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Statement of Purpose

The *Journal of Dental Hygiene* is the refereed, scientific publication of the American Dental Hygienists' Association. It promotes the publication of original research related to the profession, the education, and the practice of dental hygiene. The Journal supports the development and dissemination of a dental hygiene body of knowledge through scientific inquiry in basic, applied and clinical research.

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Editorial

The Impact of Leadership and Research on Decision Making: Leading Through Research

Deborah M. Lyle, RDH, BS, MS

The past 5 years have been exciting and critical for the dental hygiene profession. It started when ADHA requisitioned an environmental scan that revealed an opportunity to move the profession in a new direction that provide for more leadership opportunities and roles for dental hygienists.[1] Subsequent to this scan, the ADHA board of trustees developed a bold and comprehensive strategic plan that is designed to meet the challenges and opportunities of the future.

To support the objectives and goals of ADHA the National Dental Hygiene Research Agenda (NDHRA) needed to be updated. The last revision was in 2007, well before the changes started to happen within ADHA, the educational system, and clinical practice. The current revision of the NDHRA was designed to support the core ideology to lead the transformation of the dental hygiene profession, the vision that dental hygienists are integrated into the healthcare delivery system and the values of service, collaboration, quality, community, lifelong learning and ethics.

One of the first steps was to read other dental hygiene research agendas. Surprisingly, the U.S. and Canada are the only dental hygiene associations with a research agenda. Other disciplines have research agendas such as like nursing, dentistry and physician assistants. Research agendas from other healthcare disciplines were reviewed to see where dental hygiene research could have an impact. A research agenda helps:

- Balance internal and external influences to make good decisions
- Provides a capacity to influence clinical practice and public policy
- Provides the next generation of questions that will advance the science of dental hygiene
- Focus funding in research topics that will help make informed decision about initiatives for the future

This update was accomplished by collaboration with researchers, educators and leaders in dental hygiene. A thorough review of past NDHRA and articles was conducted. It allowed the council to understand the development of the first agenda and the reasons for updates over the years. Once that was completed it was time to critically review key documents including "Dental Hygiene at the Crossroads of Change" and "Transforming Dental Hygiene Education and the Profession for the 21st Century."[1,2] These 2 documents helped in identifying the current key priorities and also to develop a document that could be used by educators, researchers and clinicians.

The idea to develop a conceptual research model was predicated on providing a document that could be utilized by educators who teach research concepts at all levels, graduate students and novice researchers. Experienced researchers may also use this when mentoring junior faculty and new researchers.

The model breaks down the areas of dental hygiene research into three categories: professional development, client level, and population level. The model also shows the phases of research. This is reflected in the conceptual model as discovery, testing/evaluation, and dissemination/translation.

There are many research questions and areas of research that are needed to support the continual development of the dental hygiene discipline. However, based on ADHA's strategic plan there were 5 priorities that researchers are encouraged to explore:[3]

1. Differences between baccalaureate- and associate-level educated dental hygienists
2. The impact of dental hygiene mid-level practitioners on oral health outcomes.
3. Development and testing of conceptual models distinct to dental hygiene that will guide education, practice and research.
4. Efficacy of preventive interventions across the lifespan including oral health behaviors.
5. Patient outcomes in varying delivery systems that may include cost effectiveness, workforce models, telehealth, access to care, and direct access.

Focus on these priorities has the potential to accelerate the pace of transformation of the profession to improve the public's oral and overall health. Also, within these priority areas are research questions

that will impact the future of the profession and the direction of ADHA.

This revised research agenda is intended to guide researchers, educators, clinicians and students in advancing the profession though research by generating new knowledge within the discipline. It provides a visual framework for conceptualizing how individual research topic addresses ADHA priorities. Dental hygiene research and researchers are necessary, relevant and integral to our future.

Sincerely,

Deborah M. Lyle, RDH, BS, MS
Director of Professional & Clinical Affairs
Water Pik, Inc.

References

1. American Dental Hygienists' Association. Dental Hygiene at the Crossroads of Change. 2011 https://www.adha.org/resources-docs/7117_ADHA_Environmental_Scan.pdf

2. American Dental Hygienists' Association. Transforming Dental Hygiene Education and the Profession for the 21st Century. 2016 https://www.adha.org/resources-docs/7117_ADHA_Environmental_Scan.pdf

3. American Dental Hygienists' Association. National Dental Hygiene Research Agenda. 2016 https://www.adha.org/resources-docs/7111_National_Dental_Hygiene_Research_Agenda.pdf

Interprofessional Collaborative Care by Dental Hygienists to Foster Medical-Dental Integration

Denise M. Bowen, RDH, MS

The purpose of Linking Research to Clinical Practice is to present evidence based information to clinical dental hygienists so that they can make informed decisions regarding patient treatment and recommendations. Each issue will feature a different topic area of importance to clinical dental hygienists with A BOTTOM LINE to translate the research findings into clinical application.

The Bottom Line:

The link between oral health and systemic health is broadly known, yet over 15 years of research, reports, and recommendations focusing on the dental-medical divide have resulted in few programs to effectively address integration of oral health care and primary health care in a variety of settings.[1] A health care professional with management and leadership capabilities is needed to coordinate an interprofessional approach to providing comprehensive health care. The dental hygienist is uniquely well-suited to fulfill this need by providing preventive oral health services and referrals for dental care in medical settings and addressing primary care needs related to oral health in dental care settings. Several models incorporating dental hygienists in medical-dental care integration exist.

Based on the findings of these 2 reviews, the ensuing conclusions regarding dental hygienists' potential for interprofessional roles related to medical-dental integration can be drawn:

- Bringing preventive oral health care to the patient in the medical home and community health clinics has potential to reduce persistent barriers to receiving dental care, improve oral health outcomes in vulnerable populations, and decrease oral health disparities.
- The dental hygienist has the opportunity to assume a leadership role in developing closer integration of oral and primary care as an oral health care manager, by coordinating interprofessional efforts of the providers needed to implement comprehensive, patient-centered care.
- Evidence is needed to advance these models of medical-dental integration, remove barriers to implementation, and document effectiveness of each model.

Braun PA, Cusick A. Collaboration between medical providers and dental hygienists in pediatric health care. J Evid Base Dent Prac 2016. 16S; 59-67.

Abstract

Basic preventive oral services for children can be provided within the medical home through the collaborative care of medical providers and dental hygienists to expand access for vulnerable populations.

Background: Because dental caries is a largely preventable disease, it is untenable that it remains the most common chronic disease of childhood. Leveraging the multiple visits children have with medical providers has potential to expand access to early preventive oral services. Developing interprofessional relationships between dental providers, including dental hygienists, and medical providers is a strategic approach to symbiotically expand access to dental care. Alternative care delivery models that provide dental services in the medical home expand access to these services for vulnerable populations. The purpose of this article is to explore 4 innovative care models aimed to expand access to dental care.

Methods: Current activities in Colorado and around the nation are described regarding the provision of basic preventive oral health services (eg, fluoride varnish) by medical providers with referral to a dentist (expanded coordinated care), the colocation of dental hygiene services into the medical home (colocated care), the integration of a dental hygienist into the medical care team (integrated care), and the expansion of the dental home into the community setting through telehealth-enabled teams (virtual dental home). Gaps in evidence regarding the impacts of these models are elucidated.

Conclusion: Bringing preventive and restorative dental services to the patient both in the medical home and in the community has potential to reduce longstanding barriers to receive these services, improve oral health outcomes of vulnerable patients, and decrease oral health disparities.

Commentary: Evidence is needed to document the effectiveness of the dental hygienist in coordinating patient-centered care to enhance integration of primary

care and oral health care and expand access to care. This article provides a review of 4 innovative interprofessional care models which provide dental hygiene services and dental referrals to vulnerable populations in medical and/or community settings and highlights areas of research needed to provide evidence of effectiveness. The target population is children experiencing or at risk for dental caries and the approach involves delivering oral health care in the primary health care setting or medical home. Observations regarding each of these models are based on implementation in Colorado and in other locations throughout the United States. Although early outcomes are described to document feasibility, empirical evidence is needed to determine effectiveness of each model presented.

In the first model, expanded coordinated care, the primary care provider (e.g., pediatrician, family doctor, nurse practitioner, physician assistant) delivers preventive oral health care such as oral health risk assessment and anticipatory guidance, application of fluoride varnish, dental referrals, and prescription of fluoride supplements in the medical office. This model is based on the fact that infants and young children see their primary care provider frequently and regularly for the first 36 months of life, and they do not often visit a dental care provider. An example cited by the authors of this review is Colorado's Cavity Free at Three Program which has trained 3,000 health care professionals and has begun to increase access to preventive oral health services and dental referrals for young children.[2] Nonetheless, barriers have been identified including a lack of time during the medical visit to provide preventive oral health care, inadequate public and private reimbursement, conflicting priorities of medical/primary health care providers, and a deficiency of dentists to whom patients can be referred (especially very young and Medicaid-insured patients).[2]

A small group of medical practices in Colorado tested another innovative model in the Colorado Dental Hygiene Co-Location Project where dental hygienists were co-located in private and public primary care practices. Co-location of medical and dental services within the same health care facility also has existed in community health centers for a many years; however, actual positioning of a dental hygienist delivering preventive services in a primary care practice setting is a more recent approach. Rooms serve a dual purpose, equipped for delivery of primary care and preventive oral health services by either a dental hygienist or a medical care provider depending on needs of the child and scheduling. Barriers include a lack of prioritization by primary care providers or limited time to schedule the added services. Part-time availability of a dental hygienist in the office is less seamless than having one available full-time to establish a routine. Busy medical providers are being asked to assume additional responsibilities and provide preventive oral health services; however, evidence-based strategies to save time and evidence of effectiveness in improving oral health outcomes and related behaviors of infant and child patients and their parents are needed.

The Colorado Medical-Dental Integration (CO MDI) Project represents a medical-dental integration model where dental hygiene services are assimilated directly into the medical home to create a "health home" to address both general and oral health. Sixteen medical practices/systems are participating including federally qualified health centers, school-based clinics, and clinics serving homeless or refugee children. Each facility is equipped with space and portable dental equipment for the dental hygienist who develops a referral relationship or contract with one or more dentists in the local community and coordinates the cases. This model has advantages such as enhanced communication, comprehensive care plans, and shared resources such as scheduling, billing, and medical records. A sustainable business plan is essential to its success. The authors present 3 models emerging out of the CO MDI, each providing an opportunity for dental hygiene research.

Teledentistry, or a virtual dental home, involves using the latest technology to connect dental hygienists in the community with dentists at remote office sites. Dental hygienists are able to work in medical practices/clinics or community settings and provide case management using collaboration and a contractual arrangement with a dentist to address patients' needs in areas without access to care. The authors describe the Hub and Spoke Model with the dentist at the hub and hygienists out in the field or in medical settings as ideal for teledentistry. It has been tested in California and now is being tested in Colorado and Oregon.

The authors conclude that all of these models require education for medical providers regarding their role in identifying oral disease and related risk factors. Dental hygienists also need knowledge and support to address systemic health conditions related to oral health, skills in interprofessional communication/relationships, and training in development of a business plan for sustainability. Each model has benefits and challenges to implementation, and all models lack strong evidence of their impacts on the oral health of various populations. Gaps in knowledge include tools to facilitate coordinated care, effective strategies to assure follow up on referrals from medical settings for dental care, effective strategies to overcome barriers, acceptability of these models to communities and patients, and oral health outcomes. Opportunities are needed to implement these various medical-dental care models and evaluate their effectiveness.

Thiele CW, Strauss SM, Northridge ME, Birenz S. The oral health care manager in a patient-centered health facility. J Evid Base Dent Prac. 2016;16S:34-42.

Abstract

The dental hygienist team member has an opportunity to coordinate care within an interprofessional practice as an oral health care manager.

Background and Purpose: Although dental hygienists are currently practicing within interprofessional teams in settings such as pediatric offices, hospitals, nursing homes, schools, and federally qualified health centers, they often still assume traditional responsibilities rather than practicing to the full extent of their training and licenses. This article explains the opportunity for the dental hygiene professional to embrace patient-centered care as an oral health care manager who can facilitate integration of oral and primary care in a variety of health care settings.

Methods: Based on an innovative model of collaboration between a college of dentistry and a college of nursing, an idea emerged among several faculty members for a new management method for realizing continuity and coordination of comprehensive patient care. Involved faculty members began working on the development of an approach to interprofessional practice with the dental hygienist serving as an oral health care manager who would address both oral health care and a patient's related primary care issues through appropriate referrals and follow-up. This approach is explained in this article, along with the results of several pilot studies that begin to evaluate the feasibility of a dental hygienist as an oral health care manager.

Conclusion: A health care provider with management skills and leadership qualities is required to coordinate the interprofessional provision of comprehensive health care. The dental hygienist has the opportunity to lead closer integration of oral and primary care as an oral health care manager, by coordinating the team of providers needed to implement comprehensive, patient-centered care.

Commentary: This article describes a model in which the dental hygienist, serving as an oral health care manager, coordinates both oral health care and primary care at chairside in the dental setting. The authors assert that dental hygienists are well-suited for this role and have the opportunity to become leaders as primary oral health care coordinators focusing on the oral-systemic health link, rather than allowing other health care professionals (e.g., nurses, physician assistants, nurse practitioners) to fulfill this need. They discuss findings of a pilot study regarding feasibility of this model for interprofessional education and, more importantly, interprofessional practice or collaboration (IPC). This model is based upon a project initiated through cooperation between a school of dentistry and a college of nursing. Rather than expanding the scope of practice for other health care providers to assess oral health, provide preventive services, and refer patients to dentists for needed care, the authors explored the possibility of the dental hygienist assuming the role of IPC coordinator for patient-centered care in the dental care setting. The dental hygienist not only addresses oral health and disease but also primary health care needs, regardless of the limitations of practice acts or regulations governing dental hygiene practice. Sample cases of patients with diabetes, hypertension, and human papilloma virus are discussed within the context of the model.

A pilot study using a theoretical framework and research methods was conducted in 10 dental offices in the New York City area to explore approaches to implementation of IPC with diverse patient populations. The results, summarized in this review, were previously published.[3,4] Findings based on interviews with both dental hygienists and dentists indicated a need for improved use of evidence-based guidelines to screen for systemic health conditions requiring primary care. Strikingly, dental providers knew of the importance of tobacco use and poor nutrition for general and oral health and reported using handheld Web-based devices to seek information for patients. The authors concluded more support is needed for dental providers related to these oral-systemic health issues; systems change is needed to facilitate implementation; and, the dental hygienist is well-positioned to provide patient-centered care and leadership in primary care referral and coordination at chairside. Further research is being conducted to assess an evidence-based clinical decision support system for use by dental hygienists at chairside for tobacco use, hypertension and diabetes screening, and nutritional counseling. Further, the authors propose, given the dynamic nature of practice acts, advanced practice settings, revised roles, and emerging workforce models, it is time for dental hygienists to become leaders in the interprofessional oral care team.

Summary: Dental hygienists are preventive professionals responsible for providing oral health care to patients in traditional dental settings, community settings, and primary care or medical settings. Several models for involvement of the dental hygienist in interprofessional provision of primary health care and preventive oral health care with referrals for dental care have been implemented, and pilot studies provide initial documentation of feasibility. More research in needed to advance these models of medical-dental integration, develop tools for implementation, assess acceptability by communities and patients, remove barriers to implementation, and document effectiveness of each model. Dental hygienists have an opportunity to provide leadership in addressing the medical-dental divide.

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References

1. Donoff, B., McDonough, J. E., & Riedy, C. A., (2014). Integrating oral and general health care. The New England Journal of Medicine. 371:2247-2249. doi: 10.1056/NEJMp1410824

2. Braun PA, Widmer Racich K, Ling S, et al. Impact of an interpro-fessional oral health education program on health care professional and practice behaviors: a RE-AIM analysis. Pediatric Health. Med Ther 2015;6:101-9.Marinho VCC, Worthington HV, Walsh T, Chong L. Fluoride gels for preventing dental caries in children and adolescents. Cochrane Database of Systematic Reviews 2015, Issue 6. Art. No.: CD002280. DOI: 10.1002/14651858.CD002280.pub2

3. Northridge ME, Birenz S, Gomes G, et al. Views of dental providers on primary care coordination at chairside. J Dent Hyg 2016;90.

4. Russell SL, Greenblatt AP, Gomes D, et al. Toward implementing primary care at chairside: developing a clinical decision support system for dental hygienists. J Evid Based Dent Pract 2015;15: 145-51.

Creating Immediacy Using Verbal and Nonverbal Methods

Debra A. Dalonges, RDH; Jacquelyn L. Fried, RDH, BA, MS

Abstract

Purpose: The importance of immediacy and positive relationships between students and teachers is well-documented. Applying immediacy to the patient/provider model has not been sufficiently explored. The significance in creating a bond of trust between the patient/provider is vital to the diagnostic and therapeutic process. As outlined by the National Dental Hygiene Research Agenda, this literature review supports strategies for effective communication between the dental hygienist and client. It examines the relationship between oral health care providers and their patients and applies the verbal and nonverbal cues associated with immediacy to affirm their relevance and effectiveness in educating and motivating patients to achieve optimal oral and systemic health.

Keywords: immediacy, teacher, verbal communication, nonverbal communication

This study supports the NDHRA priority area, **Health Promotion/Disease Prevention:** Assess strategies for effective communication between the dental hygienist and client.

Introduction

"Immediacy is defined as the degree of perceived physical or psychological closeness between two people."[1] Social psychologist, Albert Mehrabian, is recognized for defining the concept of immediacy which states "people are drawn toward persons and things they like, evaluate highly, and prefer; and they avoid or move away from things they dislike, evaluate negatively, or do not prefer."[2] Immediacy encompasses verbal and nonverbal communication techniques that can be applied across multiple settings. Reducing stress and establishing a rapport with clients requires integrating the finesse of an educator and compassion of a quality clinician. Educators use immediacy techniques to educate their students; these same methods can be applied in a clinical setting. Like academicians, dental hygienists rely on finely honed verbal and nonverbal communication skills to impart health education information to motivate and educate patients in oral and systemic health. Dental hygienist, as skilled and knowledgeable clinicians must utilize communication skills that build patient trust and confidence and that convey their skills and knowledge. Desired traits associated with verbal immediacy include self-disclosure, humor, tone, reference to another's positive traits and discourse regarding commonalities. Principle nonverbal cues associated with immediacy include empathic listening, facial migration (showing expression), smiling, gaze orientation, physical appearance and touching.

By means of nonverbal and verbal communication strategies, a dental hygienist can enhance interactions and encourage clients to express their concerns. Nonverbal cues can be equally important, if not more important, than what is said. These cues may influence the outcomes of academic and clinical exchanges. Kearney et al found teacher immediacy was the most powerful predictor of students' reported willingness to comply with teacher requests.[3]

Consistent with the results of instructional communication, patients who view physicians as immediate report being less fearful and generally more satisfied with the medical care they receive.[4] Interpersonal attractiveness, the degree to which others respond positively toward one another, can be improved by using immediacy behaviors. Clinicians wishing to employ the behaviors of immediacy should explore both verbal and nonverbal techniques and ways to ensure their congruence. Simple acts such as maintaining eye contact when communicating, gently patting a patient's arm for reinforcement and speaking with a gently nonthreatening tone are some of the ways to achieve immediacy. Conscious application and diligent learning of both verbal and nonverbal communication strategies may help to improve health education outcomes.

Nonverbal Immediacy Behaviors

A part of all communication are nonverbal behaviors. These behaviors include kinesics, (the study of body movements when communicating), gestures and facial expressions, proxemics (the nature, degree and effect of the spatial separation individuals naturally maintain), olfaction, skin sensitivity, the use of artifacts, physical characteristics, eye movement, touching behavior, and environmental factors.[5] Facial expressions and gestures include bodily contact, physical appear-

ance, and the direction of gaze. Nonverbal behaviors include the paralinguistic variables of emotional tone, timing and accent. Teachers who convey verbal caring messages in combination with nonverbal caring cues are rated by their students as more credible.[6] Some researchers believe that nonverbal behaviors are more effective at communicating immediacy than verbal behaviors. Approximately 93% of interpersonal attitude is communicated nonverbally.[7] Nonverbal cues are often innate and may sometimes contradict a verbal message. One who has a proficient knowledge of nonverbal behaviors can effectively transmit a controlled nonverbal message.

