Current Perceptions of the Role of Dental Hygienists in Interdisciplinary Collaboration

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Introduction

In today's health care environment, medical professionals increasingly utilize interdisciplinary collaboration to reach optimal decisions regarding patient care. Collaborative health care teams are part of patient care in most medical settings.[1] A work environment supportive of collaboration better ensures positive outcomes for patient care.[2-4] Recent scientific studies show strong correlations between oral and systemic disease,[5-8] indicating a need for increased collaboration between the medical and dental professions. Interdisciplinary collaboration between medical and dental professionals is emerging as a critical component to effective patient care.[3]

Consider a case when the dental hygienist finds a suspicious lesion on the soft palate of a patient. The patient is referred to an oral surgeon by his general dentist and subsequently diagnosed with oral cancer. The collaborative team may consist of the medical oncologist, radiologist, oral surgeon, social worker, dentist, and dental hygienist. All of these professionals will work together collaboratively to make the best decisions regarding treatment for the patient.

In recent years, diabetes,[5,6] cardiovascular disease,[9,6] preterm, low-birth-weight ba-

Abstract

Purpose: Recent scientific studies show strong correlations between oral and systemic disease, creating a crucial need for increased communication between the medical and dental professions. Interdisciplinary collaboration between medical and dental providers is emerging as a critical component to effective patient care. Dental hygienists have been underutilized in interdisciplinary collaboration, and what utilization does take place has not been well studied. The objectives of this research are to assess dental hygienists' perceptions of (1) their role in interdisciplinary collaboration, (2) the barriers to effective collaboration, and, (3) communication skills needed to better participate in interdisciplinary collaboration.

Methods: Data were gathered using an original, 45-question, quantitative survey instrument, consisting of Likert scale, ranking, and demographic questions. After approval from Oregon State University's Internal Review Board, the survey was pilot tested with 8 dental hygienists licensed in Oregon with diverse educational and practice backgrounds. The survey was revised based on feedback from the pilot test. Variables measured included experience, confidence, importance, leadership, knowledge utilization, and the future of interdisciplinary collaboration. Survey participants consisted of a convenience sample of Oregon dental hygienists (N=103), recruited from 2 large dental hygiene meetings. The overall response rate was 60% (N=103). Descriptive statistics and histograms were generated for all responses. To better understand the nature of relationships between variables, and to make comparisons among groups, statistical analyses included correlation analysis and t-tests.

Results: Results show that dental hygienists perceive their role in interdisciplinary collaboration as valuable, both now and in the future. However, current experience in collaboration is limited. Barriers to collaboration include insufficient time and knowledge of medical diseases. Speaking, listening, and leadership skills are necessary to effectively participate in interdisciplinary collaboration.

Conclusions: Analyses of these findings support a call for greater education in communication skills. Increased knowledge of medical diseases is also needed to increase further confidence in interdisciplinary collaboration. Interdisciplinary education needs to become the expected standard in dental and medical education. Organizational and individual barriers to collaboration require further study.

Keywords: Interdisciplinary collaboration, communication skills, professional roles, barriers to practice, dental hygienist

bies,[7,8,10,11] and certain respiratory diseases[12] have been linked to the inflammation caused by periodontal disease.[13] These correlations place the dental hygienist in a unique position within the interdisciplinary team, as it is often his/her role to initiate communication within the dental team and with the medical office concerning the care of the patient. Of all the dental team members, dental hygienists regularly spend the most time with patients, updating the medical history and listening to patients' descriptions of their medical conditions.

The dental hygienist's assessment is an important piece of patient care as well as potential interdisciplinary collaboration. While the role of the dental hygienist in interdisciplinary health care collaborations deserves inquiry, it has not been studied.

Before defining the role of dental hygienists in interdisciplinary collaboration, it is important to investigate their current practice regarding interdisciplinary collaboration. This small exploratory study will provide a starting point for elucidating the role of the dental hygienist in interdisciplinary collaboration, discovering barriers to collaborative efforts and communication skills perceived as necessary for effective collaboration.

Review of the Literature

What Is Collaboration?

