange that occurs through a diffuse and growing set of dental information purveyors. This analysis is a first step in enabling a more effective dissemination of evidence-based material to chairside clinicians through documenting the phenomenon.

There are advantages and disadvantages to the increased interpersonal exchange of information in the dental community. On the positive side, the new expanded set of conduits can provide rapid access to distilled information targeted to specific needs. This could facilitate the uptake of the newest evidence into practice –reducing the science to service gap. Yet, disadvantages also exist. Information overload could block the most up-to-date empirical knowledge and information may be assessed on the source, rather than its substance. We do not comment how important elements of dental information, such as study clubs and continuing education, fit into the dental media landscape described here –an important next step in developing a complete picture.

References

1. Funkhouser E, Agee BS, Gordan VV, et al. Use of online sources of information by dental practitioners: findings from The Dental Practice-Based Research Network. *J Public Health Dent* 2014;74(1):71-9.
2. Straub-Morarend CL, Marshall TA, Holmes DC, Finkelstein MW. Informational resources utilized in clinical decision making: common practices in dentistry. *J Dent Educ* 2011;75(4):441-52.
3. Straub-Morarend CL, Marshall TA, Holmes DC, Finkelstein MW. Toward defining dentists' evidence-based practice: influence of decade of dental school graduation and scope of practice on implementation and perceived obstacles. *J Dent Educ* 2013;77(2):137-45.
4. Botello-Harbaum MT, Demko CA, Curro FA, et al. Information-seeking behaviors of dental practitioners in three practice-based research networks. *J Dent Educ* 2013;77(2):152-60.
5. Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, D.C.: National Academy Press; 2001.
6. Lawrence A. Electronic documents in a print world: Grey literature and the internet. *Media International Australia* 2012;143:122-31.
7. Morris ZS, Wooding S, Grant J. The answer is 17 years, what is the question: understanding time lags in translational research. *J R Soc Med* 2011;104(12):510-20.
8. Prensky M. Digital Natives, Digital Immigrants part 1. *On the Horizon* 2001;9(5):1-6.
9. Efimova L, Fielder S. Learning Webs: Learning in Weblog networks.
10. Knosel M, Jung K, Bleckmann A. YouTube, dentistry, and dental education. *J Dent Educ* 2011;75(12):1558-68.
11. Jayaratne YSN, Zwahlen RA. The evolution of dental journals from 2003 to 2012: A bibliometric analysis. *PLOS One* 2015;10(3):e0119503.
12. Couldry N. *Media, Society, World: Social Theory and Digital Media Practice*. Polity 2012.
13. Borgman CL. *From Guttenberg to the global information infrastructure: Access to information in the networked world*. Cambridge, MA: MIT Press; 2000.
14. Mars MM, Bronstein JL, Lusch RF. The value of a metaphor: Organizations and ecosystems. *Organizational Dynamics* 2012;41(4):271-80.
15. Leckie GJ, Pettigrew KE, Sylvain C. Modeling the information seeking of professionals: A general model derived from research on engineers, health care professionals, and lawyers. *Library Quarterly* 1996;66(2):161-93.
16. Keefer A, Baiget T. How it all began: A brief history of the internet. *Vine* 2001;31(3).
17. Roberts P. Scholarly Publishing, peer review, and the internet. *First Monday* 1999;4(4).
18. Briscoe G. Complex adaptive digital ecosystems. *Proceedings of the International Conference on Management of Emergent Digital Ecosystems* 2010:39-46.
19. Greenwood R, Suddaby R, Hinings CR. Theorizing change: The role of professional associations in the transformation of institutional fields. *Acad Manage J* 2002;45(1):58-80.

20. Swan JA, Newell S. The Role of Professional-Associations in Technology Diffusion. *Organization Studies* 1995;16(5):847-74.
21. Pearson G, Kosicki G. How Way-Finding is challenging gatekeeping in the Digital Age. *Journalism Studies* 2016;12:1-9.
22. Case DO. *Looking for Information: A Survey of Research on Information Seeking, Needs, and Behavior*: Emerald Group Publishing; 2012.
23. Robinson L. Building on models of information behaviour: linking information seeking and communication. *Journal of Documentation* 2013;69(2):169-93.
24. Agrawal N, Liu H, Tang L, Yu PS. Identifying the influential bloggers in a community. *Proceedings of the 2008 International conference on web search and data mining* 2008:207-18.
25. Johnson TJ, Kaye BK. Wag the blog: How reliance on traditional media and the Internet influence credibility perceptions of Weblogs among blog users. *Journalism & Mass Communication Quarterly* 2004;81(3):622-42.
26. Tucker P, Keen A. Fighting the cult of the amateur. *Futurist* 2008;42(1):33-34.
27. Buis LR, Carpenter S. Health and Medical Blog Content and Its Relationships With Blogger Credentials and Blog Host. *Health Communication* 2009;24(8):703-10.
28. Pinelli TE. The information-seeking habits and practices of engineers. *Science & Technology Libraries* 1991;11(3):5-26.
29. Wang Z, Walther JB, Pingree S, Hawkins RP. Health information, credibility, homophily, and influence via the Internet: Web sites versus discussion groups. *Health Commun* 2008;23(4):358-68.
30. Schleyer T, Forrest J, Kenney R, Dodell D, Dovgy N. Is the Internet useful for Clinical Practice? *Journal of the American Dental Association* 1999;130(10):1501-11.
31. Kimball BA. The Internets [sic] Impact on Dentistry. *Dental Economics* 2000;90(8).