Empathetic Listening

Listening effectively to others offers personal time, psychological presence, cognitive attention and emotional response, all valuable interpersonal resources. Expending the energy to listen to someone is theorized as an expression of affection. Empathic listening results in the receiver feeling validated and understood.[8] Empathy is a required element in effective doctor-patient relationships.[9] A study was performed analyzing empathy and clinical competency with 57 medical students. Clinical interactions and displays of empathy were rated by an independent observer. Results indicated that empathy can be related to high levels of clinical capability and favorable patient outcomes.[10]

Facial Expression

The human face is highly expressive and is often the object of attention.[11] Mehrabian suggests that 55% of interpersonal communication occurs through facial expression alone.[2] A dental hygiene clinician's expectations often are clearly communicated through facial expression. Through proper training and motivation, clinicians can effectively communicate sympathy and understanding, or a positive outlook and expectations.[11]

Smiling

Smiling, as a facial expression, has been studied extensively.[12-14] Smiling is an important aspect of nonverbal communication and has been correlated with liking, affiliation an immediacy.[1] A smiling person may be perceived as more trustworthy and honest. In a case of academic misconduct, students were given a summary of evidence and a photograph of the accused student displaying different facial expressions such as a neutral expression, a felt smile, a false smile or a miserable smile. Smiling targets although not seen as less guilty received more leniency than non-smiling targets. The study revealed that smiling targets are considered more likable, submissive, diplomatic and trustworthy. It appears that a smile can be an effective and positive immediacy tool for achieving leniency.[15]

Good communication is of paramount importance for effective patient outcomes. Smiling can enhance interactions between patients and health care workers. A qualitative study explored oncology patients' perceptions of how healthcare providers conveyed positive communication. Characteristics deemed positive were helpfulness, approachability and smiling.[16]

Gaze Orientation

Every clinical encounter allows the possibility for eye contact to build immediate rapport between the clinician and patient. A gaze may be comforting if it intensifies a pleasant situation, and it can open communication in an uncertain one. Conversely, failure to look a patient in the eye causes the patient to feel like a body and not a person, creating a process of dehumanization commonly seen in medical settings.[11] Open-minded people face the person to whom they speak, stand close to the other person and maintain eye contact.[5]

Physical Appearance

The first form of nonverbal communication relates to physical appearance. Appearance can be used when developing judgements about people based on their looks, what they wear and their level of attractiveness.[17] Physical appearance applies to attire, hairstyle, grooming and accessories. Perceived professionalism, including suitability, competence, ease of conversation and friendliness of professionals is suggestively influenced by the choice of dress style worn for work.[18] Research suggests a patient's preference is for professional attire in dentistry. In one study of 586 subjects they experienced a greater willingness to share personal information with those who wear the identifiable and trusted white coat.[19]

Touch

Touch improves communication quality and demonstrates empathy. Touch is often culturally regulated in professional settings.[17] A qualitative study of both patients and general practitioners (GPs) conducted in England showed the value that each of these groups attributed to touch. The study demonstrated that touch increases the warmth felt, and establishes the connection between doctor and patient. Touching provided the patient with a feeling of warmth increasing the connection to the doctor. GPs in the study stated that touching is "a human thing to do" and they felt that touch should be appropriate.[20] Avoiding concerns about intimacy is critical but the patient responders felt touch on the hand or forearm was appropriate.[20]

Verbal Immediacy Behaviors

Verbal immediacy refers to the stylistic choice of verbal expressions that educators employ. Effective verbal communication helps receivers feel valued and

important. Students may develop either a like or dislike for their teacher based on their display of immediacy during verbal communication.[21] Oral health educators who use verbal behaviors to encourage immediacy may make their patients feel valued and important. Exceptional educators are not remembered because of an interesting lesson, but by how they made the student feel. Verbal immediacy tools like self-disclosure and using humor convey humanness. Verbal immediacy behaviors are displayed by signaling warmth and a willingness to connect to the receiver of a message. An example of effective verbal communication occurs when professionals urge patients to express their feelings about their oral health by simply encouraging their questions.

Self-Disclosure

Self-disclosure is deliberate sharing of personal information to help establish relationships of trust. Revealing motives, intentions, goals, values, and emotions, increases liking and feelings of immediacy.[22] Skillful self-disclosure can humanize a person, creating connections that increase feelings of trust and intimacy. Disclosure can increase a readiness to work collaboratively to reach mutual goals. Students considered teachers effective when they displayed caring through self-disclosure.[22]

Humor

Considerable research examined an instructor's use of humor and resultant learning outcomes.[23-25] The use of humor has been described as an important element for improving student interest and attention during the learning process. When students are interested, they enjoy the learning process.[24] Humor can help students feel more comfortable, relaxed and more likely to learn and develop a bond with the teacher; however, if humor leads to sarcasm and criticism, intimidation may occur.[25] In a classroom setting, humor can have both positive and negative effects.[25]

Humor, integrated into the clinical setting, creates a tone of openness and respect between clinician and patient. A study by Fovet states that the positive effects of humor include the release of endorphins and tension reduction during communication. Humor can have a holistic benefit by creating a natural connection with patients. Humor appears to promote an intimate connection between nurses and patients. This connection may result in more comforting and compassionate care.[26]

Vocal Behavior

Vocal cues convey certain personal characteristics and attitudes. Six specific vocal qualities may directly affect one's ability to be a persuasive speaker: volume control, rate of speech, use of pitch, articulation and fluency with effective pauses.[27] Woolbert provided one of the earliest empirical studies of vocal communication showing that variety in tempo, force and pitch contribute to higher retention and learning of material.[28] Imhof isolated vocal pitch to test how this variable impacts listeners' judgments of the people speaking.[25] Results showed that low pitch makes a difference in the way a person is perceived.[25] Negative teacher evaluations are closely related to teachers with a monotone voice, a speech pattern that works against a teacher's efforts to stimulate student attention.[28] A monotone voice can reduce a patient's comprehension of material delivered orally.[29] Full comprehension is especially important to motivate and help patients change behaviors to achieve optimal oral health.

Application of Immediacy Principles

When applying the principles of immediacy, both verbal and nonverbal communication behaviors can be combined.[21] Whether discussing an individual's health status or educating students, messages are transmitted via two types of communication: explicit and implicit. Explicit messages carry the content; implicit communication conveys emotions and feelings.[21] Explicit messages are fundamentally verbal, while implicit communications are primarily nonverbal.[21] Of the 7% of verbal communication, Mehrabian found that 38% happens through voice tone and 55% happens via general body language.[2] When forming immediacy relationships with patients, clinicians must consider all acts of verbal and nonverbal communications.

Advantages of Immediacy

Immediacy displays warmth and improves interactions and relationships. Patient interactions are human experiences that create a relational link. Effective communication is a vehicle through which patients' involvement is optimized. A correlational study of nurses and patients revealed that the strength of their bond facilitated positive outcomes of care and enhanced patient satisfaction.[30] Fostering and strengthening dental hygienists' bonds with their patients could produce similar results.

Relating educational principle of immediacy, Velez and Cano studied the association between student motivation and teacher immediacy. Their survey found that to increase student motivation via verbal and nonverbal cues, the instructor needs to exercise care and consistency. Exhibiting positive, encouraging gestures were recommended.5 Expectations for success are enhanced through a combination of constant, positive, and supportive verbal and nonverbal communication.[20]

Disadvantages of Immediacy

One distinct disadvantage of immediacy is that cues can be misinterpreted as intimate. Being warm and

friendly in a social environment may be acceptable and encouraged. Similar communication traits may not be considered suitable in certain professional environments. The perception that one is not immediate has more dire consequences than counterproductive immediacy.[1] With practice, one can become familiar with the immediacy degree necessary and appropriate for conveying professional messages required in the clinical setting.[1]

Conclusion

Communication skills, verbal and nonverbal, are essential to successful educator/clinician encounters with patients. As oral health professionals seek new and innovative ways to motivate and engage the dental patient in oral self-care, clinicians must consider the positive effects of immediacy. Successful and meaningful professional encounters require effective communication between the patient and the clinician. Developing approaches that improve communication allows the clinician to build trust, promote healing, and ultimately improve health outcomes. Specific communication skills to motivate patients to achieve optimal oral health are critical. Sending a supportive and caring message will contribute to the development of trust between the patient and the clinician, creating pathways conducive to learning and motivation. Oral health providers continually communicate to patients through body language, gaze, and facial expressions; therefore, care must be exercised to portray positive and caring gestures. A combination of productive verbal and non-verbal patterns will benefit educators, students, health care providers and patients. Although he concept of immediacy has been studied in education and nursing, further research relating to interactions between oral health care providers and patients is necessary.

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References

1. Richmond VP, McCroskey JC, Hickson ML. Nonverbal Behavior in Interpersonal Relations. 7th rev. ed. Boston, MA: Allyn and Bacon/Pearson Education Publishing. 2012. 368 p.

2. Mehrabian A. Silent messages. Belmont, CA: Wadsworth Publishing Company. 1971. 152 p.

3. Kearney P, Plax TG, Smith VR, and Sorensen G. Effects of teacher immediacy and strategy type on college student resistance to on-task demands. Commun Educ. 1988: 37(1); 54-67.

4. Richmond VP, Smith RS, Heisel AD and McCroskey JC. Immediacy in the physician/patient relationship. Communication Research Reports. (2001)18, 211-216.

5. Mandal F. Nonverbal communication in humans. J Hum Behave Soc Environ. 2014; 24(4): 417-421

6. Treven, JJ, Hanson, TL. The impact of teacher immediacy and perceived caring on teacher competence and trustworthiness. Commun Q. 2004; 51(1): 39–53.

7. Mehrabian A, Nonverbal Communication. Chicago IL: Aldine-Atherton, 1972. 235 p.

8. Floyd K. Empathic listening as an expression of interpersonal affection. The Intl J Listen 2014; 28: 1-12

9. Rogers C. Empathic – an unappreciated way of being. Couns Psychol 1975; 5:2–10.

10. Ogle J, Bushnell JA, Caputi P. Empathy is related to clinical competence in medical care. Med Educ. 2013; 47(8): 824-831

11. Friedman HS. Nonverbal communication between patients and medical practitioners. J Soc Issues. 1979: 35(1); 82-99

12. Borgstrom M. Automatic mimicry reactions as related to differences in emotional empathy. Scand J Psychol [Internet]. 2002 12 [cited 2/20/2015 2:18:00 PM];43(5):433-43. Available from: http://search.ebscohost.com.proxy- hs.researchport.umd.edu/login.aspx?direct=true&db=pbh&AN=12414816&site=eds-live

13. Hack T. Forming impressions: Effects of facial expression and gender stereotypes. Psychol Rep [Internet]. 2014 04 [cited 2/20/2015 2:14:55 PM];114(2):557-71. Available from: http://search.ebscohost.com.proxy- hs.researchport.umd.edu/login.aspx?direct=true&db=cmedm&AN=24897907&site=eds- live

14. LaFrance M, Hecht M. Automatic mimicry reactions as related to differences in emotional empathy. Scand J Psychol [Internet]. 2002 12 [cited 2/20/2015 2:18:00 PM];43(5):433-43. Available from: http://search.ebscohost.com.proxy- hs.researchport.umd.edu/login.aspx?direct=true&db=pbh&AN=12414816&site=eds-live

15. LaFrance M, Hecht M. Why smiles generate leniency. Pers Soc Psychol Bull 1995; 21(3): 207-214

16. McCarthy B. Patients' perceptions of how healthcare providers communicate with them and their families following a diagnosis of colorectal cancer and undergoing chemotherapy treatment. Eur J Oncol Nurs [Internet]. 2014 [cited 7/11/2015 11:21:56 AM];18:452-8. Available from: http://search.ebscohost.com.proxy- hs.researchport.umd.edu/login.aspx?direct=true&db=edselp&AN=S1462388914000738&site=eds-live

17. Gupta N. Effective body language in organizations, IUP J Soft Skills. 2013; 7(1): 35-44.

18. Furnham A, Chan P, Willson E. What to wear? the influence of attire on the perceived professionalism of dentists and lawyers. J Appl Soc Psychol [Internet]. 2013;43(9):1838- 1850.

19. Gherardi G, Cameron J, West A, Crossley M. Are we dressed to impress? A descriptive survey assessing patients' preference of doctors' attire in the hospital setting. Clin Med. 2009: 9(6); 519–524

20. Cocksedge S, George B, Renwick S, Chew-Graham CA. Touch in primary care consultations. J R Coll Gen Pract. 2013: 63(609); 283–290.

21. Velez J, Cano J. The relationship between teacher immediacy and student motivation, J Agric Educ. 2008; 49(3): 76-86

22. Peart NA, Campbell FA. At-risk students' perceptions of teacher effectiveness. J Just Caring Educ.1999; 5(3):269–284.

23. Kher N, Molstad S, Donahue R. Using humor in the college classroom to enhance teaching effectiveness in 'dread courses'. Coll Stud J. 1999: 33(3); 400.

24. Fovet F. The use of humour in classroom interventions with students with social, emotional and behavioural difficulties. Emot Behav Diffic [Internet]. 2009 11/11; 2015/02 [cited 2/20/2015 2:38:50 PM];14(4):275-89. Available from: http://www-tandfonline-com.proxy-hs.researchport.umd.edu/doi/abs/10.1080/13632750903303104

25. Imhof M. Listening to voices and judging people. The Intl J Listen 2010; 24:19-33

26. Tremayne P. Using humour to enhance the nurse-patient relationship. Nurs Stand [Internet]. 2014 03/26 [cited 7/11/2015 8:59:22 PM];28(30):37-40. Available from: http://search.ebscohost.com.proxy-hs.researchport.umd.edu/login.aspx?direct=true&db=c8h&AN=2012520245&site=eds- live

27. McCroskey JC. An introduction to rhetorical communication 8th ed. Englewood Cliffs, NJ:Prentice-Hall Publishing. 2001. 269-288

28. Woolbert CH. Effects of various modes of public reading. J Appl Psychol [Internet]. 1920 06;4(2-3):162-85. Available from: http://search.ebscohost.com.proxy- hs.researchport.umd.edu/login.aspx?direct=true&db=pdh&AN=1926-05021- 001&site=eds-live

29. Markel NN. The reliability of coding paralanguage: Pitch, loudness, and tempo. J Verbal Learning Verbal Behav [Internet]. 1965;4(4):306-8. Available from: http://search.ebscohost.com.proxy-hs.researchport.umd.edu/login.aspx?direct=true&db=psyh&AN=1966-02846- 001&site=eds-live

30. Tejero LMS. The mediating role of the nurse-patient dyad bonding in bringing about patient satisfaction. J Adv Nurs [Internet]. 2012 05 [cited 7/11/2015 6:10:21 PM];68(5):994-1002. Available from: http://search.ebscohost.com.proxy- hs.researchport.umd.edu/login.aspx?direct=true&db=c8h&AN=2011487985&site=ehost-live

Oral Health on Wheels: A Service Learning Project for Dental Hygiene Students

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Abstract

Purpose: To provide dental hygiene students with a service learning opportunity to work with special needs and culturally diverse underserved populations through the Oral Health on Wheels (OHOW) community based mobile dental hygiene clinic.

Methods: A student feedback survey was administered between the years of 2009 and 2013 to 90 students in order to gather and identify significant satisfaction, skills acquisition and personal growth information after the student's clinical experience on the OHOW. ANOVA and Pearson correlation coefficient statistical analysis were utilized to investigate relationships between student responses to key questions in the survey.

Results: An analysis of 85 student responses (94.44%) demonstrated statistically significant correlations between student learning and their understanding of underserved populations, building confidence in skills, participation as a dental team member and understanding their role in total patient care. The strong correlations between these key questions related to the clinical experience and students confidence, skills integration into the dental team, and understanding of both total patient care, and the increased understanding of the oral health care needs of special populations. All questions directly link to the core mission of the OHOW program.

Conclusion: The OHOW clinical experience allows dental hygiene students a unique opportunity to engage in their community while acquiring necessary clinical competencies required by national accreditation and providing access to oral health care services to underserved patients who would otherwise go without treatment.

Keywords: access to care, alternative practice, cultural competency, clinical education, dental hygiene, dental hygiene work force models

This study supports the NDHRA priority area, **Health Services Research:** Investigate how alternative models of dental hygiene care delivery can reduce health care inequities.

Introduction

There have been many well-established reports regarding the education of oral health care providers within educational institutions.[1,2] One most notable report in 2003 from the American Dental Education Association's (ADEA) President's Commission details the roles and responsibilities of academic dental institutions.[3] In that report, authors draw attention to the significance educational institutions have in becoming part of the "moral community," helping not only improve access to oral health care, but to "be able to influence state and federal policy makers, community leaders, industry, and other stakeholders to help the profession fulfill its moral duties."[3] A critical concern in this ADEA report was meeting the oral health care needs of our changing demographic society including underserved and culturally diverse populations.

The Surgeon General's Healthy People 2020 report noted the impact of oral health on general health, disparities in oral health, and access to care within the low income and underserved.[4] For example, a higher percentage of diverse populations have been shown to have a greater incidence of dental/oral disease. Therefore, the Surgeon General outlined the substantial benefits of including oral health in the design of community programming.[3,4] It has also been suggested that without substantial change in dental and dental hygiene education models of oral care, dentistry as a profession will only reproduce rather than address and change the current landscape of oral health disparities.[5]

The Commission on Dental Accreditation (CODA) standards clearly identify that students graduating from dental/dental hygiene institutions must be competent in managing a diverse patient population and have the interpersonal and communication skills to function successfully in multi-cultural work environments (Standard 2.17), and that they are competent in assessing the treatment needs of patients with special needs, (Standard 2.12).[6] Therefore, if educators implement strategies to expose students to diverse patient populations, those students may view working with these patients as a rewarding experience and be better prepared to treat them in the workforce.

Legislators are turning to alternative delivery systems to address the oral health care needs of underserved populations. Several midlevel provider models have been described and suggested such as the advanced dental hygiene practitioner (ADHP), the community den-

tal health coordinator (CDHC) and the dental health aid therapist (DHAT).[7] These models have been proposed at a national level, however, individual states are also working on models specific to their needs. For example, the state of Kansas has addressed access to oral health care through the enactment of the Extended Care Permit (ECP) Dental Hygienist and to date has in place the ECP I, II and III.[8]

In order to prepare students for working with a diverse population upon graduation, it is critical that they are exposed to and know how to treat those from diverse backgrounds, oral health needs and/or disabilities. The literature suggests the best way for students to grasp the importance of community service and to gain a sense of cultural competency is through the implementation of service learning opportunities. Yoder states that "integrating service-learning into dental curriculum will create a deeper understanding of the dynamics, the assets, and the challenges of the community and its relationship to oral and general health."[9]

Service learning is not simply providing services to the community or volunteer work. To be authentic service learning, there must be a reciprocal component, preparation and reflection.[9,10] The services provided are in response to a community need, works with and enhances the students' course goals and objectives, and their roles as professionals and community partners.[9,11] Yoder outlines critical components for the planning, implementation and evaluation of service learning in dental curriculum which are needed to be authentic service learning and not just community engagement.[9]

Three main goals of service learning used in dental educational settings have also been described by Hood.[12] Improving student learning, promoting civic engagement and addressing social needs are all crucial to a successful service learning project in addition to strengthening the community at large. Other key components include reciprocation between the students and the community entity being served. Reflection by the student is also crucial to a successful learning experience.[12] Elyer and Giles discuss the importance of matching the academic goals with the placement of students in the community setting in addition to student reflection as a way to deepen the transfer of knowledge learned in the engagement.[13] Other important pieces noted by these authors include the students' relationship with the community partner, the time or duration of the experience and the student's perception of the quality of the service learning experience.[13] The Commission on Dental Accreditation (CODA) evaluates the dental institutions' ability to make sure students are culturally competent; therefore, implementing service learning opportunities in the dental hygiene curriculum is an effective way to ensure this outcome.

As an innovative approach to dental hygiene education and public health, a service learning outreach clinic called, Oral Health on Wheels (OHOW) began full operation as a clinical rotation for dental hygiene students at Johnson County Community College (JCCC) in August, 2008. Following successful capital fundraising and college commitment towards ongoing operating expenses, a mobile dental hygiene vehicle was purchased to implement this service learning program (Figure 1). The mobile dental hygiene clinic is a 43 foot custom designed truck (LifeLineMobile®) outfitted with 2 complete dental operatories, sterilization area, patient intake, waiting room and a wheel chair lift. Clinical rotation on the OHOW allows dental hygiene students to participate in, and provide the full scope of dental hygiene services to culturally diverse patients and those with special needs. The OHOW continues to be fiscally supported by the college and is therefore maintained as an enriching clinical experience for the dental hygiene students. Operations of the OHOW are monitored by a full-time dental hygiene faculty who is the project coordinator. Additionally, community dentists are employed to enhance interprofessional education.[12,13] Second year dental hygiene students spend a 3-week rotation in the OHOW as part of their clinical instruction. A 1:1 faculty-student ratio on the OHOW allows for extended learning and assistance with new patient experiences with special populations served by OHOW (Table I).

Figure 1: JCCC Mobile Dental Unit

Community Partners (Reciprocal Component)

The OHOW partners with 2 Johnson County service agencies including Johnson County Developmental Supports (JCDS) and Johnson County Department of Health and Environment (JCDHE). A third partnership is in place with an outreach center, Center of Grace. Clients from JCDS are diagnosed with mild to severe intellectual and developmental disabilities. Patients seen at JCDHE are pregnant mothers while Center of Grace clients are predominantly Hispanic adults. Table II describes the demographics of these community partners. Eligibility of consumers are determined by the JCDS Director of Clinical Supports. Appointment scheduling is maintained by nursing staff using a re-care system prescribed by OHOW staff to benefit clients' periodontal health. Wednesday treatment alternates between JCDHE and Center of Grace outreach center. Clients at JCDHE are informed of the health benefits and provision of oral health services provided on OHOW through an internal intake system by WIC coordinators and nurse practitioners. Clients are then scheduled for a screening by the bilingual social workers in order to begin treatment as most of the clients served are Spanish speaking. Clients at Center of Grace are given appointments on a first come first serve basis. These patients continue care if they are still enrolled in ESL classes at the center.