Collaboration is defined as both a process of interaction and an outcome of decision making.[14,15] Collaborative process includes open communication between parties, allowing for constructive exploration of differences in search of workable solutions.[14,16] A collaborative project ultimately brings members from multiple disciplines or fields of knowledge to collectively engage in critical thinking for the purpose of meeting a goal. Through collaborative interaction, individuals with different competencies and skill sets can combine knowledge and experience to create outcomes and answers that no one individual could accomplish alone.[17] Collaborative process centrally involves attributes of a democratically oriented flow of communication transactions; this process involves a sharing of information that is beneficial to the outcome goals of the group.[18] As an outcome, collaboration is defined as how decisions are made within a group. Collaborative decision-making can be measured by shared power, collective responsibility and meaningful opportunities for input by group members.[15] An exchange of information occurs, leading to completion or closure of the collaborative problem.[19] Optimally, the opinions of all are respected, and individual biases are secondary to the goals of the group.[20] For the purpose of this study, interdisciplinary is defined as 2 or more academic or professional disciplines, coming together to engage in the process and outcomes of collaboration. Interdisciplinary can also be referred to as interprofessional, multidisciplinary or cross-disciplinary and cross-professional.[21,22] These various synonyms are used interchangeably within the literature.

Competence, Roles and Goals within Collaboration

Individual members of an effective collaborative team need to be competent in their fields of knowledge and display critical-thinking skills.[23,24] The collaborative team needs members with skill, knowledge and the expertise from their disciplines coupled with a willingness and ability to share.[17] Clear roles and responsibilities are also important to effective collaboration. Team members need to understand clearly their designated responsibilities and roles. Often, individuals within groups will self-organize according to their own specialties and interests.[23,24] Leadership and facilitation are roles that can contribute to the success or failure of the collaboration.[3,25] Standard professional roles are learned through education and the setting in which professional training is accomplished.[21,22,26] For example, dental hygienists trained in a dental school setting often have the opportunity to collaborate with dental students regarding patient care. Collaborative efforts then become part of the learning process. Collaborative team members must have constructive conversations about each other's roles within the group in order to understand their role within the team. A shared understood goal is an essential component of successful collaboration and is the first step in a collaborative process.[14] There must be a common definition of the problem, and a commitment to collaborate for a desired outcome. Cooperative goals mutually benefit the group and the individuals within the group.[24] In dental/medical interactions, the common shared goal is optimal patient care. Strategic collaborative members are individuals respected by their peers who understand their roles and responsibilities and are committed to the shared understood goals of the group. Willingness to participate, positive attitudes towards communication, effective communication skills, and hard work are individual contributions important to realizing collaborative goals.[3,27]

Collaborative Practice Model

The collaborative practice model is taught as one of the foundations of dental hygiene practice. This model teaches that dentists and dental hygienists work together, each offering professional expertise to reach the goal of optimal patient care.[28,29] The relationship should be one of co-therapists,[30] each with unique and differing roles. In the collaborative practice model, the dental hygienist is viewed as the

expert in oral health interventions, dental hygiene treatment planning, and evaluation.[30] Today, many state practice acts allow dental hygienists to work collaboratively with dentists in nontraditional facilities and in under-accessed populations. Collaborative models today include, but are not limited to, collaborative practice agreements (MN, NM), public health endorsements (NV, ME), limited access permits (OR) and alternative practice hygienists (CA).[31]

Increasingly, dental team members need to communicate with medical professionals concerning shared patients.[32,33] Thus, the collaborative model that is taught in the dental hygiene curriculum, and often is at work between the dentist and dental hygienist, needs to be expanded to include communication with other medical specialists. The growing need for interdisciplinary collaboration is driven by the current science connecting oral and systemic diseases, providing new concerns for the whole health of the patient.

