Oral-Systemic Interrelationships

Will Evidence of Oral-Systemic Interrelationships be Integrated into the Clinical Practice of Physicians and Other Non-Dental Health Care Providers?

It has been said that "the creation of new knowledge often does not on its own lead to widespread implementation or impacts on health."[1] Perhaps one of the most poignant examples of this truth is the challenge inherent to integrating evidence of periodontal-systemic interrelationships within the clinical practice of physician and other non-dental health care practitioner (HCP) communities.

Starting with the 1989 landmark study of Mattila and colleagues,[2] researchers have produced an exponential number of epidemiologic, animal and human studies which have offered compelling support of the role of periodontal infection in contributing to various inflammatory driven diseases states. There was a time when research on periodontal-systemic connections was reported solely in dental journals. In recent years, compelling research related to periodontal-systemic science has also been published in highly respected medical journals. A review of the lengthy list of medical journals in Table 1 provides a glimpse of the magnitude of information about periodontal-systemic links that has been disseminated to physicians, nurses and other non-dental health care practitioners.

No Easy Answers or Quick Fixes

Regardless of the fact that there are inconsistencies in the findings of many of the investigations, a number of periodontal-systemic links have garnered significant interest within inter-professional practice spheres. At least with atherosclerosis-induced diseases, complications of diabetes, aspiration pneumonia and adverse pregnancy outcomes, there is growing awareness of the risk that periodontal disease may pose. Is there a dose-response relationship implicated in these associations, and does treatment of periodontal disease have an effect? These are questions that are likely to remain unanswered in the short term. Yet, even with these unknowns, most experts agree there is now sufficient evidence of certain periodontal-systemic links that our cohorts outside of dentistry (e.g.,

American Family Physician
American Heart Journal
American Journal of Epidemiology
American Journal of Kidney Disease
American Journal of Obstetrics & Gynecology
American Journal of Infection Control
Annals of the New York Academy of Sciences
Annual Review of Immunology
Annals of the Rheumatic Diseases
Archives of Internal Medicine
Archives of Pediatrics & Adolescent Medicine
Arthritis & Rheumatism
Arteriosclerosis, Thrombosis, and Vascular Biology
Australia & New Zealand Journal of Obstetrics & Gynecology
Autoimmunity
Blood Purification
British Medical Journal
Calcified Tissue International
Chest
Circulation
Clinical Diabetes
Clinical & Diagnostic Laboratory Immunology
Clinical & Experimental Rheumatology
Clinical Hemorheology & Microcirculation
Clinical Infectious Diseases
Clinical Journal of the American Society of Nephrologists
Clinical Microbiology & Infection
Clinical Rheumatology
Critical Care Medicine
Current Drug Metabolism
Current Opinion in Endocrinology, Diabetes and Obesity
Current Rheumatology Reports
Cytokine
Diabetes Care
European Heart Journal
European Journal of Cardiovascular Prevention and Rehabilitation
European Journal of Radiology
Inflammation
Intensive Care Medicine
Intensive Critical Care Nursing
Journal of the American College of Cardiology
Journal of the American Geriatric Society
Journal of the American Medical Association
Journal of Cardiovascular Risk
Journal of Diabetes Complications
Journal of Gynecology & Obstetrics
Journal of Internal Medicine
Journal of Pediatric Endocrinology & Metabolism
Journal of Rheumatology
Lancet
Maternal Child Health
Microbial Pathogenesis
Mutation Research
New England Journal of Medicine
Nephrology, Dialysis, Transplantation
Obstetrics & Gynecology
Obstetrical & Gynecological Survey
Osteoporosis International
Pediatrics
Public Health
Revista da Associação Médica Brasileira
Rheumatology
Scandinavian Journal of Urology and Nephrology
Stroke
Yonsei Medical Journal

Table 1. List of prestigious scientific and professional journals that have published articles related to periodontal-systemic interrelationships.