OHOW Operations: Faculty, Staff, Students

Supervision of the OHOW mobile clinic is conducted by a full time dental hygiene faculty from the college. A community pool of dentists make up the staff dentist position on the OHOW. One dentist is on the mobile unit during each rotation. Two dental hygiene students rotate through the mobile dental clinic at one time, twice per week. The same dentist maintains the staff position every Monday, serving clients at Johnson County Developmental Supports (JCDS). The consistency of the same dentist on site with the special needs population strengthens the acceptability and comfort level for the patients. Currently, 5 remaining dentists rotate to fill the Wednesday staff dentist position participating from 1 to 5 days per semester. This community pool of dentists strengthens the relationship with the local dentist community and shares the learning experiences the college offers the dental hygiene student. In order to facilitate the cross-cultural bridge with the Spanish speaking community, an experienced interpreter/translator completes the OHOW team. As an integral part of the OHOW mobile clinic, the interpreter assists Spanish speaking clients with completion of forms, and referrals (English/Spanish), understanding treatment findings and needs, oral health care instruction, scheduling and post-treatment follow-up.

The literature is clear that dental hygiene education is a conducive platform to providing students with valuable service learning experiences as an avenue for creating community partnerships.[2,14] Therefore, the purpose of this service learning project was to provide dental hygiene students a unique opportunity to gain meaningful patient care experiences with special needs and culturally diverse underserved populations through a mobile community based clinic. In addition, this study evaluated student satisfaction with their experience on the OHOW rotation through a student feedback survey.

Methods and Materials

Students participated in the OHOW rotation 3 weeks at a time, 2 times per week. Prior to participation, students review and complete a series of modules on "Practical Oral Care for People with Developmental Disabilities."[15] Students also complete a take-home exam on this information thereby increasing their ability to work with and treat patients with special needs and those from underserved populations.

In order to evaluate student satisfaction of the OHOW service learning project, a Student Feedback Survey was administered to all students who participated in the project over the 5 years from 2009 to 2013. The survey was administered at the culmination of the second year, prior to graduation, giving the students time to reflect on their service learning experience. The survey was blind and consent was given by participation. A total of 90 students completed the survey from 2009 to 2013. Completion of the survey was not required.

The survey measured the degree to which OHOW increased student awareness of underserved populations, cultural diversity, clinical skills, confidence building, dental team working relationships and the delivery of ethical patient care. Students also provided open ended feedback about current program operations and the degree to which the rotation may have influenced their clinical dental hygiene education as well as future professional endeavors. In this way, the survey assessed both quantitative and qualitative feedback.

The Feedback Survey was adapted from one used in a study by Ashton-Brown et al, where the authors evaluated the use of public health clinics in a service-learning rotation for dental hygiene students.[16] That survey was originally modeled after the Health Professions Schools in Service to the Nation program taken from the handbook Methods and Strategies for Assessing Service-Learning in the Health Professions.[17] The final adaptation of the survey in this study included a total of 25 questions. These 25 questions were broken into 3 sections. The first section included 10 questions pertaining to skill development with a 5 point Likert scale answer ranging from 1=not at all, to 5=very much. The second section included 11 questions relating to the students' experiences on the service learning rotation. The Likert scale in this section ranged from 1=strongly disagree to 5=strongly agree. Lastly, section 3 included 4 questions for students to provide reflection on things they learned, might change, advice for the project and any comments they would like to

Table I: OHOW Service Learning Rotation Framework

OHOW Service Learning Item	Time Frame	Week	Team Members
Student completes modules and exam Oral health needs of patients with intellectual and developmental disabilities	Prior to participation in the Oral Health on Wheels Rotation	Clinic III Fall Semester, 2nd year of program	All Second Year Students
Rotation on the OHOW Service Learning Project Preventive Services: • Prophylaxis • Scaling • Rootplaning • Polish • Fluoride • Education • Radiographs • Dental Exam • Referral	3 Week Rotation 2 times per week Mondays and Wednesdays	Fall and Spring Semester of the 2nd Year Mondays – JCDS Wednesdays – Alternates between JCDHE (Pregnant Mothers) and Center of Grace	Full Time DH Faculty – Both Days Monday DDS – Same each week Wednesday DDS – Alternates Spanish Interpreter
Meet with Faculty to provide reflection: • Daily Formative Feedback • Summative Feedback	After completion of Service Learning Rotation	End of Semester	FT Faculty Member and Student meet for Reflection
Complete Student Feedback Survey: • Likert scale items and Open-ended reflection & feedback	After completion of Service Learning Rotation	End of Semester	Student completes Survey

Table II: Patient Demographics of Collaborative Partnerships

	Place of Service		
Demographic	JCDS	JCDHE	Center of Grace
Number of Patients Served	147 Intellectual and Developmental Disabilities	51 Pregnant Women	51 Hispanic Adults
Age Range (Years)	21 to 67	16 to 45	16 to 60
Gender (n, Percent)	51 (34%) Female 96 (66%) Male	51 (100%) Women	40 (80%) Female 11 (20%) Male
Ethnicity (n, Percent)	145 (99.9%) White 2 (0.01%) Other	45 (89%) Hispanic 6 (11%) Other	49 (95%) Hispanic 2 (5%) Other

share with the faculty and staff about their service learning experience.

In order to assess the student's learning strategies while on the OHOW rotation, student's conferenced with the program director at the end of each rotation. Students provided reflection regarding their triumphs, progress and opportunities for clinical skill improvement based on their performance. Progress evaluations were also submitted to the Second Year Lead Clinical Coordinator(s) of Clinic III and IV for consideration during clinic course conferences which served as additional reflection.

Results

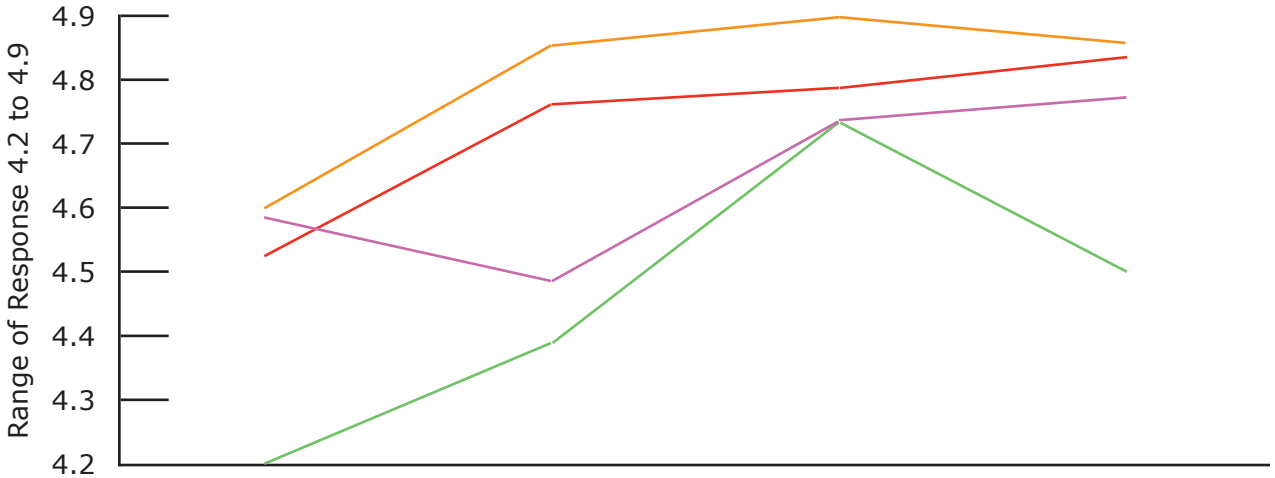
Out of the 90 students who responded to the survey, 85 (94.44%) indicated satisfaction and personal growth after their clinical experiences on the OHOW rotation. These responses provided valuable feedback for any changes in the curriculum related to intellectually and physically disabled populations. Students reported significant satisfaction, personal growth and confidence while working with clients with intellectual and developmental disabilities ($p \leq 0.05$). The JCDS service site was repeatedly favored by the dental hygiene students. Additionally, students expressed how the OHOW rotation exceeded their clinical expectations and personal satisfaction in treating clients with special needs.

Table III: Pearson Correlations of Student Responses to Key Questions

		Underserved	Learned More	Build Confidence	Dental Team	Total PT Care
Underserved	Pearson Correlation	1	0.504**	0.246*	0.437**	0.428**
	(Sig 2-tailed)		0.000	0.024	0.000	0.000
	n	84	84	84	84	84
Learned More	Pearson Correlation	0.504**	1	0.645**	0.586**	0.545**
	(Sig 2-tailed)	0.000		0.000	0.000	0.000
	n	84	84	84	84	84
Build Confidence	Pearson Correlation	0.246*	0.645**	1	0.426**	0.497**
	(Sig 2-tailed)	0.024	0.000		0.000	0.000
	n	84	84	84	84	84
Dental Team	Pearson Correlation	0.437**	0.586**	0.462**	1	0.867**
	(Sig 2-tailed)	0.000	0.000	0.000		0.000
	n	84	84	84	84	84
Total PT Care	Pearson Correlation	0.428**	0.545**	0.497**	0.867**	1
	(Sig 2-tailed)	0.000	0.000	0.000	0.000	
	n	84	0.84	84	84	84

Pearson Correlation=r value, Sig 2 tail=significance, n=number of respondents
*Significant at the 0.05 level (2-tailed), **Significant at the 0.01 level (2-tailed)

Table IV: Student Responses to Survey Questions



	2010	2011	2012	2013
Underserved	4.53	4.76	4.77	4.82
Learned More	4.2	4.38	4.73	4.5
Dental Team	4.58	4.48	4.73	4.77
Serve Patients	4.6	4.85	4.9	4.87

Year of Student Response

The survey also ascertained the degree to which the OHOW experience enhanced the students' dental hygiene education in working with diverse, underserved, multicultural and special needs populations. Table III shows the Pearson correlation of students' responses to key questions asked on the survey. Students expressed a significant level of satisfaction in many domains. Responses demonstrated strong correlations between student learning and their understanding of underserved populations (r=0.504), building confidence in skills (r=0.645), participation as a dental team member (r=0.586), and understanding their role in total patient care (r=0.545) (Table III). The strong correlations among these key questions related to their clinical experience and confidence, skills, integration into the dental team, and understanding of both total patient care, and their increased understanding of the needs of special populations. All of these items speak to the core mission of the OHOW program. Students also responded favorably to the advanced challenges presented in case treatment. Comments consistently reported a favorable learning environment and skill acquisition in the mobile facility. Students also reported significant satisfaction with their experience working as a team of professionals in order to treat the underserved populations on the OHOW facility.

The Johnson County Community College survey demonstrated a high satisfaction with the ability of the OHOW rotation to enhance the dental hygiene students' ability to provide dental hygiene care. Student comments included, "challenging, but a good experience," "by far my favorite rotation site" and "I wish I could have been on the truck all the time, I learned so much." This feedback is essential in order to continue to provide each student with an authentic learning environment, while meeting the needs of each service center. Several key questions are noted regarding the treatment of underserved populations learning, working as a team, and serving patients without discrimination. Table IV demonstrates student responses to these key questions. It highlights student responses to working with underserved populations, learning more skills, working as a team and learning the value of serving patients with special needs. There was a major increase in the student's perceived ability to learn more skills during their rotation on the Oral Health on Wheels service learning project.

The unique operation in the OHOW setting allows students to treat special needs and underserved populations in a 1:1 faculty/student ratio. Significant satisfaction was expressed by students regarding the learning environment and treating patients with intellectual (ID) and developmental (DD) disabilities. Open-ended responses on the OHOW survey indicated students comfort level with treating ID and DD patients through JCDS were quite positive. One piece of advice given by a student stated "I would tell next year's students about how great of an experience it is working with the population selected: rewarding, so just relax and think of the service being provided."

Discussion

The faculty and administration at JCCC are committed to implementing and continuing service learning projects in the dental hygiene program. Students positive response to their OHOW service learning experience, support the mission of the educational arm of the dental hygiene program and the mission of OHOW. The strong correlations identified in this service learning evaluation project may be in part due to the unique environment in which learning takes place. Students are encouraged and directed by all faculty and staff, on how to use their knowledge and skills to deliver exceptional patient care while continuing to sharpen their professionalism.

The most significant results were from the JCDS service site. Students indicated treating clients with either intellectual/developmental disabilities (ID/DD) exceeded their expectations clinically and gave them personal satisfaction. In this setting students work with case/social workers, support staff, nurses and dentists as well as the dental hygiene OHOW program coordinator. These results coincide with expected competencies of a graduating dental hygienist as indicated in the CODA standards (2-12) which address student competency in assessing treatment for patients with special needs.[6] Additionally, having the project coordinator who is a full time faculty on site at all times, increases the experience, supervision and skill development of the student. Many of these recommendations are outlined in the Macy study which favors a more community based dental education model.[18]

Students' utilized didactic lessons learned in the classroom and applied that information in the mobile clinical setting under guided instruction. This guided instruction is thought to reduce potential apprehension when treating patients with ID and DD. The students' ability to learn from their experience is an internal process within themselves. Different from the onsite clinic, students do not have scheduling burdens as this is done by the site personnel and project coordinator. This reduced burden may also allow students to focus with the task presented to them. Working with a Spanish Interpreter also creates seamless communication with the Hispanic patient population. Students learn how to work with the interpreter for effective translation. It is understood that an interpreter is not available for every non-English speaking encounter post-graduation; however, the experience provides students with an appreciation of the interpreter as a key member of the oral health care team. Additionally, this experience may give students the tools needed to navigate the public health care system in their future career endeavors.[12]

Other student feedback demonstrated a high satisfaction with their ability to provide dental hygiene care for special needs populations. Students became more aware of and sensitive to the unmet needs of underserved and diverse populations. One comment in partic-

ular highlights this reflection, "The most important thing I learned in my rotation was providing dental hygiene care for special needs patients, and having patience for others having trouble understanding." This outcome demonstrates how the OHOW project has helped to increase the students' sense of professionalism and civic responsibility as an oral health care provider.[9,12]

Results of this service learning project are consistent with other research such as Wolff et al, which stated that the more experience dental students had with treating persons with intellectual disabilities, the more positive their attitude concerning this population.[19] In another study by Aston-Brown et al, the authors found that after experience in a service-learning rotation opportunity in the public health environment, dental hygiene students expressed an improved understanding of ethical patient care as well are their awareness of underserved populations and cultural diversity.[16] These authors underscore the necessity of service learning as a way to increase student awareness of dental public health as an alternate career choice.[16] These suggestions have been cited in the literature as integral components for a successful service learning project.[9,12,13,18]

Lautar describes the characteristics of service learning in dental hygiene education.[20] She suggests how providing sealants within a rural community is a good example of a service learning project in the dental hygiene curriculum. This activity meets the needs of the underserved children in the community in addition to giving students exposure to a population they might not generally be able to treat.[20] Likewise, the OHOW project meets the oral health care needs of underserved disabled populations, exposes students to community service, and connects and engages students to the community. Students are able to reflect on their experience and become more culturally competent.[16]

Another study utilizing a one-on-one faculty mentor approach found similar outcomes after their dental hygiene students participated in a "Miles of Smiles" service learning rotation.[21] Results indicated students were able to increase their clinical skills, became more aware of community oral health needs in child populations, found satisfaction in working with these patients, and developed an appreciation for alternative models for delivery of oral health care.[21]

Elyer and Giles suggest that a crucial component of an effective service learning project is connecting the academic goals with the placement of students in the community setting, further deepening engagement.[13] The outcomes of this study demonstrated this suggestion by these authors. Students' perception of the OHOW rotation were favorable showing high satisfaction in their feedback demonstrating the experience to be valuable both personally, for their clinical skills, and impacting their sensitivity to underserved populations.

A unique hallmark of service learning in dental hygiene is how the community partner benefits from the service provided.[9] Patient surveys are shared with students as part of the student feedback process and reflection, allowing the students to see the direct impact and appreciation clients express after receiving oral health care services from the OHOW project. As part of the national oral health care objectives, working as a team to reduce the burden of oral disease is seen as an integral part to promote health and quality of life for all individuals.[4] As educational institutions change the delivery of dental education for future health care professionals, it is hypothesized that the changes may produce oral health professionals with a renewed dedication to reach out to underserved populations.

Long term data continues to be collected on the OHOW project and will be valuable in assessing the future impact of the service learning from both the student and community partner perspective. Follow-up study should include information from graduates to assess how the project impacted their choice of employment in public health clinics. Additionally, future plans include utilizing an Advanced Education in General Dentistry resident on the OHOW rotation 1 day per month to collaborate with the students and patients as well as reduce the burden of care in underserved populations.

Conclusion

The main purpose of the OHOW project was to evaluate its' impact on student satisfaction and their ability to gain valuable clinical experiences treating underserved populations. The results demonstrated the OHOW project was able to meet its stated purpose as students were highly satisfied. Rotation on the OHOW increased student learning and understanding of underserved populations, built confidence in their clinical skills, increased their participation as a dental team member, as well as their understanding of their role in total patient care. Lastly, results from this study support the ADEA Commission on Dental Education recommendations for improving the oral health for all Americans. The OHOW service learning project allows dental hygiene students a unique opportunity to engage with their community while acquiring necessary clinical competencies required by national accreditation and providing access to oral health care services to underserved patients who would otherwise go without treatment.

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References

1. U.S. Department of Health and Human Services. A National Call to Action to Promote Oral Health. U.S Department of Health and Human Services, Public Health Service, Centers of Disease Control and Prevention, and The National Institutes of Health, National Institute of Dental and Craniofacial Research. NIH Publication No. 03-5303, May, 2003; Rockville, MD.

2. Institute of Medicine and National Research Council. Improving access to oral health care for vulnerable and underserved populations. 2011; Washington, DC: The National Academies Press.

3. Haden NK, Catalanotto FA, Alexander CJ, et al. Improving the oral health status of all Americans: roles and responsibilities of academic dental institutions. The report of the ADEA President's Commission. J Dent Educ. 2003; 67(5):563-583.

4. U.S. Department of Health & Human Services. (2012). U.S. Department of Health and Human Services: Office of Disease Prevention and Health Promotion:Healthy People 2020 Nasnewsletter (2002/05/04 ed., Vol. 15, p. 3): U.S. Department of Health & Human Services.

5. Albino JEN, Inglehart MR, Habil P, Tedesco LA. Dental education and changing oral health care needs: disparities and demands. J Dent Educ. 2012; 76(1): 75-88.

6. Commission on Dental Accreditation. Accreditation Standards for Allied Dental Hygiene Education Programs: Chicago. American Dental Association, April, 2013.

7. McKinnon M, Luke G, Bresch J, Moss M, Valachovic RW. Emerging allied dental workforce models: considerations for academic dental institutions. J Dent Educ. 2007; 71(11):1476-1491.

8. Kansas Dental Board. Kansas dental practices act statues and regulations and related law relating to dentists and dental hygienists. Kansas Dental Board (Internet). 2014 April (Cited 2015 April 25). Available from: http://www.dental.ks.gov/laws/kansas-dental-practices-act

9. Yoder KM. A framework for service-learning in dental education. J Dent Educ. 2006; 70(2): 115-123.

10. Siefer SD. Service-learning: community–campus partnerships for health professions education. Acad Med. 1998; 73(3):273-277.

11. Brown JS, Collins A, Duguid P. Situated cognition and the culture of learning. Educational Researcher. 1989; 18(91): 32-42.

12. Hood JG. Service-learning in dental education: meeting needs and challenges. J Dent Educ. 2009; 73(4): 454-463.

13. Elyer J, Giles DW. Where's the learning in service-learning? 1st ed. San Francisco: Jossey-Bass; 1999.

14. Dehaitem MJ, Ridley K, Kerschebaum, WE, Inglehart MR. Dental hygiene education about patients with special needs: A survey of U.S. programs. J Dent Educ. 2008 Sep; 72(9): 1010-9.

15. U.S. Department of Health and Human Services, National Institutes of Health. Continuing education series: Practical oral care for people with disabilities. 2008; www.nidcr.nih.gov

16. Aston-Brown RE, Branson B, Gadbury-Amyot, CC, Krust-Bray, K. Utilizing public health clinics for service-learning rotations in dental hygiene: a four-year retrospective study. J Dent Educ. 2009; 73(3): 358-374.

17. Shinnamon A, Gelmon SB, Holland BA. Methods and strategies for assessing service-learning in the health professions. San Francisco: Community-Campus Partnerships for health, 1999.

18. Formicola AJ, Bailit HL, Beazoglou TJ, Tedesco LA. Introduction to the Macy Study Report. J Dent Educ. 2008; 72(2S): 5-9.