Interdisciplinary Education

Increasing shared learning experiences between professions in health care education is a way to advance interdisciplinary collaboration.[1] Curran et al reported on a study of interdisciplinary teams working together in education. Health care students from medicine, nursing and pharmacology concluded that continuous exposure to other professions leads to improved attitudes towards teamwork and a better understanding of what differing professions offer to the collaboration.[2] At Georgetown University, students and faculty in medicine and nursing have developed an interdisciplinary curriculum in clinical ethics. The goal is to bring students together collaboratively in order to prepare future clinicians for the realities of practice. Clinical decision making and patient care are increasingly collaborative endeavors dependent on multiple disciplines working together.[34] Rafter et al[35] reviewed current literature on interprofessional education and conducted a preliminary survey of 7 academic health centers. They concluded that topics such as ethics, communication skills, and evidenced-based practice could effectively be taught in an interprofessional setting.

Currently, some academic health centers are attempting to develop interprofessional education programs. At Oregon Health Sciences University, an Interprofessional Ethics Education Team is being co-chaired by the associate dean of the dental school and an MD at the university hospital. The goal of this team is to educate multiple specialties on professionalism and ethics of care. Collaboration is emphasized in this setting.[36] In other studies, dental and medical students report a positive attitude towards interprofessional education, yet they have little concept of collaborative teamwork between the two disciplines nor the roles of each other to achieve it.[36,37] In a 2007 national study of dental hygiene program directors, 99% agreed that dental hygienists will play an increasing role in collaborative endeavors concerning patients with periodontal and systemic disease connections, yet only 4% report teaching periodontal disease curriculum content with other allied health professionals.[39] Clearly, there is much work to be done in this area.

Interdisciplinary education can help promote mutual respect and trust in the competence of others and decrease barriers such as status posturing and self-preservation.[40] Students in medicine, nursing, pharmacy and dentistry need to learn to work together as a team in order to provide efficient, high-quality patient care. The changing face of medicine with increased patient expectations, the growing complexity of medical care, and the developing science of discovery require the collaborative expertise of many disciplines working together,[3,41] including dentistry, dental hygiene, and medicine.

The purpose of this study was to determine 1) how dental hygienists view their role in interdisciplinary collaboration within their professional setting; 2) what barriers dental hygienists face in becoming an active participant in interdisciplinary collaboration; and, 3) communication skills dental hygienists perceive as being important to interdisciplinary communication.

Methods

A 45-item, quantitative survey instrument was designed and utilized for this study. The survey consisted of 5 sections: foundation questions, roles, barriers, communication skills and demographics. Section 1 included 14 Likert scale questions that address current interdisciplinary practices. For example, "I have experienced interdisciplinary collaboration in patient care." And, "I am more confident collaborating with dental professionals than with medical professionals."

The second section was divided into 2 parts. Part 1 consisted of 10 Likert scale questions focusing specifically on issues of leadership, value and respect when collaborating. For example, "I initiate communication between my workplace and other dental specialists, regarding patient care." Part 2 asked respondents to rank roles fulfilled in patient care, such as clinician and patient educator.

The third and fourth sections focused on perceived barriers to becoming an active voice, and communication skills needed to better participate in interdisciplinary collaboration. Both the barriers and communication sections asked participants to check all items that applied to them. Barrier choices included items such as insufficient

time, being taken seriously, and insufficient knowledge of medical diseases/conditions. Communication skills important for interdisciplinary participation included listening, leadership, and speaking skills. The communication section also asked participants if they had previous communication training and if so, where the training took place. The final section consisted of demographic questions.

After approval from Oregon State University's Internal Review Board (IRB), the survey was pilot tested with 8 Oregon dental hygienists with diverse educational and practice backgrounds. Comments and suggestions for changes were incorporated into the final survey instrument. No additional review was required.

The survey sample was cross-sectional, voluntary, and non-random. It consisted of dental hygienists registered to practice within the state of Oregon. One hundred seventy-two surveys were distributed, at 2 separate dental hygiene meetings, 1 statewide and 1 local. After data were collected, surveys were numbered and results were manually entered into a spreadsheet. All statistical analyses were performed using the data analysis tools in Microsoft Excel version 11.2.[42] Statistical analyses included generating descriptive statistics and histograms for all responses. Data were analyzed using nonparametric correlation analysis: specifically, Spearman's rank correlation analysis was used to investigate correlations between appropriate variables, determining positive or negative relationships and the relative strength of those relationships.

Results

A total of 103 surveys were completed and returned for a response rate of 60%.