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	Physicians (230)	Pharmacists (279)
Do you currently assess or speak with patients about oral health?	No: 31% Yes: 69%	No: 38% Yes: 62%
Are you aware that there is data to suggest that periodontitis (advanced form of gum disease that can cause tooth loss) is associated with cardiovascular disease, stroke and bacterial pneumonia?	No: 20% Yes: 80%	No: 26% Yes: 74%
Do you currently collaborate with your dental health colleagues?	No: 56% Yes: 44%	No: 67% Yes: 33%
Do you ever refer patients to a dentist?	No: 10% Yes: 90%	No: 15% Yes: 85%
Do you feel you have enough information on oral systemic links?	No: 88% Yes: 12%	No: 93% Yes: 7%
If armed with effective continuing education programs, would you recommend oral health strategies to your patients?	No: 8% Yes: 92%	No: 3% Yes: 97%

Table 2. Assessment of non-dental health care providers' knowledge of oral-systemic health.
Source: Data on file; mdBriefCase, rxBriefCase; March 2009

physicians, nurses, pharmacists and dieticians) should consider untreated periodontal disease an often-unrecognized source of ongoing inflammation that may be implicated in a number of chronic diseases or conditions. Furthermore, given the depth and breadth of this evidence, this new body of knowledge should be clinically integrated into the practices of non-dental health care practitioners. Unfortunately, even with 20 years of compelling research, there is little evidence that this knowledge-to-action cycle has begun.

Consumer publications and mainstream media[3-9] have already primed the public about the risk of periodontal disease, yet sadly this science base has not been translated into the education, training or clinical practice of non-dental health care practitioners. In the *Oral Health in America Report*[10] published in 2000 the need for curriculum reform to educate non-dental health care practitioners about oral health was extensively cited. A 2008 report of the Association of American Medical Colleges[11] advocated oral health education for medical students suggesting "specific oral-systemic health learning objectives can be created and matched with clinically relevant experiences to enhance oral health knowledge and the collaboration with dental schools." The American Dietetic Association[12] has acknowledged that nutrition is an integral component of oral health and that collaboration between dieticians and dental professionals is important for oral health promotion, disease prevention and intervention. Recently the International Centre for Oral-Systemic Health (ICOSH)* conducted a survey[13] of a number of English speaking universities around the world to query the extent to which curriculum focusing on oral-systemic relationships is being taught in non-dental health care practitioner pre-licensure education. The findings were no surprise. Responses from inquiries of academic deans validated that there were substantial deficiencies in curriculum content related to oral-systemic interrelationships in current pre-licensure education of physicians, pharmacists and nurses. The survey data provided concrete evidence that academicians from medicine, pharmacy and nursing disciplines strongly perceive the utility of educational modules that are dedicated to oral-systemic science for non-dental health care students. Finally, preliminary

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inquiries of Canadian non-dental health care practitioners conducted through an electronic survey[14] suggest that 88% of physicians and 92% of pharmacists believe they do not have enough information on oral-systemic interrelationships. As seen in Table 2, other responses to this survey indicate that even though physicians may be aware of periodontal-systemic links and they may refer patients to dentists, the majority do not collaborate with their colleagues in dentistry. Therein lies the challenge; to move from knowledge-to-action by integrating evidence of periodontal-systemic science into their clinical practice physicians need to begin collaborating with oral health care practitioners. How ready are they? How ready are we?

The publication of a small consensus proceedings of cardiology and periodontology experts is a great example of our naivety in assuming that collaborative relationships between dentists and physicians will automatically be spawned through circulation of these types of reports.** The report following the proceedings was published as *The American Journal of Cardiology and Journal of Periodontology Editors' Consensus on Periodontitis and Atherosclerotic Cardiovascular Disease*.[15] The task of the 10 experts was to evaluate the quality of the evidence related to the link between periodontitis and atherosclerotic cardiovascular disease. On the basis of their findings relative to the quality of this evidence, the experts developed clinical recommendations for reducing the risk for primary and secondary atherosclerotic cardiovascular disease (CVD) events in patients with periodontitis and clinical recommendations for CVD patients with or without a previous diagnosis of periodontitis. (The consensus report can be accessed at www.perio.org and a synopsis of the findings can be downloaded at www.caseyhein.com.) Many of the clinical recommendations are based on establishing collaboration between dentists and physicians. One example: "When periodontitis is newly diagnosed in patients with atherosclerotic CVD, periodontists and physicians managing patients' CVD should closely collaborate to optimize CVD risk reduction and periodontal care."[15] This begs a question: Will this consensus report be impactful enough on its own to persuade periodontists and physicians to collaborate on these types of cases? I doubt it.