19. Wolff AJ, Waldman HB, Milano M, Perlman SP. Dental students' experiences with and attitudes toward people with mental retardation. J Am Dent Assoc. 2004; 135: 353-357.

20. Lautar CJ, Miller FY. Service learning and dental hygiene: A literature review. J Dent Hyg. 2007; 81(3): 1-10.

21. Simmer-Beck M, Gadbury-Amyot, CC, Ferris H, Voelker MA, Keselyak NT, Eplee H, Parkinson J, Marse B, Galemore C. Extending oral health care services to underserved children through a school-based collaboration: Part 1-A Descriptive Overview. J Dent Hyg. 2011; 85(3): 181-192.

Factors Influencing California Dental Hygienists' Involvement in School-Based Oral Health Programs

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Abstract

Purpose: To assess the influence of community oral health experiences during entry-level dental hygiene education on participation in community oral health events after graduation and the facilitators and barriers experienced by dental hygienists in participating in these programs.

Methods: A 27-item survey, consisting of items related to community oral health experiences during and after entry-level education, was distributed by the California Dental Hygienists' Association to all dental hygienists whose email addresses were in their database. Frequencies of participants' responses to each survey item were calculated. Chi-square analysis was performed to identify significant relationships among variables.

Results: Response rate was 8%, with 513 out of the 6,248 contacted having responded. Additionally, 95% of the respondents had participated, as entry-level students, in community oral health experiences such as school-based oral health educational programs. Respondents agreed that participation in these programs was valuable to their professional development and encouraged them to participate after graduation; both these variables were related ($p<0.01$) to their participation in community experiences as a licensed dental hygienist. Most (75%) respondents reported participation in community events after graduation. The most commonly reported facilitators, encouraging participation, were an interest in helping people (89%) and professional development (59%). Barriers included conflict with work (61%), family time commitment (52%), and no knowledge of existing programs (24%).

Conclusion: Dental hygienists' involvement in school-based oral health programs is enhanced by their community experiences as a dental hygiene student. Barriers and facilitators need to be addressed to increase the number of programs and participants so that more children can benefit.

Keywords: access to oral care, community oral health experiences, dental hygiene student experiences, school-based oral health programs, volunteerism

This study supports the NDHRA priority area, **Health Services Research:** Assess the impact of increasing access to dental hygiene services on the oral health outcomes of underserved populations.

Introduction

School-based oral health programs address the problem of access to care for children.[1-7] Dental decay is the most common preventable disease seen in children.[1] According to the 2004-2005 California Smiles Survey, 53% of children entering kindergarten had experienced dental decay, and of those, 28% had untreated dental decay.[7] Hispanic children were found to be twice as likely to have untreated dental decay than white children.[1] Dental problems interfere with the academic and social development of children.[1,8-10] In California 874,000 school days were lost due to dental problems, costing schools nearly $30 million annually.[8] Children who suffer from painful dental problems are 12 times more likely to miss school,[1] and 4 times more likely to have a lower-grade-point average than those who do not.[10] One solution to these issues would be oral health programs in schools so that all school children could benefit.

School-based oral health programs have been shown to reduce oral disease.[2-6] In a school-based oral health program, such as described by Niederman et al, oral disease was reduced by 52%.[6] In these programs education and preventive care can be delivered to children in underserved populations, who are otherwise unable to receive care. These programs are closing the gap in ethnic and racial oral health disparities, by eliminating critical barriers to care.[1,2,4]

Dental hygienists' involvement in school-based oral health programs began in 1913 when dental hygienists functioned as community health professionals in schools. They believed that "it was equally important they provide outreach services to those who could not afford private dental care,"[11] and consequently reduced tooth decay by 75%.[12] Greater involvement of dental hygienists would allow further expansion of these programs. Dental hygienists have the skills and knowledge to initiate and participate in school-based oral health educational programs.

Dental hygiene entry-level programs prepare dental hygienists to provide oral health education, usually offering educational opportunities in public health settings.

Currently, there is a low percentage of dental hygienists involved in community oral health programs: 9% of respondents to an ADHA survey reported that they worked in a non-clinical role, such as school-based oral health programs.[13] However, it is unknown why more dental hygienists do not participate in these programs. The purpose of this study was to assess the influence of community oral health experiences during entry-level dental hygiene education on participation in community oral health events after graduation, and to assess the facilitators and barriers that are experienced by dental hygienists in participating in these community programs.

Methods and Materials

The study population consisted of dental hygienists whose email addresses were in the California Dental Hygienists' Association (CDHA) database. The 27-item survey instrument was composed of the following items: 13 items on community experiences as a dental hygiene student; 2 items on community experiences as a licensed dental hygiene; 3 items on facilitators and barriers to participation; 1 item on attitudes toward 6 community oral health statements; and, 8 items on demographic information.

A convenience sample of 7 dental hygiene educators and 11 licensed dental hygienists pilot-tested the survey for feasibility and clarity. The survey was modified based on their feedback. CDHA electronically distributed the information about the survey to those in their database with a link to the informed consent and the survey. The researchers had no access to the personal identifiers of the respondents, as well as the target population. CDHA had no knowledge of who had responded to the survey and their responses. This anonymous process resulted in CDHA needing to re-distribute the survey 3 times to the same population. On the second and third distributions, a disclaimer was added to the message for the recipients to disregard if previously completed.

Qualtrics,[14] a survey research software program, was used to create and host the survey instrument, as well as tabulate the data and calculate frequencies of responses for each survey item. Chi-square analyses were performed on predictive variables to assess relationships with participation in community experiences as a licensed dental hygienist. Relationships were considered statistically significant when p values were <0.05. Comments from open-ended items were grouped into themes.

Table I: Demographic Characteristics of Respondents

	Percent	n
Qualifications in addition to entry-level degree:* (n=256)		
Baccalaureate in Dental Hygiene	40	107
Baccalaureate in another discipline	38	101
Masters in Dental Hygiene	8	23
Masters in Public Health	3	8
Masters in another discipline	11	28
Doctorate	2	5
RDHAP	14	37
Other	8	21
Year of graduation from dental hygiene program:		
1960 to 1979	17	66
1980 to 1999	35	138
2000 to 2010	23	92
2011 to 2014	25	97
Number of children living at home:		
0	62	264
1 to 2	33	140
>3	5	21
Number of days employed as a dental hygienist:		
0 to 1	15	64
2 to 3	31	129
4 to 5	51	214
>6	3	11
Ethnicity		
White, Non-Hispanic	72	304
Hispanic	13	55
Asian	10	41
Other (African-American, Pacific Islander, Bi-Racial)	3	20

*Respondents selected all that applied

Results

Of the 6,248 in the CDHA database, 513 dental hygienists responded to the survey for a response rate of 8%. Respondents were mainly female (97%), graduates from an associate entry-level dental hygiene program (66%), and a member of the American Dental Hygienists' Association (ADHA) (86%). Table I reports that the majority of respondents were white non-Hispanic, had a degree in addition to that of their entry-level program, graduated from an entry-level dental hygiene program between 1980 to 1999, had no children living at home and were employed 4 to 5 days a week. Participation in community oral health events as a licensed dental hygienist

Table II: Respondent's Participation in Community Experiences as a Dental Hygiene Student and the Value of the Experience to Professional Development and the Level of Encouragement to Participate in Such Programs after Graduation (percent, n)

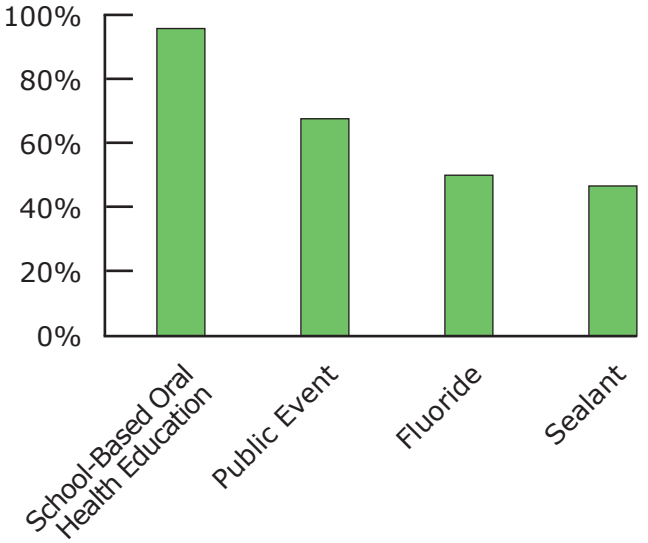
Participation as a Dental Hygiene Student in community programs	Volunteer	Required	Both Volunteer and Required
School-Based (n=447)	8 (37)	44 (196)	48 (214)
Public Health (n=306)	25 (76)	30 (92)	45 (138)
Fluoride (n=232)	8 (19)	46 (107)	46 (106)
Sealant(n=226)	9 (21)	52 (117)	39 (88)

Community Experiences Valuable to Professional Development	Strongly Disagreed	Disagreed	Neutral	Agreed	Strongly Agreed
School-Based (n=440)	6(30)	2 (7)	6 (27)	35(153)	51(223)
Public Health (n=307)	3 (8)	1 (4)	6 (19)	37(113)	53 (163)
Fluoride (n=230)	3 (6)	1 (3)	7 (16)	37(84)	53 (121)
Sealant (n=224)	4 (9)	2 (4)	6 (14)	32(72)	56 (125)
Community experiences encouraged participation after graduation	**Strongly Disagreed**	**Disagreed**	**Neutral**	**Agreed**	**Strongly Agreed**
School-Based (n=439)	7 (31)	8(37)	26 (114)	27(117)	32 (140)
Public Health (n=305)	3 (8)	6(17)	18(54)	33(102)	41 (124)
Fluoride (n=282)	3 (7)	7(15)	21(49)	30(68)	39 (89)
Sealant (n=220)	5 (10)	7(16)	25(54)	25(55)	38 (85)

was not statistically significant to either the number of children living at home (p=0.55) or the number of days employed (p=0.25).

A total of 95% of respondents reported participating in community experiences to promote oral health as an entry-level dental hygiene student. Figure 1 illustrates the percentages of respondents who participated in each of the 4 different community oral health programs: school-based oral health educational program, public health event, sealant program and fluoride program. The number of respondents who had participated in each of the 4 programs varied, from 226 to 447, with school-based oral health educational programs having the highest percentage of participants (Figure 1). Participation in the school-based oral health educational program was fairly equally divided between those who only had participated in the required school program and those who had additionally volunteered (Table II). Public health events had the highest percentage of respondents who had volunteered. Fewer respondents participated in the sealant programs, but the percentage of participation required by the dental hygiene program was higher than the other programs.

Figure 1: Percentage of Respondents Who Participated In Each of the Community Oral Health Programs as a Dental Hygiene Student



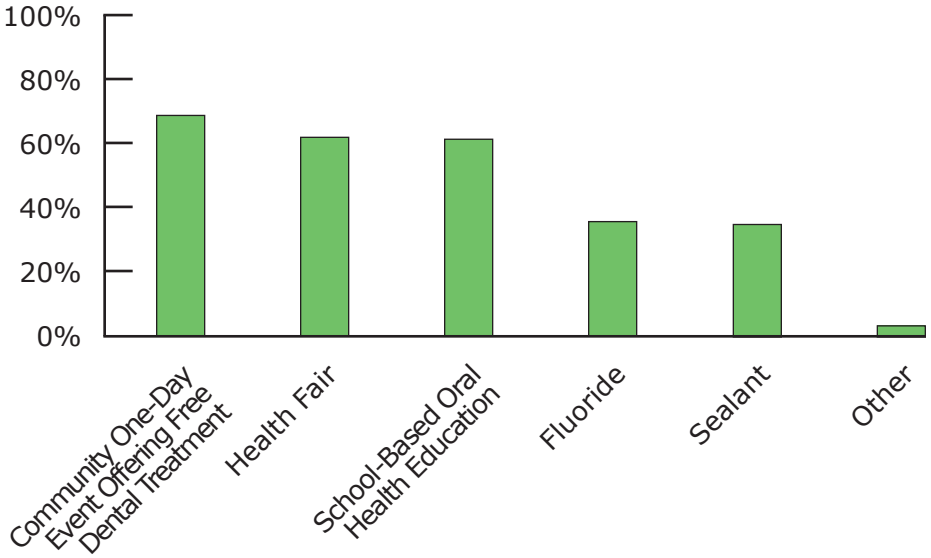
Over half of the respondents who had participated in each of the programs strongly agreed that their experiences in community oral health programs as a student were valuable to their professional development (Table II). Participating in school-based oral health educational programs as a student offered encouragement to participate after graduation for over half the respondents. Three-quarters of respondents agreed that public health events had this encouraging effect.

Table III: Respondent's Attitudes Toward Community Oral Health Statements, as a Licensed Dental Hygienist (percent, n)

	Strongly Disagreed	Disagree	Neutral	Agree	Strongly Agreed
All children should have a dental exam before entering kindergarten	2 (8)	1 (2)	1 (6)	15 (65)	81 (355)
All communities should have fluoride in their drinking water	2 (8)	1 (3)	3 (13)	16 (70)	78 (342)
All children should have access to affordable dental care	2 (8)	2 (9)	8 (33)	28 (122)	60 (263)
All elementary schools should have the responsibility to provide oral health educational programs	4 (18)	3 (12)	13 (55)	23 (101)	57 (250)
All elementary schools should commit to providing oral health educational programs	3 (11)	4 (18)	10 (47)	27 (117)	56 (243)
All elementary schools should incorporate tele-dentistry	3 (13)	4 (16)	27 (116)	22 (96)	44 (191)

Responses to the community oral health statements showed general agreement (Table III). The most positive response, with 81% responding strongly agree, was to the statement that all children should have a dental exam before entering kindergarten. Most respondents also agreed that all children should have access to affordable dental care and that schools should be committed to providing school-based oral health educational programs. The most neutral response was to the statement that all schools should incorporate tele-dentistry.

Figure 2: Percentage of Respondents Who Volunteered in Community Oral Health Programs as a Licensed Dental Hygienist

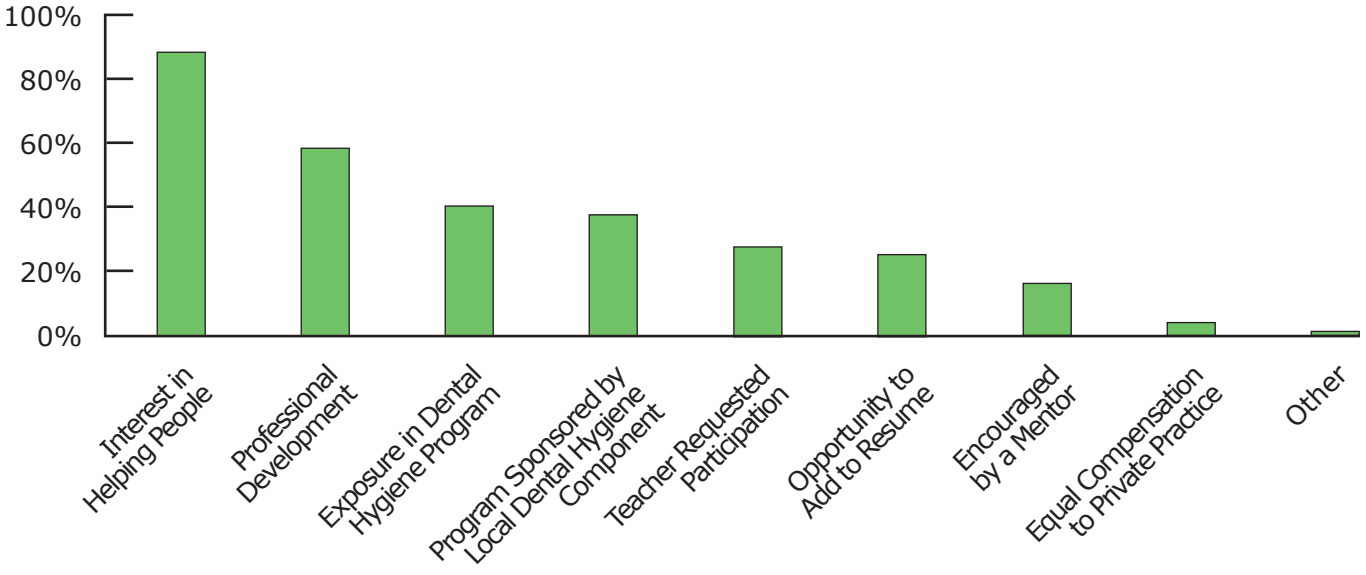


Respondents selected all that applied

A total of 75% of licensed dental hygienists reported participating in community events to promote oral health. Respondents indicated participation in community 1-day events (69%), health fairs (62%), school-based educational programs (61%), fluoride programs (36%), sealant programs (35%) and other (2%) (Figure 2). Responses received to "other" included international missionary trips and homeless shelter programs.

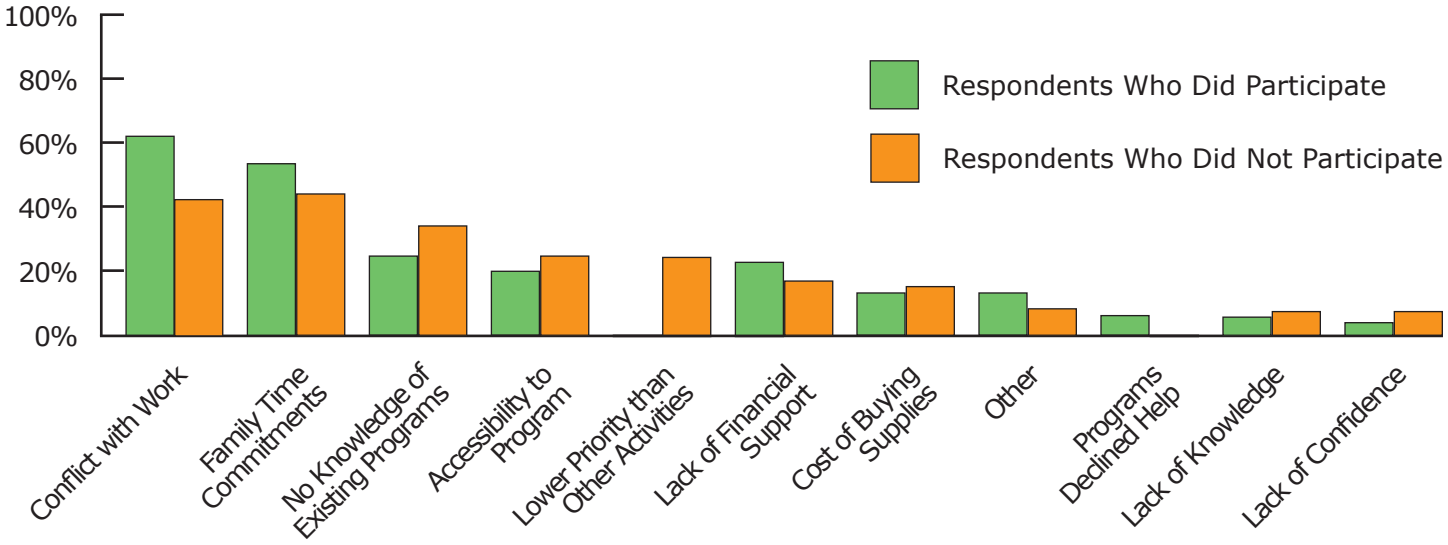
The percentages of specific factors that encouraged their participation in community oral health programs are illustrated in Figure 3. The commonly selected facilitator factors were an "interest in helping people," "professional development," "exposure in dental hygiene program" and "program sponsored by local dental hygiene component." Respondents of-

Figure 3: Percentages Selecting Specific Factors That Encouraged their Participation in Community Oral Health Programs, as a Licensed Dental Hygienist



Respondents selected all that applied

Figure 4: Percentages of Respondents Selecting the Factors that Discouraged/Limited Their Participation in Community Oral Health Programs



Respondents selected all that applied

Table IV: Relationship of Participation in Community Experiences as a Licensed Dental Hygienist to the Following Survey Items

My participation in the school-based oral health educational program encouraged me to participate in school programs after graduation	0.00*
My participation in the school-based oral health educational program was valuable to my professional development	0.01*
All elementary schools should commit to providing oral health educational programs	0.01*
ADHA Membership	0.02*
As a dental hygiene student, did you participate in community experiences that promoted oral health	0.06

*Significant relationships indicated by $p \leq 0.05$

fered the following comments related to encouragement: "good feeling you get when helping others," "opportunity to introduce our values to the public" and "I believe professionals have a duty to give back to their community."

Survey participants also identified barriers, factors that discouraged them to participate, or to participate more frequently in community oral health programs (Figure 4). The most commonly selected barriers for both groups were "conflict with work," "family time commitments" and "no knowledge of existing programs." "Lack of financial support," "lack of knowledge" and "lack of confidence" were not shown to be substantial barriers. The greatest difference between the 2 groups was "conflict with work," in which over 60% of those who did participate selected this as a barrier that discouraged them from participating more frequently. Respondents also provided the following comments related to discouragement: "finding a babysitter," "I have been rarely asked to help; I don't have the time to organize, but am willing to help when asked" and "poor organization."