Demographics

Survey respondents generally work in urban and suburban areas. The majority of respondents (68%) live in the northwest corner of Oregon. The surveys were distributed at 2 meetings, both in northwest urban settings. This would account for the lower number of respondents from rural practice areas and from differing parts of the state. Respondents overwhelmingly answered clinician (77%) when asked about their primary work responsibility. Private practice was the primary type of work setting reported (67%), followed by dental HMO, education and independent practice, each with 10%. Respondents reported a fairly equitable distribution of years in practice, 0-10 years (38%), 10-25 years (35%), and 25+ years (27%). Almost one half of study participants hold bachelor's degrees (48%). Over one third has associates degrees and almost 1 in 8 has earned a master's degree. Finally, over two thirds of respondents are members of the American Dental Hygienists' Association (ADHA).

The Dental Hygienist's Role in Interdisciplinary Collaboration

Respondents were asked multiple questions addressing their perceptions of their role in interdisciplinary collaboration. Aspects of role include experience, importance, leadership, knowledge utilization, and future (Table 1). Three items generated mean scores above 4, or reasonably strong agreement. Hygienists noted the importance of interdisciplinary collaboration, the future of interdisciplinary collaboration and knowledge utilized as key factors. Respondents agreed that the role of the dental hygienist is important in interdisciplinary collaboration even though they only occasionally have experienced it in daily practice. They concur that their knowledge is utilized when they engage in interdisciplinary collaboration and that the dental hygienist will have a greater role in collaboration in the future. The lowest ranked variable is experience in interdisciplinary collaboration, although the collective response indicates a modest degree of agreement.

Table 1. Perceptions of the Dental Hygienist's Role in Interdisciplinary Collaboration (IC) (n=103)

Role Factors	X Mean	S.D. Standard Deviation
I have experience in IC	3.27	0.98
My knowledge is utilized in IC	4.2	0.73
The role of the dental hygienist is important in IC	4.58	0.55
The dental hygienist will have a greater role in IC in the future	4.42	0.70
I take a leadership role in IC within my work setting	3.82	0.98

Primary Role Perceptions in the Workplace

Respondents were asked to rank the role of the dental hygienist, in order of importance to them, in their working practice. The role choices were patient advocate, patient educator, clinician, treatment coordinator, and communication facilitator. This role ranking was undertaken both in light of their current practice and what they foresee for the future (Table 2). More than half of survey participants identified clinician as the

Table 2. Reported Roles of the Individual Dental Hygienist, Now, and in the Future (n=83)

Roles: Individual	Present		Future	
	Frequency	%	Frequency	%
Clinician	45	54%	32	39%
Patient Educator	22	27%	26	31%
Patient Advocate	6	7%	14	17%
Communication Facilitator	5	6%	6	7%
Treatment Coordinator	5	6%	5	6%

most important role (54%). The role ranked as least important was treatment coordinator (6%). The role identified as increasing the most in the future was patient advocate, from 7% to 17%. However, clinician still ranks as most important in the future (39%) and communication facilitator (7%) and treatment coordinator (6%) rank last.

Barriers

Respondents were asked, "What barriers or obstacles does the dental hygienist face in becoming an active voice in interdisciplinary collaboration regarding patient care?" They were asked to check all that applied to them. The top 4 barriers reported were insufficient time (72%), willingness of other professionals to collaborate (67%), need more professional freedom (51%), and insufficient knowledge of medical diseases (50%) (Table 3).

Communication Skills

Respondents were asked, "What communication skills are important to learn to better participate in interdisciplinary collaboration?" They were asked to check all that applied. Survey respondents marked speaking skills, listening skills, leadership skills, working effectively with teams, dealing with difficult people, power and influence strategies and motivation and persuasion strategies at 58% and above. Negotiation (43%) was the only communication variable marked in less than half the surveys (Table 4). The majority of respondents (62%) have had some communication skills training. Forty-one percent report that communication training happens at the college (23%) and university level (18%), as part of the dental hygiene general education curriculum, while only 6% report receiving communication training from a professional organization.