From the viewpoint of someone who has monitored these trends in inter-professional collaboration bolstered with some interesting research on how physicians (and by extension, other non-dental health care practitioners) really do make day-to-day decisions about the care of patients, I think we might be making some wrong assumptions about physicians' readiness to adopt these types of clinical recommendations. Intriguing research related to the social and organizational processes by which physicians transform evidence and information into knowledge and knowledge into practice indicates that "mindlines" of physicians (and other health care practitioners) are really the force that governs most of their clinical decision-making, and not evidence-based decision-making.

The Myth of EBDM vs. the Reality of Mindlines

Evidence-based decision-making (EBDM) in health care has long been the mantra. However, for those of us who are such strong proponents of EBDM, we may want to step back and do a little reality check here. Regardless of how important EBDM is I have come to recognize how very few health care practitioners practice this way. I don't believe this is intentional. The reality is that EBDM requires resources that most practitioners simply don't have; time to conduct a literature search, access to electronic sources, training in how to conduct a search, in addition to limited opportunities to substantially initiate new protocols or modify out dated ones within the fast-paced practice environment. It is time to rethink how practitioners really make decisions about patients. It appears that "mindlines" are really the basis for clinical decision-making.

As an alternative to EBDM (accessing, appraising and use of evidence from research or formal sources), mindlines are informally constructed (or implied) guidelines, which have been internalized ("stored in my head") by practitioners. We can only hope that mindlines are shaped by scientific evidence. Figure 1, adapted from the work of Gabbay and leMay[16], depicts the iterative process by which mindlines are developed.

The mindline process begins largely with explicit knowledge that is built on early education and training of health care practitioners. Often teachers have a significant influence on their

** *The Report of the Independent Panel of Experts of the Scottsdale Project* (Hein, et al. 2007; downloadable from www.caseyhein.com) suffered a similar fate. Neither '*The Scottsdale Report*' or the *American Journal of Cardiology* and *Journal of Periodontology Editors' Consensus on Periodontitis and Atherosclerotic Cardiovascular Disease* represent official guidelines endorsed by authoritative bodies. In this regard it is noteworthy to mention that research indicates that even officially approved guidelines are not readily adopted by physicians. A number of barriers have been identified as obstacles to clinical integration. (Cabana, et al. *JAMA* 1999)