The chi-square analyses showed that participation in community oral health programs as a licensed dental hygienist was significantly ($p<0.05$) related to these survey items: professional development and encouragement of participation in school-based oral health educational experiences as a student, ADHA membership and elementary schools' commitment to providing oral health educational programs (Table IV). The relationship between licensed dental hygienists' community experiences and entry-level dental hygiene students' community experiences approached significance ($p=0.06$).

Discussion

Community Experiences as an Entry-Level Dental Hygiene Student

In this study, 95% of the respondents had participated as entry-level dental hygiene students in community oral health experiences, such as school-based oral health programs. The majority agreed that their participation in all 4 programs - school-based oral health education, public health, fluoride and sealant, was valuable to their professional development, and that their involvement while a student encouraged them to participate after graduation. Agreement that involvement was valuable for professional development and that it encouraged participation after graduation was significantly related to participation in community experiences after graduation

More than half of respondents participated as a student in community oral health programs, both voluntarily, i.e., in addition to what was required, and as a program requirement. More students volunteered outside of school time at public health events than at the other 3 programs, which may be due to public health events being more accessible and easier to coordinate. According to Volvovsky's study, the students who volunteered on their own time exhibited increased interest in working with others to enhance the community, and increase their respect for diverse cultures.[15]

Most respondents strongly agreed that their participation in school-based oral health programs as a dental hygiene student was valuable to their professional development. The findings of the current study are consistent with other studies, such as Simmer-Beck et al who reported that student experiences in school-based oral health programs during the dental hygiene program provided the opportunity for students to share their knowledge and skills while providing care in the community.[16] One important component of professional development is the ability to place societal needs before personal needs.[17] Blue reported that participation in the community allowed dental hygiene students to experience this altruistic professional trait, and develop a sense of their role as a health care provider relative to the community.[17] In that study the respondents agreed that participation in these programs as dental hygiene students was valuable to establishing their identity as a dental hygiene professional.[17]

The majority of respondents agreed that their participation in school-based oral health programs as a student encouraged them to participate after graduation. Furthermore, this encouragement from participating in school-based oral educational programs was significantly related to licensed dental hygienists' participation in community experiences after graduation. This relationship may have arisen from the experience of developing and presenting their lesson plans in the school environment, which led to an increase in the respondents' comfort in educating children concerning their oral health. Similar studies showed that students' participation in community experiences increased their comfort and their willingness to volunteer in the future.[18]

Community Experiences and Attitudes of Licensed Dental Hygienists

Participation in community experiences as a licensed dental hygienist was marginally related to their participation as a student. Higher numbers of respondents volunteered in health fairs, one-day community events, and school-based oral health educational programs after graduation than in sealant and fluoride programs. This lower participation in sealant and fluoride programs may have been due to less participation as dental hygiene students. This confirms a study, that evaluated dental hygiene students' behaviors relating to community oral health throughout the 2-year curriculum, where students were found to be more comfortable in the last semester.[16] The ADHA Access to Care

position paper supports these findings by recommending that dental hygiene programs develop externships in underserved communities.[19] These experiences would provide more time for dental hygiene students to provide care to the underserved and would encourage them to participate in solving dentistry's access to care problem after graduation.

By agreeing with the 6 community oral health statements presented to participants of this study, respondents indicated their support of these concepts. This is consistent with a study by Marsh, who found that volunteers had a more positive attitude concerning community service.[20] In the current study, 75% of respondents did volunteer in at least 1 community oral health program after graduation and nearly all strongly agreed with the concepts and potential strategies for improving access to care for children. Interestingly, the most prevalent attitude was that children entering kindergarten should have a dental exam. This suggests that the respondents recognized that a need exists for children to see a dentist before starting school. In California, parents are required to complete an oral health form before their children enter kindergarten.[21] Unfortunately, while this encourages parents to find a dental home, they can be excused from this requirement for many reasons. This is a lost opportunity for the underserved children to be seen by an oral health professional, who may detect dental disease. According to the 2004-2005 California Smile Survey, 17% of children entering kindergarten who had not seen a dentist in the past year were more at risk than those children with an established dental home, and of those at risk, 42% had untreated decay.[7]

A total of 83% of respondents agreed that schools should be committed to providing oral health educational programs. Studies indicate that children with toothaches are more likely to have poor grades and that they miss more school days.[9,10] To supplement a school's commitment to provide these programs, models have been designed to share the commitment. The Health Promoting Schools model by the World Health Organization,[22] and the First National Oral Health model by the Center for Disease and Prevention,[23] are designed to collaborate with the school, dental professionals and community. A success story in Missouri used a similar model called the Preventive Service Program to engage volunteers and dental professionals to provide preventive services to low-income school districts.[5]

Facilitators and Barriers to Participation in Community Experiences

The primary factor encouraging dental hygienists to participate in community oral health programs was an "interest in helping people." Based on the comments received, the respondents feel good when they help others. In another study on dental hygiene students, Baca et al found that the "desire to help others" was an important motivating influence for choosing dental hygiene as a profession for 100% of the dental hygiene student respondents.[24] In a study on underrepresented racial and ethnic group dental hygiene students, helping others was cited by 89% of the respondents as being the aspect of dental hygiene, which had interested them the most.[25]

Another factor encouraging participation in community programs was "professional development." Blue interpreted the term "professional development" as placing the needs of society above your own by giving back knowledge and skills to promote the well-being of the community.[17] The combination of dental hygienists' great interest in helping people and the value they place in giving back to their communities partly explains the high percentage of dental hygienists who participate in community oral health programs.

One factor that most respondents agreed that discouraged dental hygienists from participating, or participating more frequently, in community oral health events was "conflict with work." This barrier was more pronounced in respondents who did rather than did not participate. However, statistical results showed no relationship between number of days employed and participation in community oral health events. Dental hygienists employed more than 4 days a week did not volunteer less than those employed less days.

"Family time commitment" was another factor reported by participants that discouraged dental hygienists from volunteering. In this survey over half the respondents had no children living at home. The number of children living at the respondents' home and their participation in programs was not statistically related. This did not confirm the thought that dental hygienists with children might have been more involved in teaching oral health in their children's classrooms.

On the other hand, the lack of children did not contradict the respondents' view that family time commitment was a barrier. Respondents may have perceived family time commitments to include extended family other than children, such as spouse and parents. The Simmer-Beck et al study found that in a 3-year longitudinal study, dental hygiene students' priorities concerning personal time commitments diminished after volunteering in their community for a semester.[16] This suggests that a priority of family time commitments may be able to be balanced by a passion for serving in the community.

The third ranked factor discouraging dental hygienists from participating was "no knowledge of existing programs." Due to the large percentage of ADHA members in this study, it is surprising that many had no knowledge of existing community oral health programs. Often, local dental hygiene components organize community oral health events. Furthermore, in

our study ADHA membership was significantly related to participation as a licensed dental hygienist. Perhaps these ADHA members are not actively involved in their specific component. While some components may not be sponsoring oral health programs, 38% of our respondents selected "program sponsored by local dental hygiene components" as a facilitative factor that had encouraged participation. This result may be related to the smaller percentage of those who did, rather than did not participate, who selected no knowledge of existing programs.

One suggestion for increasing involvement in school-based oral health programs is for dental hygienists to assume leadership roles. Respondents indicated that the lack of organization discouraged them from participating in these programs, but expressed their willingness to participate when others would assume a leadership role to organize the event. To organize these programs, leaders, funding and resources are needed. ADHA component members could work together to organize the details and enlist others to help on the day of the event. Volunteers could be recruited from the component's website or component meetings, emphasizing the role that the dental hygienists can play in improving oral health for others who are less fortunate.

As more children are enrolled in federal programs and living in dental shortage areas, school-based oral health programs can be an effective strategy to providing oral health care in a convenient environment.[2,26] Studies have reported that oral health programs that incorporate oral health education, fluoride and sealant programs are the most effective approach to preventing caries.[3] The Affordable Care Act supports and funds school-based oral health programs.[27]

Funding to support these programs could be obtained through grants from the ADHA Institute for Oral Health, Affordable Care Act, as well as community organizations. For example, the 2014-2015 Wrigley Company Foundation Community Service Grant funded a nonprofit organization of dental professionals, called the Oral Health Awareness Society, who initiated a school-based oral health program. This program provided oral health education, dental screenings and fluoride varnish applications to 425 children entering kindergarten at preschools in California.[28]

Resources for school-based oral health programs can be found on various websites. A valuable community partner is The California School-Based Health Alliance, which provides oral health resources to parents, and provides preventive oral health tools to dental hygienists to use in initiating school-based programs. Another resource is The World Health Organization Series on school health, which supplies information specific to school oral health programs.[22]

One limitation of this study may be response bias, due to the low response rate of 8%. Those respondents that completed the survey may have done so due to greater interest in the topic, which prevents generalizing these findings to all dental hygienists in California. Social desirability bias may have influenced respondents' responses, causing the respondents to answer more positively regarding community experiences. Attempts to remember their experiences as a student may have caused recall bias for those less recently graduated. Because CDHA had no means to track respondents, the survey was distributed to the same population three times, to both respondents and non-respondents. There is a slight possibility that a respondent may have completed the survey 3 times. Although this is highly unlikely, especially with the added disclosure, it is noted as a limitation. Also, the lack of specific definitions for the 4 community oral health programs: school-based oral health education, public health event, fluoride and sealant may have created some confusion among participants.

To avoid some of these limitations and to reduce threats to internal and external validity, it is recommended that further research studies focus on increasing the response rate. One suggestion would be to change the mode of distributing the survey to the target population from the internet to postal mail. Mailed surveys generally have a higher response rate than web-based ones.[29] The response rate of web-based surveys may be lower because the e-mail message, inviting them to participate in the survey, may not have reached the potential respondents. The message may have been filtered by the computer's spam blocking tools and deleted as spam. As email addresses are frequently changed, the email addresses in the CDHA database may not have been current or the ones routinely checked by the potential respondent. On the other hand, mailing addresses, obtained from the state licensing committee, would be more reliable as an accurate billing address is required for license renewal. For these reasons and others, a mailed survey may elicit a higher response rate and should be considered in future studies.

Conclusion

Dental hygienists involvement in school-based oral health programs could be influenced by student experiences in entry-level dental hygiene programs. Respondents that participated in school-based programs as a student reported their experiences were valuable to their professional development and encouraged them to participate after graduation. These reported benefits, as well as the respondents' interest in helping others and positive attitudes toward improving access to care for children, would have seemed to predict a greater number of respondents participating in school-based oral health programs. However, perceived barriers, such as conflict with work, family time commitments and no knowledge

of existing programs, seemed to have discouraged participation, or more frequent participation in community programs.

Dental hygiene needs to assume greater responsibility for overcoming these barriers. Leadership is needed at the dental hygiene component level to solicit funding, organize programs and recruit volunteers to help. These activities could be organized to minimize the impact of barriers and maximize the dental hygienists' altruistic traits of helping others and placing societal needs before their own. Increasing the involvement of dental hygienists in school-based oral health programs is an innovative and feasible approach to reducing oral disease in school children. The reported barriers and facilitators need to be addressed to increase the number of programs and participants so that more children can benefit from the skills and knowledge of dental hygienists.

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References

1. U.S. Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General. U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research [Internet]. 2000 [cited 2014 August 26]. Available from: nidcr.nig.gov

2. Kwan SY, Petersen PE, Pine CM, et. al. Health-promoting schools: An opportunity for oral health promotion. Bull World Health Organ. 2005;83(9):677-85.

3. McCombs GB, Gadbury-Amyot CC, Wilder RS, et. al. Dental hygienists' contributions to improving the nation's oral health through school-based initiatives from 1970 through 1999: A historical review. J Dent Hyg. 2007;81(2):52.

4. Simmer-Beck M, Gadbury-Amyot CC, Ferris H, et al. Extending oral health care services to underserved children through a school-based collaboration: Part 1: A descriptive overview. J Dent Hyg. 2011;85(3):181-92.

5. Hoffman AM, Branson BG, Keselyak NT, et al. Preventive services program: A model engaging volunteers to expand community-based oral health services for children. J Dent Hyg. 2014;88(2):69-77.

6. Niederman R, Gould E, Soncini J, et al. A model for extending the reach of the traditional dental practice: The ForsythKids program. J Am Dent Assoc. 2008;139(8):1040-50.

7. Dental Health Foundation. The California Smile Survey an Oral Health Assessment of California's Kindergarten and 3rd Grade Children. Dental Health Foundation [Internet]. 2006 [cited 2015 June 3]. Available from: www.centerfororalhealth.org/images/lib_PDF/dhf_2006_report.pdf

8. Alston PA, Knapp J, Luomanen JC. Who will tend the dental safety net? J Calif Dent Assoc. 2014;42(2):112-8.

9. Braun B, Horowitz AM, Kleinman DV, et al. Oral health literacy: At the intersection of K-12 education and public health. J Calif Dent Assoc. 2012;40(4):323-30.

10. Seirawan H, Faust S, Mulligan R. The impact of oral health on the academic performance of disadvantaged children. Am J Public Health. 2012;102(9):1729-34.

11. Naughton DK. Expanding oral care opportunities: Direct access care provided by dental hygienists in the united states. J Evid Based Dent Pract. 2014;14 Suppl:171-182

12. Mosby's. Dental Hygiene: Concepts, cases, and Competencies. St. Louis, Missouri, Elsevier Science, 2002; p.10

13. Isman BA, Farrell CM. Are dental hygienists prepared to work in the changing public health environment? J Evid Based Dent Pract. 2014;14 Suppl:183-90.

14. Qualtrics software, Version 60526, of Qualtrics Research Suite. Copyright © 2015. Provo, UT, USA. http://www.qualtrics.com

15. Volvovsky M, Vodopyanov D, Inglehart MR. Dental students and faculty members' attitudes towards care for underserved patients and community service: Do community-based dental education and voluntary service-learning matter? J Dent Educ. 2014;78(8):1127-38.

16. Simmer-Beck M, Gadbury-Amyot C, Williams KB, et al. Measuring the short-term effects of incorporating academic service learning throughout a dental hygiene curriculum. Int J Dent Hyg. 2013;11(4):260-6.

17. Blue CM. Cultivating professional responsibility in a dental hygiene curriculum. J Dent Educ. 2013;77(8):1042-51.

18. Kuthy RA, Heller KE, Riniker KJ, et al. Students' opinions about treating vulnerable populations immediately after completing community-based clinical experiences. J Dent Educ. 2007;71(5):646-54.

19. American Dental Hygienists' Association. Access to Care Position Paper, 2001. American Dental Hygienists' Association [Internet]. 2001 [cited 2015 June 3] Available from: www.adha.org/resources-docs/7112_Access_Care_Position_Paper.pdf

20. Marsh LA. Dental hygienist attitudes toward providing care for the underserved population. J Dent Hyg. 2012;86(4):315-22.

21. California Dental Association. Kindergarten Oral Health Requirement. California Dental Association[Internet]. 2006 [cited 2015 June 21] Available from: www.cda.org/public-resources/kindergarten-oral-health-requirement

22. World Health Organization. Oral health promotion through schools. World Health Organization [Internet]. 2003 [cited 2015 June 3]. Available from:www.who.int/oral_health/publications/doc11/en/

23. California School Boards Association. Integrating Oral Health into the School Health Programs and Policies [Internet]. 2010 [cited 2015 June 3]. Available from:www.csba.org

24. Baca ZR and Rowe DJ. Motivational factors influencing different racial and ethnic groups to enter dental hygiene educational programs. unpublished data

25. Sandino AH, Rowe DJ. Students from underrepresented racial and ethnic groups entering the dental hygiene profession. J Dent Educ. 2014;78(3):465-72.

26. Tsai C, Wides C, Mertz E. Dental workforce capacity and California's expanding pediatric medicaid population. J Calif Dent Assoc. 2014;42(11):757-766.

27. California School-Based Oral Health Alliance. School-Based Health Centers and Health Care Reform [Internet]. 2013 [cited 2015 June 7]. Available from:www.schoolhealthcenters.org/wp-content/uploads/2013/12/SBHCs-and-Health-Care-Reform-2014.pdf

28. Snyder J. The 2015 Wrigley Company foundation grants. Access. 2015; 29(9-10):24-27

29. Manfreda KL, Bosnjak M, BerzelakJ, et al. Web surveys versus other survey modes: A meta-analysis comparing response rates. Int J Market Res. 2008;50(1):79-104

Professional Caregivers' Oral Care Practices and Beliefs for Elderly Clients Aging In Place

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Abstract

Purpose: As recently as the 1990s long-term care facilities (LTCFs) were the main housing option for semi- or fully-dependent elders. Today, 90% of those 65 and older want to "age in place." The growth of the elderly population that want to "age in place" will require increasing numbers of professional caregivers to assist in oral care practices. The purpose of this study was to address the gap in the knowledge about the oral care practices and beliefs of professional caregivers who work for non-medical in-home care companies charged in the care of "aging in place" elders.

Methods: The Nursing Dental Coping Belief Scale was used in a descriptive cross-sectional study. Professional caregivers (n=67) employed by 3 non-medical in-home care companies in South Texas completed the survey. The survey gathered demographic information, oral care practice questions and oral health belief questions. Statistics used for data analysis included chi-square contingency table analysis. The level of significance was set at $p<0.05$ for all analyses.

Results: Non-medical in-home care companies are not mandated by law to provide training, yet professional caregivers wanted more training in brushing and flossing (85%). A majority (60%) reported being trained. Most (85%) looked inside their client's mouth yet nearly 18% did not floss their client's teeth and only 31% knew if their clients wore dentures.

Conclusion: While this was a small study, it provides preliminary information that professional caregivers, who serve clients aging in place, want more oral care training. Professional caregivers would be better served if there were more thorough and frequent training provided with managerial oversight.

Keywords: aging in place, oral care, oral health, non-medical in-home care companies, elderly, training

This study supports the NDHRA priority area, **Health Promotion/Disease Prevention:** Investigate how environmental factors (culture, socioeconomic status-SES, education) influence oral health behaviors.

Introduction

Unprecedented aging of the U.S. population brings about new challenges in obtaining proper oral care.[1] By 2050, the population, aged 65 and over, is projected to grow in number to 83.7 million.[2] With this growth is a concomitant increase in life expectancy. These individuals were reported to be at risk for developing chronic illnesses, and have greater prescription drug use, and age-associated physiological changes that could deprive them of their mobility and independence.[3]

As recently as the 1990s, long-term care facilities (LTCFs) were the main housing option for elders who were semi- or fully-dependent upon others for their activities of daily living.[4] Activities of daily living, were defined as the basic tasks of everyday life, such as eating, bathing, dressing, toileting and transferring.[5] In recent years, more elders have chosen a different direction than long-term care by choosing to remain in their home and "age in place."[6] Today, 90% of elders 65 and older want to "age in place" rather than move into LTCFs, and 80% believe their current residence is where they will always live.[6]

Aging in place was defined as the ability to live in one's own home and community regardless of age, income or ability level.[7] Growth of the increasingly dependent elderly population aging in place has brought about a concomitant increased need for professional caregiver assistance with activities of daily living.[3] Therefore, the use of non-medical in-home care companies has become an alternative to transitioning into LTCFs.[4]

Non-medical in-home care companies, self-defined as companies that utilized professional caregivers, allowed elderly clients to remain at home where they received non-skilled supportive care.[8] Non-skilled supportive care services ranged from housekeeping and companionship to assistance with personal care such as bathing, dressing, toileting and providing oral care.[8] Professional caregivers were defined as

either certified (CPC) or non-certified (NCPC). The CPC included: registered nurses (RN), licensed vocational nurses (LVN) and certified nursing assistants (CNA). The NCPC were defined as professionals who did not have certification or training in health care.

Among the consequences of increased dependency levels was the loss in the ability to perform oral care activities, such as brushing or flossing of teeth without assistance.[3] Elderly clients, therefore, were at an increased risk of oral health complications including tooth loss, dental caries, periodontal disease and mucosal lesions.[9] Maintaining oral health was vital for their overall health and quality of life.[9] Poor oral hygiene could complicate the management of systemic illnesses such as diabetes, dental pain could cause malnutrition and inhaling bacteria could cause pneumonia.[9] Literature was replete with studies that reported poor oral hygiene in elderly clients in LTCFs.[10-17] It was reported that, in LTCFs, oral care practices were non-systemized, insufficient and an underemphasized component of personal care provided by professional caregivers.[3,9,17]

Further search of literature found no information about training or the provision of oral care procedures for professional caregivers employed by non-medical in-home care companies. The dearth of data was a possible consequence of state regulations requiring oral care plans. For example, the Texas Administration Code (TAC) had regulations for the provision of oral care for support service companies, which included non-medical in-home care companies, and stated that they must adopt and implement a written policy that specified the companies' client care practices.[18] However, TAC did not require these companies to have a specific individualized oral care plan in the client care policy, or a coordinated educational effort in oral care for employees.[18]

Several current studies that evaluated the training of LTCF caregivers were used to support this study's discussion about training and certification of professional caregivers employed by non-medical in-home care companies.[14,15,17,19] These studies demonstrated that compromised oral health of elderly clients at LTCFs was improved by institutional intervention and training to increase the priority placed on oral care by caregivers.[14,15,17,19] When LTCF caregivers were trained in oral care practices and beliefs, studies showed that these caregivers increased the priority they placed on oral care for the elderly client.[14,15,17,19] In contrast to LTCFs, management of non-medical in-home care companies were not mandated by regulation to provide training in oral care. They provided minimal training utilizing online videos.