Table 3. Barriers to Interdisciplinary Collaboration (n=103)

Barrier	Yes % (#)	No % (#)
Insufficient time	72% (74)	28% (29)
Willingness of other professionals to collaborate	67% (69)	33% (34)
Need more professional freedom	51% (53)	49% (50)
Insufficient knowledge of medical diseases	50% (51)	50% (52)
I won't be taken seriously	42% (43)	58% (60)
Unsupportive work environment	41% (42)	59% (61)
Lack of confidence in using professional language	39% (40)	61% (63)
Insufficient education	29% (30)	71% (73)
Unable to identify correct contact person	18% (19)	82% (84)
It is not my job	14% (14)	86% (89)
Insufficient knowledge of dental diseases	13% (13)	87% (90)
Other	12% (12)	88% (91)

Table 4. Communication Skills Necessary for Interdisciplinary Collaboration (n =103)

Communication Skill	Yes	No % (#)
Speaking skills	79% (81)	21% (22)
Listening skills	72% (74)	28% (29)
Leadership skills	66% (68)	34% (35)
Effectively working in teams	64% (66)	36% (37)
Dealing w/difficult people	61% (63)	39% (40)
Power/Influence strategies	60% (62)	40% (41)
Motivation/Persuasion	58% (60)	42% (43)
Negotiation	43% (44)	57% (59)

Correlations

Correlation analysis was performed on a number of variables. Having experience in interdisciplinary collaboration relates positively to the importance of the dental hygienist's role ($r=0.345$, $p<0.000$), and to taking a leadership role in collaboration ($r=0.429$, $p<0.000$). Perceiving collaboration as important is also positively

correlated to taking a leadership role in interdisciplinary collaboration ($r=0.306$, $p<0.002$).

Correlation analysis was performed on collaboration factors between medical and dental professionals. One hypothesis examined was that the number of years a hygienist has practiced would correlate positively with experience and confidence in interdisciplinary collaboration. The findings of this study do not support that hypothesis. In this study, years in practice did not predict levels of experience, feeling respected, or having confidence in collaboration with medical or dental professionals. Another hypothesis was that the level of education would positively compare with self-confidence and experience in collaboration. This hypothesis was also not substantiated.

Discussion

This exploratory study revealed perceptions dental hygienists hold concerning their role in interdisciplinary collaboration. The 2 highest scoring factors are the importance of the dental hygienist's role in interdisciplinary collaboration and having a greater role in the future with interdisciplinary collaboration. Those who believe their role is important are more likely to initiate or engage in the experience of collaborating with other health care professionals and are more likely to take a leadership role in collaboration. Results of the study show that experience in interdisciplinary collaboration is the best predictor for positive responses to collaboration. However, experience was the lowest ranked variable. Dental hygienists need to use their clinical knowledge of oral disease to communicate with their patients' medical providers when necessary. Literature states that collaborative team members need to recognize the unique contribution each profession offers to the process.[1,21] Therefore, dental hygienists need to perceive their role as important in order to be valuable in the collaborative process. Respondents overwhelmingly view their role as that of clinician both now and in the future. Discovering how to better facilitate interdisciplinary collaboration within the clinical role is important to the dental hygienist's increasing role in it.

Findings indicate there are 2 primary reasons dental hygienists are not more proactive in initiating and leading collaborative efforts. First, they lack sufficient time during dental hygiene appointments, and second, interdisciplinary collaboration is not a conventional role. Regarding conventional roles, the profession of dental hygiene emerged from the historical model of a traditional, dominant patriarchal male dentist and a subservient female hygienist in a helper or auxiliary role.[43] Even today, hygienists are referred to as auxiliary to the dentists. While the dental workplace culture is beginning to develop more gender equality, a strong patriarchal attitude still exists in many dental practice settings.

Respondents report higher levels of confidence, experience, and feeling respected when collaborating with dental professionals as compared to medical professionals. This may reflect the fact that the dental hygienist works in dental settings and is more comfortable and understands better how the profession of dentistry functions. Dental hygienists collaborate with dental professionals during their clinical education; however, they do not often have opportunity to collaborate with medical professionals during training. Dental hygienists would benefit from receiving education and clinical training in interdisciplinary academic and health care facilities with opportunities to collaborate with medical professionals on individual patients. Respondents reported a high level of competency in knowledge of dental diseases (87%); however, half of all respondents feel they have insufficient knowledge of medical diseases. Feeling comfortable with medical diseases and the appropriate language or cultural protocol in medicine will greatly enhance dental hygienists' experience in collaboration with medical professionals.