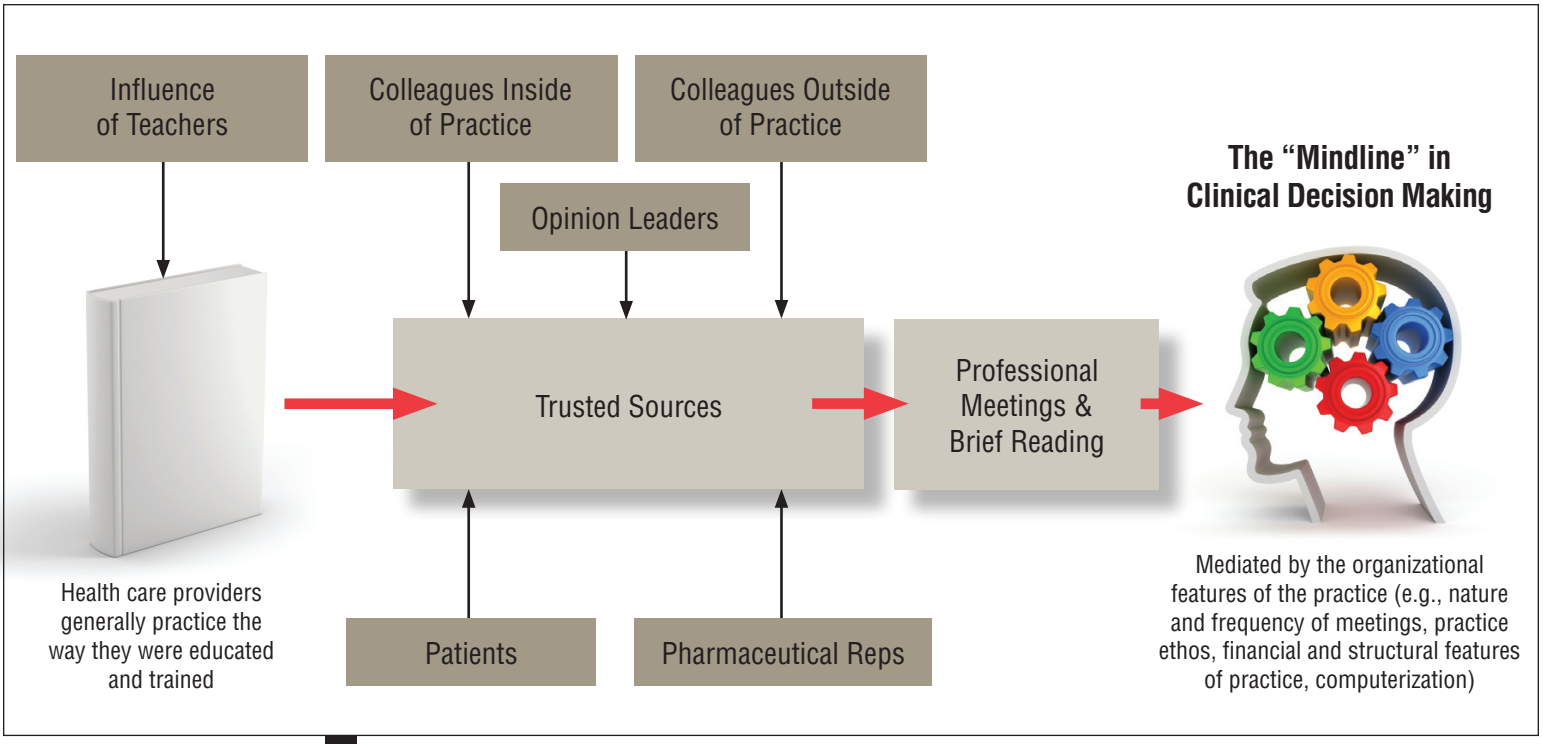

Figure 1. The process by which Health care providers "mindlines" are developed.

students' future practice ethos and patterns. Health care practitioners generally practice the way they were educated and trained. Gabbay and leMay's findings were: "Rather than directly accessing new knowledge in the literature or from the internet and other written sources, [the] practitioners nearly always took shortcuts to acquiring what they thought would be the best evidence base from sources that they trusted."

Mindlines are predominately cultivated and collectively reinforced by physicians' interactions with each other and with opinion leaders, patients, and pharmaceutical representatives. Mindlines are drawn from trusted people and experience, shared, tested, then confirmed and entrenched through discussion. Mindlines are often influenced by patients' ideas of what the appropriate evidence is about their particular case. (Their own personal history, what their family has experienced or what they have read in the media, etc.) During this development process, mindlines are continuously informed and refined by brief reading from professional journals and information gathered from professional meetings and/or continuing education courses. Mindlines are mediated by the infrastructure of a practice, including the nature and frequency of meetings between physicians to discuss protocols and case management, practice philosophy, operational structure and reimbursement mechanisms. Mindlines evolve through a variety of loosely defined social interactions in fluid communities of practice, interactions with and experience of patients and practice meetings.

The work of Gabbay and leMay and several others strongly suggests that it is unrealistic to expect even the best clinicians to rely on the full process of evidence-based decision-making which is promulgated by EBDM advocates. If that is so, strategies that focus on influencing the mindlines of physicians may be the best approach to integrating evidence of oral-systemic interrelationships into non-dental health care practitioners practice. This does not discount the importance of papers such as the *Editors' Consensus on Periodontitis and Atherosclerotic Cardiovascular Disease* [cited above]. Assuming these types of papers are disseminated to a wide enough readership, authoritative reports such as this (and *The Scottsdale Report*; downloadable from www.caseyhein.com) will become incorporated into the iterative process and provide important information that will both inform and

refine mindlines.

If we are earnest about persuading physicians and other non-dental health care practitioners to integrate evidence of periodontal-systemic interrelationships we must participate in cultivating their mindlines. This collectively reinforced process may offer the greatest promise in completing the knowledge-to-action cycle needed to integrate this body of science in non-dental health care practitioner professions. A number of specific recommendations are listed below.

1. If you are near a university that educates health care practitioners, identify key educators in the pre-licensure education of physicians, nurses, and other health care practitioner disciplines and commit to meeting with them on a regular basis to discuss oral-systemic science. Presenting research to curriculum committees is also an excellent way of increasing awareness of the need for curriculum reform to include competencies in periodontal-systemic science. Teachers can profoundly impact the future practices of their students. If teachers become "believers" in the oral-systemic message it is likely that this enthusiasm will be communicated to students. This can influence future generations of health care practitioners to screen and refer patients at risk for debilitating oral diseases and conditions.