There were no studies found in the U.S. that reported on the oral care practices and oral health beliefs of professional caregivers of non-medical in-home care companies. International studies were located that compared LTCF caregivers and those who provide domiciliary home care by using the nursing Dental Coping Belief Scale (nDCBS).[3,20] The Dental Coping Belief Scale (DCBS) survey was developed and validated in the U.S. in 1991 by Wolfe.[21] It was originally used to measure the effect of individual oral health care instructions to male veterans, not health care workers.[21] In 2005 the survey was modified and translated in Swedish by Wardh, and it was to be used in a nursing context.[20] The survey was tested amongst 31 nursing staff at a hospital and at a special facility.[20] The aim was to develop an oral health care priority index which could be used at both hospital wards and special facilities to measure oral health care priority among nursing staff.[20] The survey was validated and renamed the nDCBS. The nDCBS became a useful survey for further studies where the aim is to measure how even small nursing staff group samples give priority to and allocate responsibility for oral health care in different ways.[20]

In 2012, Garrido et al utilized the a validated measure to compare caregiver oral health beliefs in LTCFs to those who provided domiciliary home care in Chile.[3] Thirty-nine caregivers agreed to participate in the study and were interviewed by a trained interviewer during working hours or visited at their home.[3] The nDCBS survey found no significant differences between LTCF and domiciliary caregiver's oral health beliefs.[3] However, LTCF and domiciliary caregivers believed they would respond favorably to educational programs.[3] Garrido et al recommended educational programs should be arranged to promote adequate oral care practices.[3] The nDCBS was modified and used in this study, as an extension of the study by Garrido et al.[3] The purpose of this study was to begin to address the gap in literature about the non-medical in-home care companies' professional caregiver's oral care practices and oral health beliefs for their elderly clients aging in place.

Methods and Materials

A descriptive, cross-sectional study design surveyed professional caregivers from three non-medical in-home care companies in South Texas. Participants responded to the nDCBS, which was adapted to reflect current practice and specific goals of this study.[3] The survey was designed to obtain information about the priority professional caregivers assigned to the provision of oral care for their elderly clients. The survey included demographic information, close-ended oral care practice questions, and a 4-part oral health belief Likert scale survey.

The 4 parts of the Likert scale section were:[3]

1. Internal locus of control, the belief that the results of one's oral health depended on their own

attitudes and capabilities
2. External locus of control, the belief that results of one's oral health were caused by uncontrollable factors such as the environment or other people
3. Self-efficacy, the extent of ones belief in one's own ability to reach goals
4. Oral health beliefs, the extent to which one chooses to believe or not to believe in preventive oral health behaviors

The survey included participant instructions that specifically defined the term oral care as daily brushing, flossing and cleaning the clients' dentures.[3]

The survey was distributed, using SurveyMonkey®, to a list of n=1,076 professional caregivers employed by 3 NHMCs. Two of the NHMCs sent an "invitation to participate" in the study by email to their caregiver employees with instructions for informed consent and a link to access the questionnaire. The third NHMC placed a letter with an "invitation to participate" in the study, directions for informed consent and a link to the survey into employee paycheck stub envelopes. Survey participants were given 1 month to complete the survey. Follow-up emails and letters were sent by the non-medical in-home care companies to encourage participation at weekly intervals until the survey closed. Even with the incentive of a gift card drawing, response rates were low.

Survey responses were extracted from SurveyMonkey®, and obtained data were analyzed statistically with SAS® software, version 9.4 for Windows. Chi-square contingency table analysis was used to determine if there was a significant association between oral care practices and oral health beliefs of CPCs and NCPCs. The level of significance was set at $p<0.05$. The study received institutional review board approval.

Results

A 6.2% response rate (n=67) was attained from the total invited (n=1,076). From those who responded, 67 completed the demographic information, 65 completed the oral care practices questions and 62 completed the oral health beliefs questions. The majority of respondents were Hispanic (45%), female (97%) and between the ages of 40 to 60 years (52%). Thirty-seven percent of caregivers were CPCs and 58.2% were NCPCs.

Caregiver certification was significantly related to "having training in providing oral care" ($p<0.0001$) and "looking in the elderly client's mouth" ($p=0.05$). Data showed that 89% of CPCs compared to only 39% of NCPCs reported being trained in the provision of oral care. Similarly, 85% of CPCs compared to only 63% of NCPCs looked in their elderly client's mouth.

Aggregated data showed that the majority of respondents were trained in the provision of oral care (60%). Of those 60%, most looked inside their client's mouth (85%), provided oral care once a day (55%), yet did not floss their client's teeth (18%). Respondents were ambivalent about knowing if their client used a mouth rinse (51% responded "no" and 49% responded "yes"). Only 31% knew if their client wore dentures and 62% stated they did not clean their client's dentures. Greater than 46% reported using a toothbrush to provide oral care, and more than 77% stated they brushed their client's teeth using toothpaste. Finally, a variety of toothbrush hardness was reported as: 31% used a medium toothbrush, 33% used a soft toothbrush, and 15% used an electric toothbrush, with 18% not sure what type of tooth brush was used.

Data from questions under internal locus of control, where the results of caregiver's oral health was "dependent on their own attitudes and capabilities," demonstrated that both caregiver types felt strongly that teeth should last a lifetime (93.6%), cavities could be prevented (96.8%), and flossing could help prevent gum disease (100%). However, for the items of external locus of control, where the results of their oral health were "caused by uncontrollable factors," both groups of caregivers where ambivalent about whether tooth loss was a normal part of growing old (43.6% responded "yes" and 56.4% responded "no").

In the oral health beliefs dimension, the extent to which a "person chooses to believe in preventive oral health behaviors," caregiver certification was significantly related to "visiting the dentist with tooth pain" ($p=0.0018$). Slightly more than 74% of CPCs and 100% of NCPCs disagreed that visiting the dentist is only "necessary with tooth pain." In the self-efficacy dimension, where the extent of the respondent's belief in their "ability to reach goals" was questioned, both groups of caregivers indicated a high level of belief that training to recognize mouth sores (88.7%), training in brushing and flossing (85.3%), and training about gum disease (83.9%) would help them provide better oral care.

Discussion

This study was developed as an extension of the study by Garrido et al, who compared LTCF caregivers' and domiciliary caregivers' oral care practices and oral health beliefs.[3] While there were parallels between the caregiver duties in LTCFs and non-medical in-home care companies, there was no literature that focused specifically on the NMHC caregivers. Results of this study demonstrated that while CPCs were more likely than NCPCs to have training in oral care practices, they still did not provide oral care on a daily basis.

This new information supported existing literature which stated that CPCs of LTCFs had training in oral care practices that was inadequate, with evident deficiencies in providing knowledge of oral care procedures such as daily brushing, flossing and cleaning their clients' dentures.[3,14,15,17] This study supported current findings that most LTCFs and non-medical in-home care companies did not have protocols in place for providing oral care practice training for their caregiver employees.[14,22] The management of the non-medical in-home care companies, perhaps because of the lack of state regulation and oversight, provided minimal oral care training with no assurance of employee compliance or accountability to the state. This lack of accountability negatively impacted oral care guidance that professional caregivers needed when working with elderly clients.[17]

Study data suggested that caregivers overestimated the incidence of environmental factors, such as their clients' age (external locus of control).[3] Caregivers also believed certain oral care practices could have an effect on their elderly clients' oral health (internal locus of control), yet they were unsure of their ability to perform these practices (self-efficacy).[3] Therefore, it was not surprising when both CPCs and NCPCs stated they believed oral care training could improve the way they provided oral care (self-efficacy).[3]

NMHC administrators are in a prime position to initiate innovative changes in oral care policies and facilitate opportunities for knowledge building through in-service training utilizing educators in the current oral health care workforce, such as a registered dental hygienist (RDH).[14,16,22] Legislation should require all professional caregivers to be certified and mandate non-medical in-home care companies to provide training in oral care.[14,16,22] Oral care training would incorporate instructions to caregivers about daily brushing, flossing, and cleaning their clients' dentures. Further information would include the importance of oral health to support the recommended task.[23]

While providing insight and useful baseline data, there were several limitations of this study. The research does not reflect a representative sample of non-medical in-home care companies, as only 3 non-medical in-home care companies in south Texas with a total of n=67 respondents were included to support this initial research. Additionally, there were incomplete survey responses. Of the 67 professional caregivers who started the survey, 5 did not complete all of the questions and were excluded from the analyses. The survey consisted of close-ended oral care practice questions that may not exactly represent caregiver behaviors due to the Hawthorne effect.

Conclusion

While this was a small study, it provides preliminary information about professional caregivers (CPCs and NCPCs) who were serving clients aging in place, and their interest in receiving more oral care training. The CPCs, as well as the NCPCs, would be better served if there were more thorough and frequent training provided with managerial oversight.

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References

1. Yellowitz J, Schneiderman M. Elder's oral health crisis. J Evid Based Dent Pract. 2014; 191-200.

2. U.S. Census Bureau. An Aging Nation: The Older Population in the United States Current Population Reports U.S. Department of Commerce Economics and Statistics Administration [Internet]. 2014 [cited 2015 Jan 31]. Available from: http://www.census.gov/prod/2014pubs/p25-1140.pdf

3. Garrido, C, Romo, F, Espinoza, I, et al. Oral health practices and beliefs among caregivers of the dependent elderly. Gerodontology. 2011; 29, e742-e747.

4. American Association of Retired Persons. The New Aging Enterprise. Office of Academic Affairs [Internet]. 2008 [cited 2015 Jan 15]. Available from: http://assets.aarp.org/www.aarp.org_/articles/research/AgingEnterprise.pdf

5. American Association of Retired Persons. In Brief: Just Getting By: Unmet Need for Personal Assistance Services Among Persons 50 or Older with Disabilities [Internet]. 2006 [cited 2015, April 21]. Available from: http://www.aarp.org/home-garden/livable-communities/info-2006/inb132_disability.html

6. American Association of Retired Persons and National Conference of State Legislatures Aging in Place. A State Survey of Livability Policies and Practices [Internet]. 2011 [cited 2015 Feb 1]. Available from: http://assets.aarp.org/rgcenter/ppi/liv-com/ib190.pdf

7. Centers for Disease Control and Prevention Washington: National Association of County and City Health Officials. Public Health Terms for Planners and Planning terms for Public Health Professionals [Internet]. 2013 [cited 2015 Feb1]. Available from: https://www.planning.org/research/healthy/pdf/jargonfactsheet.pdf

8. Low L-F, Yap M, Brodaty H. A systematic review of different models of home and community care services for older persons. BMC Health Serv Res. 2011;11:93.

9. Coleman, P. Improving oral health care for the frail elderly: A review of widespread problems and best practices. Geriatr Nurs. 2002; 23(4), 189-199.

10. Gammack J, Pulisetty, S. Nursing education and improvement in oral care delivery in long-term care. J Am Med Dir Assoc. 2009; 10(9), 658-661.

11. Jablonski, R. A., Munro, C. L., Grap, M. J., et al. Mouth care in nursing homes: knowledge, beliefs, and practices of nursing assistants. Geriatr Nurs, 2009; 30(2), 99-107.

12. Dharamsi, S., Jivani, K., Dean, C., et al. Oral care for frail elders: knowledge, attitudes, and practices of long-term care staff. J Dent Educ. 2009; 73(5), 581-588.

13. Kullberg, E., Sjögren, P., Forsell, M., et al. Dental hygiene education for nursing staff in a nursing home for older people. J Adv Nurs. 2010; 66(6), 1273-1279.

14. Pronych, G., Brown, E., Horsch, K., et al. Oral health coordinators in long-term care: a pilot study. Spec Care Dentist. 2010; 30(2), 59-65.

15. Amerine, C., Boyd, L., Bowen, D., et al. Oral health champions in long-term care facilities: a pilot study. Spec Care Dentist. 2014; 34(4), 164-170.

16. Taverna, M., Nguyen, C., Wright, R., et al. Iatro-compliance: an unintended consequence of excessive autonomy in long-term care facilities. J Dent Hyg. 2014; 88(1), 53-60.

17. Portella F, Rocha A, Haddad D, et al. Oral hygiene caregivers' educational programme improves oral health conditions in institutionalized independent and functional elderly. Gerodontology. 2013.

18. Texas Administrative Code, Title 40, Part 1, Chapter 97, Subchapter C, Division 4, Rule § 97.281 Client Care Policies.

19. Wardh, I., Wikstrom, M. Long-term effects of using oral care aides at a nursing home for elderly dependent residents: a pilot study. Spec Care Dentist. 2013; 34(2), 64-69.

20. Wardh I, Sorensen S. Development of an index to measure oral health care priority among nursing staff. Gerodontology. 2005; 22(2), 84-90.

21. Wolfe, GR., Stewart, JE., Hartz, GW. Relationship of Dental Coping Beliefs and Oral Hygiene. Community Dent Oral Epidemiol. 1991; 19, 112-115.

22. Wintch, P., Johnson, T., Gurenlian, J., et al. Executive directors' perceptions of oral health care of aging adults in long-term care settings. J Dent Hyg. 2014; 88(5), 302-308.

23. Catteau, C., Piaton, S., Nicolas, E., et al. Assessment of the oral health knowledge of healthcare providers in geriatric nursing homes: additional training needs required. Gerodontology 2013.

Attitudes of Dental Hygienists towards Independent Practice and Professional Autonomy

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Abstract

Purpose: The purpose of this cross-sectional, quantitative research was to examine if registered dental hygienists feel competent to work independently based on regulations of dental supervision.

Methods: A stratified sample of 360 dental hygienists from 8 states completed the Dempster Practice Behaviors Scale survey. ANOVA and MANOVA analyses revealed how state dentist supervision level, age, degree of education, employment status, gender and years of clinical experience affect the perceived autonomy of professional dental hygienists.

Results: The response rate included 360 dental hygienists from 8 states. According to the findings age, education level and gender affected the hygienist's level of autonomy. In all 8 states, the registered dental hygienists have a high level of autonomy and feel competent to work independently.

Conclusion: The DPBS scores of the sample registered dental hygienists suggest that they feel prepared and competent to perform preventive dental hygiene services without dentist supervision. The attitudes of the dental hygienist sample from each of the 4 state dentist supervision levels supports a move toward achieving professional jurisdiction of preventive dental care within the U.S.

Keywords: dental hygiene, supervision level, access to dental care, autonomy, independent practice

This study supports the NDHRA priority area, **Health Services Research:** Evaluate strategies that position and gain recognition of dental hygienists as a primary care provider in the health care delivery system.

Introduction

Access to dental care is a challenge across the U.S., which has been attributed to a shortage of trained providers, a lack of funding for dental care, inadequate coverage by health plans, and an aging workforce of dentists.[1] A key component of the Patient Protection and Affordable Care Act (PPACA) is to alleviate the shortage of dental services in the U.S.[2] As of November 2012, there were 195,941 professionally active dentists in the U.S. with a projected growth rate of 21% annually.[3] In 2012, there were 195,903 professionally active dental hygienists in the U.S., with a projected growth rate of 38% annually.[4,5] The total number of dental graduates in 2012 was 5,199, whereas the total number of dental hygiene graduates in 2012 was 7,103.[4] If these trends continue, the annual increase of dentists is projected to insufficiently meet the increase of population need for dental providers in the U.S. each year.[6]

The high cost of dental care, lack of dental insurance, and misdistribution of dental providers prevent many Americans from obtaining dental care.[7] From 2010 to 2011, 13.2% of Americans who were interviewed stated that they did not obtain dental care during the previous 12 months due to the high cost.[7] In addition, as of 2013, there were 4,595 dental care Health Professional Shortage Areas (HPSAs) in the U.S. where there were an insufficient number of providers to meet the needs of the population.[6] Across these shortage areas, only 42% of the population need was met.[6] The number of additional dentists and dental hygienists required to meet 100% of the population need is 6,531.[6]

Dental hygienists are licensed preventive dental professionals who could help reduce the current burden of need if they were permitted to work without dental supervision in all 50 states.[6] Currently, licensure requirements call for all U.S. dental hygienists to graduate from an accredited dental hygiene program and complete a written national examination in addition to a regional or state clinical examination.[8] In 8 states a dental hygienist is legally required to be directly supervised (on the premises) by a dentist while providing preventive dental services.[9] In other states that have some level of general supervision, the dentist is legally required to authorize preventive services provided by a dental hygienist prior to implementation.[9] Therefore, an individual must be examined by a dentist prior to being treated by a dental hygienist for preventive services in general supervision states.

As a comparison, The Report on the Future of Nursing recommends removing scope-of-practice barriers in health care to facilitate the ability of registered providers to work to the full extent of their education and training.[10] This report has increased attention to scope-of-practice and state supervision regulations in nursing.[10] Investigators have shown that using health care mid-level providers such as nurse practitioners, to execute services that they are licensed to deliver is cost-effective and accepted by patients.[11] It is estimated that the average cost of a physician assistant or nurse practitioner visit is 20 to 35% lower than a physician visit.[12] In a study by Dierick-van Daele et al, patients seeing nurse practitioners were more satisfied and felt that the quality of care was equivalent to physician care.[11]

Professionals such as nurse practitioners are allowed greater autonomy to make decisions about the care of their patients. Autonomy is defined as self-governing; a social environment where others are considered as separate individuals capable of self-determination.[13] Gender and class background have been a significant factor in the autonomy and self-regulation of professions.[14] In the early periods of professions, women were excluded from entrance into professions which established a male domination. Whittington found that gender still plays a statistically significant factor in science-based professions.[15]

It is unclear if dental hygienists, who are predominately female,[16] feel capable of autonomy in the care of patients and if their education has prepared them to take on this role. The purpose of this study was to determine if dental hygienists from different states view their education and capabilities as adequate to provide preventive dental care independently to individuals in need and underserved areas.

Methods and Materials

The study used a cross-sectional, quantitative survey design. A stratified sample, based on state dental supervision levels for dental hygienists and gender, was drawn from state dental boards or dental hygiene boards that would allow access to the e-mail or mailing addresses of dental hygienists. The sample was obtained from state boards with various dental hygiene supervision levels. The sample of registered dental hygienists was randomly selected from 8 preselected sample states based on dental supervision levels of dental hygienists and ability to obtain e-mail and traditional mailing addresses. The states that were utilized in the study included: Alabama, California, Colorado, Florida, North Carolina, Tennessee, Washington, and West Virginia. The states were divided into 4 categories of state regulated dental supervision: direct access with local anesthesia allowed, general supervision/direct access with local anesthesia allowed, general supervision with local anesthesia allowed, and direct supervision/general supervision with no local anesthesia allowed. In order to ensure an acceptable number of male dental hygienists in the study sample, all male dental hygienists within 6 of the states were solicited since there were fewer than 100 male dental hygienists within these states. Table I displays the number of available participants by each state used in the study.

The study used a confidence level of 90%, a 0.5 standard deviation, and a confidence interval of +/- 5% in order for the results to be considered statistically significant. Using a MANOVA sample analysis table, the sample size needed for this study was 130 participants for a medium effect and an alpha level of 0.05 for 8 groups with 6 variables.[17] Therefore, surveys were sent to 1,250 registered dental hygienists in order to obtain the 130 respondents for a precision level sample size of 8 dental hygiene groups.[18]

Two tools were used to collect data for this study. The first was the Dempster Practice Behaviors Scale (DPBS) instrument utilizing scale rated questions.[19] The survey questionnaire was designed by the principal investigator, Judith S. Dempster, in 1990 for her dissertation. The questionnaire was tested for reliability and validity prior to its use in other studies.[19] The second instrument gathered demographic data including a nominal scale of age, gender, educational background, highest dental hygiene degree level obtained, clinical employment status, teaching status, graduation year from a dental hygiene program, and state of current residence.