Insufficient time, unwillingness of other professionals to collaborate, and need for more professional freedom are the top 3 barriers reported. These barriers are not in direct control of the individual dental hygienist, but rather involve workplace expectations and behaviors of others. Having insufficient time may limit the willingness of the dental hygienist to attempt collaboration with other providers. Willingness of others to collaborate is a variable controlled by all individual dental and medical team members. If other medical and dental personnel do not see value in working together with dental hygienists, collaboration will not occur. Interdisciplinary education seeks to address this barrier by training medical and dental professionals about the benefits of collaborating with other disciplines.[35] Finally, needing more professional freedom is an issue that ADHA is addressing through education and legislation.

Barriers the individual dental hygienist controls include insufficient knowledge of medical diseases and lack of confidence using professional language. The dental hygienist can attend continuing education courses and read peer-reviewed journals to gain familiarity with medical terms and to increase their vocabulary skills in the correct language to use and the proper questions to ask.

Respondents identify training in nearly every communication skill as highly important, with percentages from 58% (motivation and persuasion strategies), to 79% (speaking skills). This high response rate speaks to an enormous need for education in communication skills. Oral and written communication

education is part of the general education required for dental hygienists by the Commission on Dental Accreditation; however, most dental hygiene programs require only 3 credit hours in these subjects.[44] The need for education in speaking (79%) and listening (72%) proficiencies are the top 2 communication skills identified by respondents. Because their daily practice involves much more than technical skills, dental hygienists see a great need for communication education. A competent dental hygienist can motivate, educate, and build relationships with patients. She/he can present a case for referral to other dental specialists and often is expected to take a leadership role in office activities. All of these responsibilities are enhanced by excellent communication skills.

Limitations of this research project include sample size, demographic questions and the researcher's association with participants. The generalizability of this study is limited because of the small sample size and the demographic characteristics of the sample population. Due to time and access limitations, a random, stratified sample was difficult to obtain. The cross-sectional convenience sample of participants numbered 172 with a response rate of 60%, N=103. The total number of registered dental hygienists in Oregon is 2,593 (Oregon Board of Dentistry, 2007, personal telephone conversation). Therefore less than 5% of the dental hygienists in Oregon answered the survey. In the demographic section, educator and independent practice categories were omitted from the choices for area of primary practice. This oversight was recognized when 6 respondents wrote in educator and 5 wrote in independent practice. Finally, a limitation may exist regarding the researcher's association with respondents. At both events where the survey was presented and participants were solicited, many dental hygienists knew the researcher on a personal and professional level. While this may have been a limitation, actions were clearly taken to receive unbiased, voluntary and honest results from respondents. First, the researcher was physically present at both meetings, available to answer any question or concerns about the study. Second, all responses were voluntary and anonymous. A clear explanation was given of the research goals, and there was no direct benefit given to those who chose to respond. Nevertheless, the limitations of this study make it difficult to generalize to larger populations of dental hygienists. The intent is to initiate a discussion of the dental hygienist's role in interdisciplinary collaboration.

Further research is needed to determine how interdisciplinary collaboration fits with the role of clinician. If no change is expected in the primary role of clinician, where will the increased collaboration be evidenced? Studies focusing on the expected roles of different medical and dental professionals within collaborative efforts will be useful in expanding participation of dental hygienists. Continued research into the patient care benefits derived from dental and medical clinicians who have been educated in an interdisciplinary model of care will be beneficial to advance further interdisciplinary education efforts.