2. Primary care (family practice) physicians are best positioned to screen and refer patients with periodontal disease. Generally speaking, they may also be the most receptive to building a collaborative relationship with oral health care providers. Consider building collaborative relationships with several primary care practices. Host a business dinner and invite the physicians to discuss the research and explore ways to initiate collaboration and how to track patient outcomes. Once there is a commitment to initiate collaboration plan a joint meeting with all clinicians, including nurses and dental hygienists. Make sure to include business staff members as they are integral to operationalizing collaboration between offices.

3. Offer to make a presentation on periodontal-systemic interrelationships during rounds at the hospital and/or physicians' local study groups.

4. Use dentist-to-physician personal correspondence to advise physicians of mutual patients who you are treating for periodontal disease and include research related to the link between periodontal disease and case-specific systemic diseases. Templates for these letters can be downloaded at www.caseyhein.com.

5. Routinely visit the offices of physicians, dieticians and other health care practitioners as appropriate to leave patient education materials related to periodontal-systemic links. Very visual and user-friendly patient education materials, including a full-sized poster illustrating periodontal-systemic links, can be accessed at www.caseyhein.com.

6. Invite physicians, nurses, and other non-dental health care practitioners to private study clubs when oral-systemic science is being presented.

7. Once your patients become supporters of periodontal-systemic health enlist their support in educating their physicians and nurses about oral-systemic interrelationships. Research seems to indicate that patients can influence the mindlines of their physicians. If properly educated, patients can become very effective oral health ambassadors and communicate with their physicians about your commitment to ensuring oral-systemic health of patients. Never underestimate the influence of a patient you have discipled.

8. Offer to write an article about periodontal-systemic links in local medical societies' or hospitals' publications or newsletters.

9. Identify physicians and nurses within your community who are key opinion leaders that will champion your message regarding the importance of periodontal-systemic health. Meet with them regularly over lunch or dinner to make sure that their knowledge is based on research and experiential evidence and develop them professionally wherever possible. Explore with these colleagues opportunities for community level projects that would bring other health care practitioners together to advance oral-systemic health.

10. Never underestimate the power of personal relationships and one-on-one discussions with physicians, nurses, pharmacists, dieticians, physical therapists and a host of other non-dental health care providers who are very well positioned to collaborate with oral health care providers. This is still the most effective way of cultivating mindlines.

What a Difference it Could Make

Integrating evidence of oral-systemic interrelationships into the practice of non-dental

health care practitioners and preparing future generations of health care practitioners to screen and refer patients at risk for periodontal disease can no longer be considered optional. The isolation of the oral cavity from the other systems of the body and failure to educate non-dental health care practitioners about oral-systemic interrelationships will continue to compromise the potential for optimal patient outcomes, especially in high-risk populations. Consider the compelling evidence of the bi-directional relationship between diabetes and periodontal disease. Thirty million incident cases of diabetes in the United States are forecasted by the year 2020[17] and it is estimated that at least 75% of the population has some form of periodontal disease.[18] If physicians and other non-dental health care practitioners were enlisted to screen and appropriately refer diabetic patients who also have periodontal disease, the potential to make a difference both in terms of health care outcomes (reduced complications of diabetes) and associated health care costs within this high risk population may be of a staggering magnitude. What a difference this could make for everyone involved. Yet, unfortunately there is little evidence that physicians are integrating this information into their clinical decision-making at this time.

Shoring up the mindlines of physicians and other health care practitioners relative to periodontal-systemic science may be the most promising way to advance this body of knowledge into action. Ultimately this action will be defined by dynamic ways for oral health care practitioners and physicians, nurses and other non-dental health care practitioners to collaborate in the co-management of patients at risk for periodontal disease. It is important to state that we cannot abandon EBDM in health care. Oral health care providers have an ethical responsibility to ensure that mindlines related to periodontal-systemic interrelationships are based on research evidence wherever possible. As such, the potential of networking as part of continuing professional development must be recognized and fostered and appropriate information must be targeted through a variety of routes to the relevant individuals.

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