The study participants were recruited in June and July of 2014. Implied consent was used, that is, completing the questionnaire implied that participants were willing to participate in the study. Over a 1-month period, 650 surveys were mailed through the United States Postal Service. In addition, 600 survey links were e-mailed to dental hygiene potential participants through Survey Monkey. Candidates in Alabama, California, Colorado, and North Carolina were mailed surveys through the postal service along with a self-addressed stamped return envelope. Candidates in Florida, Tennessee, Washington, and West Virginia were sent an e-mail invitation to complete the survey online through Survey Monkey. In addition, 100 randomly selected female dental hygienists and 100 randomly selected male dental hygienists, all with an active license from each of the 8 states, were sent surveys. Due to an insufficient number

Table I: Number of Available Study Participants by State

	Active Female Dental Hygienists	Active Female Dental Hygienists (Percent)	Active Male Dental Hygienists	Active Male Dental Hygienists (Percent)	Total Active Dental Hygienists
Alabama	4,077	99	25	1	4,102
California	27,740	98	618	2	28,358
Colorado	4,479	99	63	1	4,542
Florida	13,011	98	227	2	13,238
North Carolina	5,587	99	73	1	5,660
Tennessee	3,231	99	23	1	3,254
Washington	5,179	99	67	1	5,246
West Virginia	1,090	99.99	9	0.01	1,099
Total	64,394	98.3	1,105	1.7	65,499
U.S.	191,985	98	3,918	2	195,903*

*From "Dental and allied dental graduates 2001-2012" by ADEA, 2013b and "Bureau of Labor Statistics: Occupational outlook handbook for dental hygienists" by USDL, 2013b.

of male dental hygienists within 6 states, only 25 surveys were sent to Alabama male dental hygienists, 63 to Colorado male dental hygienists, 73 to North Carolina male dental hygienists, 23 to Tennessee male dental hygienists, 67 to Washington male dental hygienists, and 9 to West Virginia male dental hygienists.

Results

Of the 1,250 surveys that were sent, a total of 405 surveys (32.4%) were returned. Of the 405 returned surveys, 198 (48.9%) were mailed surveys and 207 (51.1%) were online surveys. Forty-seven online surveys (7.8%) and 22 mailed surveys (3.4%) were returned as undeliverable. Twenty-one online recruits (3.5%) declined survey participation. Total usable surveys numbered 360 (88.9%).

Figures 1 through 5 show the frequency distribution of the study participants based on age, employment status, years of clinical experience, education level, and state of residency. The average age of the participants was 45.41 years. Clinicians numbered 333 (92.5%) and 27 (7.5%) were educators. Twenty-six (7.2%) had a certificate in dental hygiene, 191 (53.1%) had an associate degree in dental hygiene, 113 (31.4%) had a bachelor's degree in dental hygiene, 27 (7.6%) had a master's degree in dental hygiene, and 3 (0.8%) had a doctorate degree.

The ANOVA results in Table II show that there

Figure 1: Frequency Distribution of Study Participant's Age

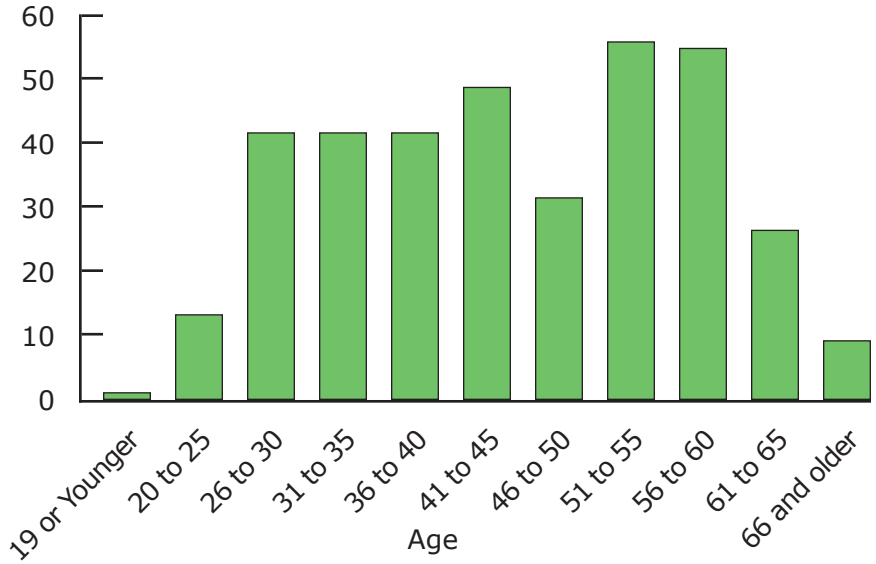
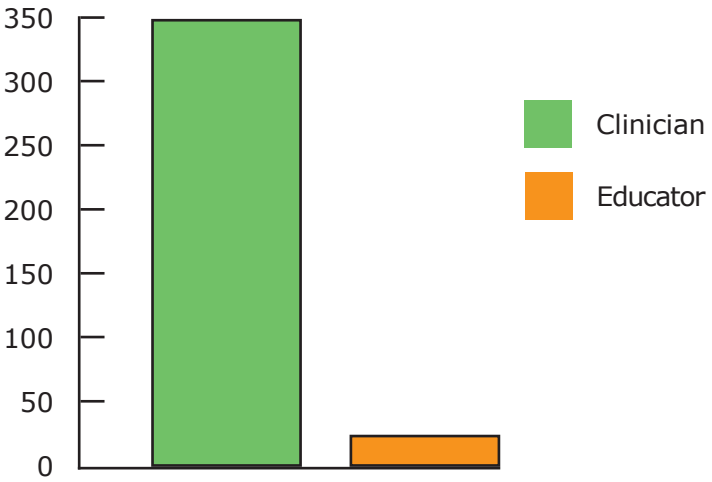


Figure 2: Frequency Distribution of Study Participant's Employment Status



were no significant differences among the DPBS scores when comparing state dental supervision levels, age groups, education level, employment status, gender, or years of clinical experience among dental hygienists. However, the MANOVA results show that there were significant differences among DPBS scores when comparing state dental supervision levels with age, educational level, and gender. These results reiterate that ANOVA post hoc analyses ignore the fact that the MANOVA hypothesis includes sub-hypotheses about linear combinations of dependent or control variables.[20]

Follow-up pairwise comparisons were conducted for the dependent variable, independent variable, and 5 control variables. With the Bonferroni method, each comparison was tested at the alpha level for the ANOVA divided by the number of comparisons.[20] In addition, the same 5 comparisons were performed using the Dunnett's C method since the variances for gender and employment status were not homogenous. For age, educational level, and gender there was a significant difference in DPBS mean scores among the 4 dental supervision levels. There was a non-significant difference in the means between: employment status and years of clinical experience among the 4 dental supervision levels and also means of the 4 dental supervision levels alone.

Total autonomy scores ranged from 57 to 148, with a mean of 118.20 (SD=15.35). Based on the DPBS the higher the score, the higher level of autonomy with possible scores ranging from 30 to 150.[19] The instrument scale does not classify a range for scoring. When compared to other DPBS instrument research results, these findings show that dental hygienists within this sample perceived high levels of autonomy. Table III displays the DPBS results for registered dental hygienists and other professions that have completed the DPBS survey.

The DBPS used a 5-point Likert scale ranging from 1 (not at all true) to 5 (extremely true).[19] Table IV displays the mean results of the DPBS instrument for the 4 subscales based on state dental supervision level: readiness, empowerment, actualization, and valuation.[19] The Readiness subscale had 11 item statements and measured elements of skills, competence, and mastery. The Empowerment subscale had 7 items and measured the acceptability of performance in a practice setting. The Actualization subscale included 9 items and

Figure 3: Frequency Distribution of Study Participant's Years of Clinical Experience

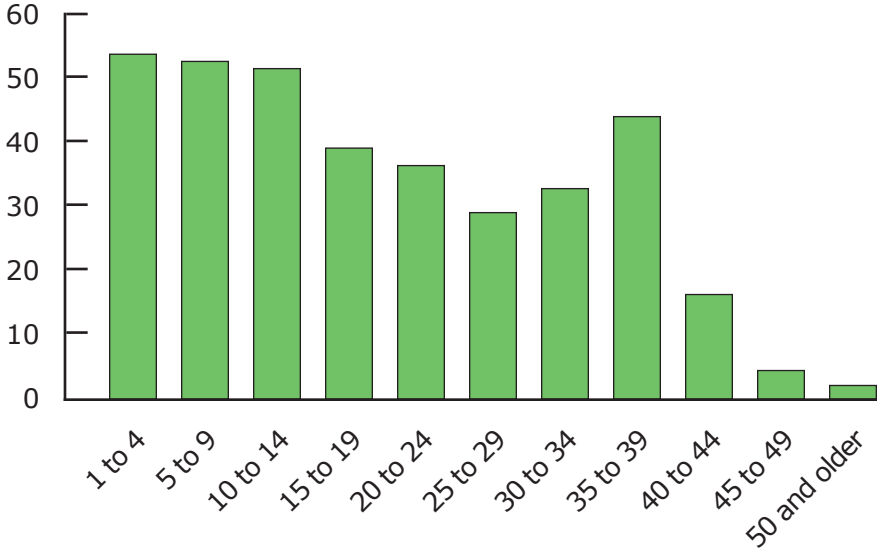


Figure 4: Frequency Distribution of Study Participant's Educational Level

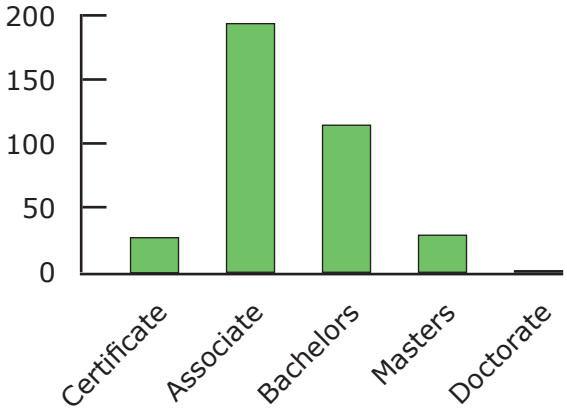


Figure 5: Frequency Distribution of Study Participant's State of Residency

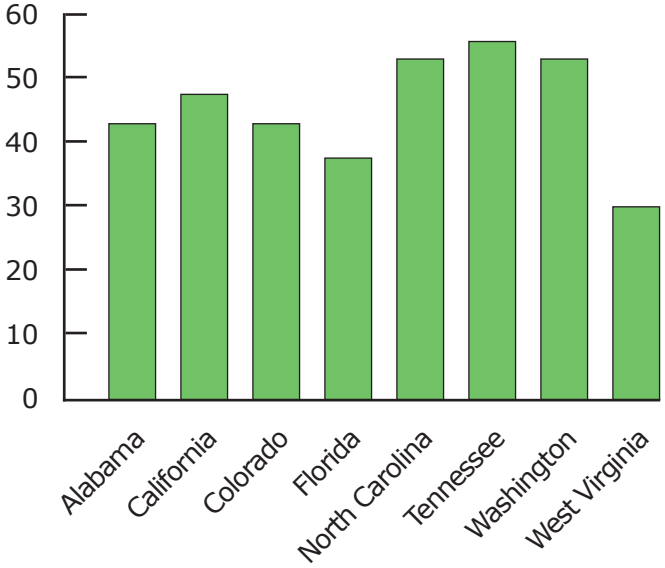


Table II: Dependent Variable ANOVAs based on DPBS Scores and MANOVA Results

Control Variable	ANOVA Significance Level ($p<0.05$)	MANOVA Significance Level with Dental Supervision ($p<0.05$)
Age	0.164	0.018*
Gender	0.981	0.000*
Employment Status	0.099	0.034
Years of Clinical Experience	0.894	0.088
Educational Background	0.314	0.004*
State Dental Supervision Level	0.080	N/A

*MANOVA results that show significant difference among DPBS scores when compared to state dental supervision levels

measured accountability, decision making, determination, responsibility. The Valuation subscale included 3 items and measured elements of worth, value, merit, and usefulness related to autonomy in practice.

Discussion

Overall, the sample of dental hygienists had a DPBS mean score of 118.2 out of a range of 30 to 150 autonomy level score. This finding supports research from McCain, which found that Virginia dental hygienists had a strong belief in competency skills and desire to work in nontraditional settings, under general dentist supervision.[21] For example, the current study found that American registered dental hygienists had a higher DPBS mean score than registered nurses from Thailand, Taiwan, and the U.S. These findings also corroborate the findings of Turner et al., who found that European dental hygienists feel competent to complete some preventive dental care services unsupervised.[22] The Turner et al study surveyed 150 dental hygienists, 183 hygiene-therapists, and 152 dental therapists from England, Scotland, Wales, and Northern Ireland and found that these providers felt competent to diagnosis periodontal disease and provide preventive dental care without a supervising dentist on the premises. In addition, the findings of this current study agree with the findings of Robinson et al. that found military nurses in highly ordered settings similar to direct supervision have less autonomy.[23] General supervision dental hygienists have the ability to work independently in some settings, whereas the dental hygienists in the direct supervision states are unable to work independently in any settings and had the lowest autonomy DPBS mean score of the 4 supervisory categories in the current study.

This study revealed that one possible explanation of why direct access dental hygienists do not have a higher level of autonomy is due to bureaucratic restrictions where they are employed. For example, a 51 to 55-year-old female direct access clinician from California with 20 to 24 years of dental hygiene experience stated, "My office has made their own rules and in many ways my decisions are limited due to not being able to decide without a dentist giving the okay for treatment. Sometimes they agree and sometimes not." Other DPBS survey comments argued the requirement of completing different state clinical board examinations if moving from state to state restricts autonomy. Therefore, dental hygienists within the direct access states are experiencing different restrictions to providing unsupervised preventive dental treatment to underserved populations from the other dental supervision leveled states; however, they are still experiencing restrictions.

Table III: Dempster Practice Behaviors Scale for Various Professions

Country and Profession	Mean	Standard Deviation	n
Thailand registered nurses[12]	91.65	9.79	614
Taiwan registered nurses[13]	107.00	13.40	286
American registered nurses[14]	116.99	12.94	100
American dental hygienists	118.2	15.35	360
American nurse practitioners[15]	127.00	10.25	48

Educational level, gender, and age appear to affect the level of professional autonomy among the dental hygienists within the 8 states of this study. Therefore, prospective research that explores a deeper understanding of these results may reveal currently unknown aspects of dental hygienists and state supervision levels.

There are limitations within this study. First, survey results gathered from the small random sample of 360 participants cannot be generalizable to a larger population of dental hygienists in the U.S. when they have unique levels of dentist

Table IV: Dempster Practice Behaviors Scale Subscale Results

DPBS Subscale	Mean DPBS Score				
	Direct Access (n=91)	Direct Access/ General Supervision (n=88)	General Supervision/Direct Supervision (n=88)	Direct Supervision (n=93)	Total
Readiness: Skill, Competence and Mastery	3.7877	3.7458	3.8430	3.7204	3.7742
Empowerment: Legal Rights, Status and Privileges	3.5831	3.3214	3.5211	3.1059	3.3854
Actualization: Accepting Responsibility, Decision Making and Action Accountability	4.4554	4.4015	4.5139	4.4169	4.4469
Valuation: Self-Respect, Worth, Job Satisfaction and Achievement	4.3004	4.2576	4.3977	4.3764	4.3340
Total	4.0317	3.9316	4.0689	3.9049	–

Note: Possible DPBS scores range from 1 (least autonomous) to 5 (most autonomous)[11]

supervision. The study sample may not be representative of the larger dental hygienist population thus hindering external validity. Second, the sample of male dental hygienists and educators that participated in the study was limited. Numbers of male dental hygienists vary as do numbers of dental hygiene educational programs between states limiting the ability to generalize the results. Third, the topic of dental hygiene independent practice and self-regulation is controversial. Participants may not have been willing to respond to the survey if they were not absolutely certain of anonymity or how the study results were to be used. Therefore, the participants could have failed to respond truthfully. Lastly, registered dental hygienists who are interested in independent practice and self-regulation for the profession may have been more likely to participate in the study compared to registered dental hygienists that have less interest in becoming autonomous. The study results that show a high level of autonomy among dental hygiene participants may be due to a more autonomous study sample.

Further studies on the attitudes of dental hygienists toward independent practice and professional autonomy are warranted. This study's small random sample did not show a difference in autonomy levels among dental hygienists based on employment status or years of clinical experience when state dentist supervision levels were taken into consideration. A larger study sample size needs to be obtained in order to capture a broader range of participants. In addition, a qualitative study could further investigate why dental hygienists from this study feel "taken advantage of by dentists".

Conclusion

The DPBS scores of the study sample suggest that dental hygienists feel prepared and competent to perform preventive dental hygiene services without dentist supervision. The attitudes of the dental hygienists from each of the 4 state dentist supervision levels supports a move toward achieving professional jurisdiction of preventive dental care within the U.S. For this shift in bureaucratic power to occur, a disruption in dental tasks and jurisdictions must transpire between the dental and dental hygiene professions.

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References

1. Health Resources and Services Administration. The professional practice environment of dental hygienists in the fifty states and the District of Columbia, 2001. National Center for Health Workforce Analysis, Bureau of Health Professions [Internet]. 2004 [cited 2014 Jan 5]. Available from: http://bhpr.hrsa.gov/healthworkforce/reports/dentalhygiene50statesdc.pdf

2. United States Congress. Bill 3590. United States Government Printing Office [Internet]. 2010 [cited 2014 Jan 8]. Available from: http://www.gpo.gov/fdsys/pkg/BILLS-111hr3590enr/pdf/BILLS-111hr3590enr.pdf

3. United States Department of Labor. Bureau of Labor Statistics: occupational outlook handbook for dentists. United States Department of Labor [Internet]. 2013 [cited 2014 Jan 7]. Available from: http://www.bls.gov/ooh/Healthcare/Dentists.htm

4. American Dental Education Association. Dental and allied dental graduates: 2001-2012. American Dental Education Association [Internet] 2013 [cited 2014 Jan 6]. Available from: http://www.adea.org/uploadedFiles/ADEA/Content_Conversion_Final/publications/Trend sinDentalEducation2009/AlliedDentalHealth/DentalandAlliedDentalGraduates.pdf

5. United States Department of Labor. Bureau of Labor Statistics: occupational outlook handbook for dental hygienists. United States Department of Labor [Internet] 2013 [cited 2014 Jan 7]. Available from: http://www.gpo.gov/fdsys/pkg/BILLS¬111hr3590enr/pdf/BILLS-111hr3590enr.pdf

6. United States Department of Health and Human Services. HRSA data warehouse: designated health professional shortage areas statistics as of July 29, 2013. United States Department of Health and Human Services [Internet]. 2013 [cited 2014 Jan 9]. Available from http://ersrs.hrsa.gov/reportserver/Pages/ReportViewer.aspx?/HGDW_Reports/BCD_HPS A/BCD_HPSA_SCR50_Smry_HTML&rs:Format=HTML4.0

7. Centers for Disease Control and Prevention /National Center for Health Statistics. National health interview survey, family core, sample child, and sample adult questionnaires. Centers for Disease Control and Prevention /National Center for Health Statistics [Internet]. 2012 [cited 2014 Jan 7]. Available from: http://www.cdc.gov/nchs/data/hus/2012/075.pdf

8. American Dental Association. Dental hygienist: job description. American Dental Association [Internet]. 2013 [cited 2014 Jan 8]. Available from: http://www.ada.org/357.aspx

9. American Dental Hygienists' Association. Scope of practice. American Dental Hygienists' Association [Internet]. 2012 [cited 2014 Jan 6]. Available from: http://www.adha.org/scope-of-practice

10. Institute of Medicine. The future of nursing: focus on scope of practice. Institute of Medicine [Internet]. 2010 [cited 2014 Jan 8]. Available from: http://www.iom.edu/~/media/Files/Report%20Files/2010/The-Future-of-Nursing/Nursing%20Scope%20of%20Practice%202010%20Brief.pdf

11. Dierick-van Daele AT, Metsemakers JF, Derckx EW, Spreeuwenberg C, Vrijhoef HJ. Nurse practitioners substituting for general practitioners: randomized controlled trial. J Adv Nurs. 2009; 62(2): 391-401.

12. Eibner C, Hussey P, Ridgely MS, McGlynn EA. Controlling health care spending in Massachusetts: an analysis of options. Division of Health Care Finance and Policy [Internet]. 2009 [cited 2014 Jan 6]. Santa Monica, CA. RAND Corporation. Available from: http://ct.gov/sustinet/lib/sustinet/board_of_directors_files/resources/control_health_care_s pending_rand_08-07-09_full.pdf

13. Moreau E, Mageau GA. The importance of perceived autonomy support for the psychological health and work satisfaction of health professionals: not only supervisors count, colleagues too! Med Care Res Rev. 2012; 67(1): 3-26.

14. Barker K. Women physicians and the gendered system of professions: an analysis of the Sheppard-Towner Act of 1921. Work Occupation. 1998; 25(2): 229-235.

15. Whittington KB. Mothers of invention? Gender, motherhood, and new dimensions of productivity in the science profession. Work Occupation. 2011; 38(3): 417-456.

16. American Dental Education Association. Dental hygiene total enrollment by gender: 2000-2011. American Dental Education Association [Internet]. 2012 [cited 2014 Jan 6]. Available from: http://www.adea.org/publications/tde/Documents/Dental%20Hygiene%20Total%20Enroll ment%20by%20Gender%20Table.pdf

17. Guilford JP, Fruchter B. Fundamental statistics in psychology and education. New York. McGraw-Hill. 1973.

18. Baruch Y. Response rate in academic studies: a comparative analysis. Hum Relat. 1999; 52(1): 421–438.

19. Dempster JS. Autonomy in practice: conceptualization, construction, and psychometric evaluation of an empirical instrument. [Doctoral dissertation]. 1990. Available from ProQuest Dissertations and Theses. Ann Arbor, MI: University Microfilms International.