Conclusion

In light of the findings of this exploratory study, the following conclusions are made. Interdisciplinary education needs to become the expected standard in dental and medical education. Learning to collaborate in the educational environment will translate to the practice setting, allowing the hygienist more opportunity and experience in collaboration. Increased communication education in accredited dental hygiene programs should be promoted concurrently with continuing education courses in multiple areas of communication. Continued education in medical conditions that have a strong correlation to dental disease such as diabetes, cardiovascular disease, and pregnancy may increase dental hygienists' knowledge and consequently increase their confidence in collaboration. If the dental hygienist is to be a key player in interdisciplinary collaboration, changes in expectations and time management strategies of the individual hygienist and her or his employer entities will be essential.

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References

1. Yeager S. Interdisciplinary collaboration: the heart and soul of health care. *CritCare Nurs Clin NA.* 2005;17(2):143-148.
2. Curran VR, Mugford JG, Law MT, MacDonald S. Influence of an interprofessional HIV/AIDS education program on role perception, attitudes and teamwork skills of undergraduate health sciences students. *Educ Health.* 2005 Mar;18(1):32-44.
3. Hirokawa RY, DeGooyer Jr. DH, Valde KS. Characteristics of effective health care teams. In: Hirokawa RY, Cathcart RS, Samovar LA, Henman LD (eds.). Small group commu-

nication. Los Angeles (CA): Roxbury Publishing Company; 2003. p. 148-157.
4. Oliver DP, Peck M. Inside the interdisciplinary team experiences of hospice social workers. *J Soc Work in End-of-Life & Pall Care.* 2006;2(3):7-21.
5. Moritz AJ, Mealey BL. Periodontal disease, insulin resistance, and diabetes mellitus: a review and clinical implications. *Grand Rounds in Oral-Systemic Med.* 2006;1(2):13-20.
6. Paquette DW, Nichols T, Williams RC. Oral inflammation, CVD, and systemic disease. *Connections: Oral and Systemic Health Rev.* 2005;1(1):1-8.
7. Offenbacher S, Katz V, Fertik G, Collins J, Boyd D, Maynor G, McKaig R, Beck J. Periodontal infection as a possible risk factor for pre-term low birth weight: results of a prospective study. *J Periodontol.* 1996;67:1103-1113.
8. Jeffcoat MK, Hauth JC, Geurs NC, Reddy MS, Cliver SP, Hodgkins PM, Goldenberg RL. Periodontal disease and preterm birth: Results of a pilot intervention study. *J Periodotol.* 2003;74(8):1214-1218.
9. Gibson F, Yumoto Y, Chou H, Genco C. Innate immune signaling and porphromonas gingivalis accelerated atherosclerosis. *J Dent Res.* 2006; 85:106-121.
10. Scannapieco FA, Bush RB, Paju S. Periodontal disease as a risk factor for adverse pregnancy outcomes. a systematic review. *Ann Periodontol.* 2003;8(1):70-76.
11. Michalowicz BS, Hodges JS, DiAngelis AJ, Lupo VR, Novak MJ, Ferguson JE, Buchanan W, Bofill J, Papapanou PN, Mitchell DA, Matseoane S, Tschida PA; OPT Study. Treatment of periodontal disease and the risk of preterm birth. *N Engl J Med.* 2006;355:1885-1894.
12. Scannapieco FA, Ho AW. Potential associations between chronic respiratory disease and periodontal disease: analysis of National Health and Nutrition Examination Survey III. *J Periodontol.* 2001;72(1):50-56.
13. Lamster IB, Lalla E. Periodontal medicine—changing the face of dental care. *Dimensions Dent Hyg.* 2004;2(4):10-14.
14. Gray B. Collaborating: finding common ground for multiparty problems. San Francisco (CA): Jossey-Bass, Inc; 1989.
15. Walker GB, Daniels SE. Assessing the promise and potential for collaboration: the progress triangle framework. Proceedings of the 7th Biennial Conference on Communication and the Environment. Corvallis (OR): Oregon State University; 2005.
16. Klein JT. Interdisciplinary: history, theory, and practice. Detroit (MI): Wayne State University Press; 1990.
17. Parker GM. Cross functional teams. San Francisco (CA): Jossey-Bass, Inc; 1994.
18. McCallin A. Interdisciplinary team leadership: a revisionist approach for an old problem? *J Nurs Manag.* 2003;11:364-370.
19. Kuhn T, Poole MS. Do conflict management styles affect group decision making? *Human Comm Res.* 2000;26(4): 558-590.
20. Hirokawa RY, DeGooyer Jr. DH, Valde KS. Narrative accounts of health care team performance. Paper presented at the National Communication Association Annual Conference. Seattle (WA): 2000.
21. Bronstein LR. A model for interdisciplinary collaboration. *Soc Work.* 2003;48(3):297-306.
22. D'Amour D, Ferrada-Videla M, San Martin Rodriguez L, Beaulieu MD. The conceptual basis for interprofessional collaboration: Core concepts and theoretical frameworks. *J Interprof Care.* 2005;19(1):116-131.
23. Hargrove R. Mastering the art of creative collaboration. New York: MGraw-Hill; 1998.
24. Tjosvold D. Learning to manage conflict; getting people to work together productively. New York: Lexington Books; 1993.
25. Horder J. Interprofessional collaboration and learning in the workplace: a personal experience. *Work Based Learning Prim Care.* 2004;2:183-185.
26. Apker J, Propp KM, Zabava Ford WS. Negotiating status and identity tensions in healthcare team interactions: an exploration of nurse role dialectics. *J Applied Comm Res.* 2005; 33(2):93-115.
27. Epstein SL. Making interdisciplinary collaboration work. In: Derry SJ, Schunn CD, Gernsbacher MA (eds). Interdisciplinary collaboration: An emerging cognitive science. Mahwah (NJ): Lawrence Erlbaum Associates; 2005. p. 245-263p.
28. Darby ML. Collaborative practice model—the future of dental hygiene. *J Dent Educ.* 1983;47(9):589-591.
29. Darby ML. Collaborative practice model—the future of dental hygiene. *Probe* 1989; 23(2):76-80.
30. Darby ML, Walsh MM. Dental hygiene theory and practice. 2nd ed. St. Louis: Saunders; 2003.
31. American Dental Hygienists' Association. The advanced dental hygiene practitioner and access to oral health care (white paper) [Internet]. 2007. Available from: http://www.ADHA.org.
32. Rhodus NL. Oral health and systemic health. *Minn Med.* 2005; 88(8):46-48.
33. Vissink A, Brand HS. Medical-dental interaction [Internet]. c2006 [cited 2007 Mar 28]. Available from http://www.pubmed.gov.
34. Cloonan P, Davis F, Bagley Burnett C. Interdisciplinary education in clinical ethics: a work in progress. *Hol Nurs Prac.* 1999;13(2):12-19.
35. Rafter ME, Pesun IJ, Herren M, Linfante JC, Mina M, Wu CD, Casada JP. A preliminary survey of interprofessional education. *J Dent Educ.* 2006;70(4):417-427.
36. Morison S, Marley J, Stevenson M, Milner S. Preparing for the dental team: investigating the views of dental and dental care professional students. *Eur J Dent Educ.* 2008 Feb;12(1):23-8.
37. Widdifield H, Ryan CA, Sullivan E. Understanding the role of the qualified professional: a comparison of medical and dental students' attitudes. *Irish Med J.* 2006;99(9):273-276.
38. Wilder RS, Thomas KM, Jared H. Oral-systemic education in United States dental hygiene programs. *J Dent Res.* 2008;87(Spec Iss A).
39. Pringle D, Levitt C, Horsburgh ME, Wilson R, Whittaker MK. Interdisciplinary collaboration and primary health care reform. *Can Fam Physician.* 2000;46:761-765.
40. Lawrence D. From chaos to care: the promise of team based medicine. Cambridge (MA): Da Capo Press; 2002.
41. Microsoft Excel version 11.2. [Computer software]. Seattle (WA): Microsoft; 2006.
42. Motley WE. Dental hygiene at 75. In ADHA's, Seventy-five years of commitment to care. [Internet]. c1988 [cited 2006 Jun 1]. Available from: http://www.adha.org/downloads/Mstory/commitment_to_care.pdf
43. American Dental Association Commission on Dental Accreditation. Accreditation standards for dental hygiene education programs [Internet]. c1988 [cited 2007 Feb 28]. Available from: http://www.ada.org/prof/ed/accred/standards/dh.pdf