20. Green SB, Salkind NJ. Using SPSS for Windows and Macintosh: analyzing and understanding data. 7th ed. Upper Saddle River, NJ. Pearson. 2013.

21. McCain LH. Attitudes of Virginia dental hygienists towards issues relevant to the independent practice of dental hygiene.[(Doctoral dissertation]. 1993. Available from ProQuest Dissertations and Theses. Ann Arbor, MI: University Microfilms International.

22. Turner S, Ross MK, Ibbetson RJ. Dental hygienists and therapists: how much professional autonomy do they have? How much do they want? Results from a UK survey. Brit Dent J. 2011; 210(10): 16-22.

23. Robinson SE, Rodriguez ER, Sammons MT, Keim J. Does being in the military affect nurses' perceptions of work life? J Adv Nurs. 1993; 18(7): 1146-1151.

Evaluating Student Self-Assessment through Video-Recorded Patient Simulations

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Abstract

Purpose: The purpose of this pilot study was to determine if the use of a video-recorded clinical session affects the accuracy of dental hygiene student self-assessment and dental hygiene instructor feedback.

Methods: A repeated measures experiment was conducted. The use of the ODU 11/12 explorer was taught to students and participating faculty through video and demonstration. Students then demonstrated activation of the explorer on a student partner using the same technique. While faculty completed the student assessment in real time, the sessions were video recorded. After completing the activation of the explorer, students and faculty completed an assessment of the student's performance using a rubric. A week later, both students and faculty viewed the video of the clinical skill performance and reassessed the student's performance using the same rubric. The student videos were randomly assigned a number, so faculty reassessed the performance without access to the student's identity or the score that was initially given.

Results: Twenty-eight students and 4 pre-clinical faculty completed the study. Students' average score was 4.68±1.16 on the first assessment and slightly higher 4.89±1.45 when reviewed by video. Faculty average scores were 5.07±2.13 at the first assessment and 4.79±2.54 on the second assessment with the video. No significant differences were found between the differences in overall scores, there was a significant difference in the scores of the grading criteria compared to the expert assessment scores ($p=0.0001$).

Conclusion: This pilot study shows that calibration and assessment without bias in education is a challenge. Analyzing and incorporating new techniques can result in more exact assessment of student performance and self-assessment.

Keywords: student self-assessment, clinical assessment, dental education, dental hygiene, faculty calibration

This study supports the NDHRA priority area, **Professional Education and Development:** Validate measures that assess continued clinical competency.

Introduction

The importance of self-assessment in health care related occupations has been well established in the literature and the ability to self-assess is vital to ensure professional growth and development.[1,2] One challenge that arises in the implementation of self-assessment is students' understanding of self-assessment and its purpose. Students have reported that they are unfamiliar with the concept of self-assessment or are unclear of the expectations especially in the clinical environment.[1,2] In some cases it is due to a lack of exposure to self-assessment. In a dental hygiene study, Mould et al reported that 52% of students had no previous experience with self-assessment. An additional 24% of students reported minimal experience with self-assessment.[2] Medical literature shows that students do not accurately self-assess and that there is a need to provide self-assessment instruction during clinical education.[1]

In dental hygiene, self-assessment is a necessary component of the curriculum, but can be difficult to cultivate. The Commission on Dental Accreditation (CODA) Standards for Dental Hygiene Programs outlines the responsibilities of institutions, putting the onus on educators to incorporate the self-assessment process into the curriculum.[3] Critical thinking and self-assessment expectations are noted in standard two for educational programs stating "Graduates must be competent in the application of self-assessment skills to prepare them for life-long learning."3 Consequently, dental hygiene programs must have evaluation mechanisms in place to examine student understanding as well as ability to apply self-assessment skills.[3] CODA accreditation standards advise dental hygiene programs to demonstrate that students are competent in the application of self-assessment. Programs can demonstrate compliance through "evaluation mechanisms designed to monitor knowledge and performance."[3]

The challenge of teaching the skills of effective self-assessment is one seen in other health professions. In addition, health profession studies have shown that the evaluation scores from student self-evaluation do not correlate with the scores given by faculty members.[4,5] In providing instruction to students, educators must be able to show students discrepancies in their performance so that the student can accurately self-assess in alignment with the instructor or expert assessment. The use of video has offered the ability to record student performance for later review and critique. Video may provide the opportunity for a student to re-examine the clinical skill performance to identify deficiencies in their performance thus having the potential to improve self-assessment practices. This is already a standard educational practice in some medical programs that could be applied to dentistry and dental hygiene as well. A study involving physiotherapy students reported that a recorded simulated exam allowed students to reflect on and evaluate their performance against established standards.[6] Based on those study findings, students can use video to compare their perceived performance to the actual recorded performance. This process of video review may provide the student with an opportunity to recognize areas of adequate and deficient performance. In addition, the process of video review could provide a measurable objective to discern whether or not self-assessment practices are in alignment with instructor assessment.

Clinical instructors could benefit from the utilization of video review as well. Observation is the most frequently utilized type of clinical assessment technique among dental hygiene educators[7] but direct observation "is limited by high interrater score variability."[8] The use of video will provide an alternative assessment technique for clinical instructors or even enhance the technique of the direct observation. The use of video as an alternative method for clinic assessment may help to reduce rater bias. In addition, instructors can use the video- recorded performances to determine if the feedback provided is complete and identify missed opportunities to provide corrective feedback. The feedback offered during a direct observation experience may differ from the feedback offered after a video review of the clinical performance.

Dental hygiene students must learn to evaluate their clinical performance to ensure that safe and appropriate care is provided to patients, however there is currently not a systematic method of self-assessment training for these students. The utilization of a video recorded clinical simulated patient learning experience is an alternative teaching method that can be investigated for its usefulness in the training of dental hygiene students and its effect on dental hygiene clinical instructor feedback. Other health professions have used instructional media such as simulation and video to provide students with opportunities to reflect on their clinical performance.[4,9,10] Students from other allied health professions have reported that the use of videos allowed them to more accurately self-assess.[5,11] A medical study found that the implementation of video exercises allows for improved calibration between student self-assessment and faculty feedback.[5] Although video is a widely used form of technology, its most effective use in the training of dental hygiene students has yet to be determined. Further, the use of a video-recorded clinical session used for student self-assessment has not been evaluated for dental hygiene. Because dental hygiene has a unique psychomotor skill set, it must be established whether or not the use of video is a relevant tool to evaluate the accuracy of student self-assessment practices. The purpose of this study is twofold in that it seeks to determine if the use of a video-recorded clinical session affects the accuracy of dental hygiene student self-assessment, if the use of a video-recorded clinical session influences feedback provided to students by dental hygiene clinical instructors.

Methods and Materials

This study was a repeated measures experiment that received expedited approval from an institutional review board. In preparation for the study, reading assignments, a video demonstrating the technique for using an ODU 11/12 explorer, and a self-assessment orientation were completed. First year dental hygiene students in the pre-clinical course were invited to participate in this pilot study. Clinical instructors viewed the same video that the students watched demonstrating the technique for using an ODU 11/12 explore. Review of this benchmark video before the laboratory exercise was intended to calibrate both students and clinical instructors. Students then demonstrated the proper technique, indicated in the benchmark video for using the ODU/11/12 explorer on a simulated patient. There were 4 criteria used to assess the clinical skill performance of exploring with the ODU 11/12 explorer. The first criterion assessed the choice of the correct working end, the second criterion assessed adaptation of the instrument to the teeth, the third criterion assessed instrument insertion into the gingival tissue, and the fourth criterion assessed instrument activation. These scores were compared to a standardized score established for each video based on criteria taught from the textbook by the pre-clinical faculty and video review by all faculty prior to the real time assessment. The clinical instructor observed the techniques of the student while one of the investigators video-recorded the clinical performance. Immediately following the performance, the student completed a self- assessment and the clinical instructor completed a faculty

assessment of student performance. The data collected from this clinical session was classified as the pre-video assessment.

The post-video assessment was completed a week later using a secure streaming server and email contact entailing evaluation instructions and a link to the video. This link connected viewers to the video-recorded clinical performance and an electronic version of the rubric used for the pre-video assessment. The post-video assessment was completed through a link to a secure electronic evaluation form in a survey software program (Qualtrics, Provo, Utah). In addition to the faculty score, the primary investigator and the co-investigator along with 2 pre-clinic course directors established a score for each video performance. The score established by the investigators and course directors is referred to as the "expert assessment" for each video performance. The standardized or expert assessment was determined by a negotiated approach. The expert assessment was the comparison for other scores completed by the students and the faculty.

Both descriptive and inferential statistics were used to analyze the data. Statistical analysis involved a total sum score and sub categorical scores assigned to each of the rubrics received from the students, instructors and investigators. These scores were totaled from the assessment rubric using the 4 criteria described previously. The criteria on the rubric were used for students and instructors to rate the performance of the clinical skill. The criteria were each scored on a 0 to 2 scale; a score of 0 represented major errors, a score of 1 represented minor errors in performance or inability to complete the skill, and a score of 2 represented the ability to perform the skills without errors. Scores were totaled by rater (instructor or student) and by time (pre- and post-video review). A mixed model for repeated measures was used to account for the association of scores between the student pre- and post-video reviews (intra-rater comparison), clinical instructor pre and post video reviews (intra-rater comparison), as well as associations between students, instructors and the expert assessment score (inter-rater comparison). The following parameters were estimated based on the mixed model: the difference of total score and criterion scores at different time intervals for the student self- assessment, the difference of total score and criterion scores at different time intervals by the instructor, difference between instructor and student self-assessment at different time intervals, and difference of scores evaluated by the student or instructor as compared to the expert assessment scores. A power analysis of 85% was determined and an alpha level of 0.01 was used for statistical testing.

Results

Thirty-two first year dental hygiene students were invited to participate in the study. Twenty-eight of the students provided consent for an 87.5% participation rate. Due to an incomplete data set, data analysis was completed for 27 subjects (n=27). Pairwise comparisons using both parametric and nonparametric methods were analyzed. In Table I, the data was summarized by count. Students scored their performance as a 0, 1 or a 2. For criterion one, 2 students scored their performance as a zero before the video was reviewed. After the video was reviewed, 5 students scored their performance as a 0 for criteria one. Instructors assigned a 0 score to 7 students for criteria one for both pre and post-video review assessments. There were 5 zeroes assigned for criteria one by the expert assessment group. The counts for the other criteria can be reviewed in Table I. Data analysis showed an increase in mean student self-assessment scores post-video review. Average instructor scores decreased post-video review. Overall scores assessed by the instructors and by the students were rated higher as compared to the expert assessment mean scores.

Differences in scores from the expert assessment scores by rater, time and criterion can be reviewed in Table II. Analysis of variance from the summary data can be examined in Table III. No statistically significant difference was found between pairs after adjustments were made using the Tukey-Kramer method. Overall scores were statistically different by criteria from the expert assessment scores. The pairwise comparisons of scores can be reviewed in Table IV.

Discussion

This study investigated the effect of video on assessment by comparing differences in student self-assessment scores as well as differences in instructor scores. The ratings by the student and by the instructor were compared to an expert assessment rating. There were 4 criteria used to assess the clinical skill performance of exploring with the ODU 11/12 explorer. The first criterion assessed the choice of the correct working end, the second criterion assessed adaptation of the instrument to the teeth, the third criterion assessed instrument insertion into the gingival tissue, and the fourth criterion assessed instrument activation.

There was an interesting trend observed when comparing students' scores before and after video review. Student scores were higher than the expert assessment scores before review of the video and lower after review of the video for criterion one. It is possible that the students were more critical of their performance after the video review and recog-

Table I: Data Summary Count by Rubric Category and Overall Score

Rubric Criteria	Criterion 1			Criterion 2			Criterion 3			Criterion 4			Total			
Scores	0	1	2	0	1	2	0	1	2	0	1	2	0 to 3	4 to 6	7 to 8	Average
Student																
Pre-Video Review	2	5	21	1	25	2	5	21	2	2	22	4	5	22	1	4.68±1.16
Post-Video Review	5	3	20	1	22	5	3	19	6	4	18	6	4	21	3	4.89±1.45
Instructor																
Pre-Video Review	7	2	19	3	15	9	4	17	7	4	12	12	7	10	10	5.07±2.13
Post-Video Review	7	2	19	6	12	10	9	11	8	6	9	13	8	11	9	4.79±2.54
Expert Assessment																
Post-Video Review	5	1	21	15	8	4	16	5	6	7	4	16	12	9	6	4.15±2.55

nized areas for improvement. A physiotherapy study lends support to this trend where students reported that the experience helped them to see how much they needed to work on.[6] Conversely, students rated their performance slightly higher for criterion two after they reviewed their video-recorded performance. The students may have observed their performance on video to be better than they had perceived during the actual clinical performance. This tendency has been noted in medical literature whereby higher performing students underrate their scores.[1] A similar trend related to assessment of the insertion of the instrument was seen with criterion three. One theory for this trend is that previous assessment experiences and feedback from the clinical instructors may not have been consistent with the established standards as evidenced by the differences in scores from the expert assessment means.

Although not statistically significant, there were some numeric changes in scores by instructors after they reviewed the video. For criteria two and three the instructors decreased the scores from the ratings they would have given pre-video review (during the direct observation/real-time experience). Similar trends were reported in a study by Benson et al where higher scores were assessed when students were evaluated in real-time compared to scores assessed in a videotaped evaluation.[12] The decrease in scores could also be due to the fact that instructors were blinded to which students' video they were scoring. Grading bias during the direct observation could have accounted for the higher scores. The expert assessment scores derived from blinded review of the videos by the investigators and preclinical course directors. In other words, the raters did not know which students they were assessing. It is possible that the instructors tend to rate higher because of their close interaction with the students in the clinical setting. Although the instructors intend to evaluate the students to a competent standard, the instructors may be recognizing the students as novice clinicians. In medical education, positive bias has been referred to as "generosity error."[13]

Table II: Mean differences of Scores from Expert Assessment for Rater, Time and Criteria

Rater and Time	Criterion 1	Criterion 2	Criterion 3	Criterion 4
Student Pre-Video	0.074	0.444	0.259	-0.259
Student Post-Video	-0.074	0.556	0.481	-0.259
Instructor Pre-Video	-0.185	0.593	0.444	-0.037
Instructor Post-Video	-0.185	0.519	0.296	-0.111

Table III: Summary Statistics of the 3-Way Analysis of Variance

Effect	Num DF	F Value	Pr>F
Criteria	3	25.74	<0.0001
Rater	1	0.04	0.8367
Time	1	0.04	0.8367
Criteria*Rater	3	1.30	0.2728
Criteria*Time	3	0.14	0.9338
Rater*Time	1	0.80	0.3719
Criteria*Rater*Time	3	0.65	0.5847

Another factor that could have influenced the instructor evaluations is a problem noted in medical education. Instructors do not want to show favoritism so they assess higher scores when evaluating students in small group.[13] Without realizing, instructors may take into account the students' attitude and personality when evaluating the skill performance.[12,14] For criterion one, there was no change with instructors' scores between pre- and post-video review. For criterion four, instructors increased their ratings after video review. For clinical instructors, the use of video could allow for a more accurate assessment of the student's clinical skill performance.[12] Some of the differences between instructor ratings

Table IV: Pairwise Comparisons of Scores from Expert Assessment

Pairs	Estimate	Standard Error	DF	t Value	Pr>|t|	Adjusted p
1 to 2	-0.6204	0.09521	405	-6.52	<0.0001	<0.0001
1 to 3	-0.4630	0.09521	405	-4.86	<0.0001	<0.0001
1 to 4	0.07407	0.09521	405	0.78	0.4370	0.8644
2 to 3	0.1574	0.09521	405	1.65	0.0991	0.3500
2 to 4	0.6944	0.09521	405	7.29	<0.0001	<0.0001
3 to 4	0.5370	0.09521	405	5.64	<0.0001	<0.0001

and expert assessment ratings could be attributed to the need for additional calibration. Although a video and rubric were provided before the study to demonstrate the assessment parameters, a reliability quotient was not established. In addition, the accuracy of assessment by the instructors could be improved through training of junior faculty with senior faculty. Nursing research reports that novice faculty are hesitant to assess lower grades as this may in turn effect their evaluations by the students.[15] The patterns noted in this study may indicate a need for an unbiased method for grading students in the clinical setting.

The comparison of instructor to student scores showed varied trends. For criterion one, student mean scores decreased after video review while the instructor mean scores remained consistent. Conversely, student scores remained consistent and instructor scores decreased after video review for criterion four. With regard to criteria two and three, the students increased their scores while the instructors decreased the scores post-video review. Overall means between instructor and student scores post video review differed by 2.07%. The relationship between clinical instructor scores and student self-assessment scores was discussed by Geissler who reported a difference of 5% between student and faculty scores.[16]

Overall means by criteria are significantly different from the expert assessment means. This difference suggests that criteria one and four were well understood by the students and instructors. It is also possible that the assessment criteria for two and three required additional clarification for the students and instructors. Other limitations discovered through this pilot study were the small sample size and the need for additional calibration among instructors.

Even though the use of video did not have a statistically significant effect on student self- assessment scores, it may still provide value as a teaching tool. Today's generation of students are expecting technology to be incorporated into their education.[17] Instructors can consider using video to review a clinical performance with a student and compare self-assessment ratings to instructor ratings. This method could allow instructors to help students more accurately assess by reviewing performance deficiencies as well as proficiencies.[18] The results of this pilot study can be used as a foundation for a full-scale study. Additional research related to the use of video- recorded patient simulations as a method for evaluating student self-assessment is warranted.

Conclusion

Self-assessment has been defined broadly as the involvement of learners in judging whether or not learner-identified standards have been met.[18] Although there is not currently a systematic method for self-assessment training of dental hygiene students, accreditation requires dental hygiene programs to have evaluation mechanisms in place to examine students' understanding as well as ability to apply self-assessment skills.[3] This pilot study aimed to bridge the gap by providing a basis for future investigation into the use of video to aid in the self-assessment training of dental hygiene students. In addition, the self-assessment strategy could be used in a continuum of time to indicate progression of skill and student acknowledgement of their strengths and weaknesses. Moreover this strategy could be applied to assessment of other instruments used for clinical performance such as curets or scalers. The data collected in this study also evokes a need for inquiry into the use of video for calibration of dental hygiene faculty. It is necessary to discover a valid method for self-assessment training of dental hygiene students.

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References

1. Evans AW, McKenna C, Oliver M. Self-assessment in medical practice. Journal of the Royal Society of Medicine. 2002;95(10):511-3. PubMed PMID: 12356978; PubMed Central PMCID: PMC1279183.

2. Mould MR, Bray KK, Gadbury-Amyot CC. Student self-assessment in dental hygiene education: a cornerstone of critical thinking and problem-solving. Journal of dental education. 2011;75(8):1061-72. PubMed PMID: 21828300.

3. American Dental Association Commission on Dental Accreditation. Accreditation Standards for Allied Dental Education Programs (Dental Hygiene). Chicago: ADA, 2013. Accessed 9-12-15, http://www.ada.org/en/coda/current-accreditation-standards/

4. Watts WE, Rush K, Wright M. Evaluating first-year nursing students' ability to self-assess psychomotor skills using videotape. Nursing education perspectives. 2009;30(4):214-9. PubMed PMID: 19753853.

5. Hawkins SC, Osborne A, Schofield SJ, Pournaras DJ, Chester JF. Improving the accuracy of self-assessment of practical clinical skills using video feedback--the importance of including benchmarks. Medical teacher. 2012;34(4):279-84. doi: 10.3109/0142159X.2012.658897. PubMed PMID: 22455696.

6. Corrigan R, Hardham G, Cant R, Mort JR. Use of technology to enhance student self evaluation and the value of feedback on teaching... ...including commentary by Cant R and Mort JR. International Journal of Therapy & Rehabilitation. 2011;18(10):579-90. PubMed PMID: 2011352847. Language: English. Entry Date: 20111202. Revision Date: 20111216. Publication Type: journal article.

7. Navickis MA, Bray KK, Overman PR, Emmons M, Hessel RF, Cowman SE. Examining clinical assessment practices in U.S. dental hygiene programs. Journal of dental education. 2010;74(3):297-310. PubMed PMID: 20203330.

8. Yeates P, O'Neill P, Mann K, K WE. 'You're certainly relatively competent': assessor bias due to recent experiences. Medical education. 2013;47(9):910-22. doi: 10.1111/medu.12254. PubMed PMID: 23931540.

9. Zick A, Granieri M, Makoul G. First-year medical students' assessment of their own communication skills: a video-based, open-ended approach. Patient education and counseling. 2007;68(2):161-6. doi: 10.1016/j.pec.2007.05.018. PubMed PMID: 17640843.

10. Seif GA, Brown D. Video-recorded simulated patient interactions: can they help develop clinical and communication skills in today's learning environment? Journal of allied health. 2013;42(2):e37-44. PubMed PMID: 23752242.

11. Gadbury-Amyot CC, Purk JH, Williams BJ, Van Ness CJ. Using tablet technology and instructional videos to enhance preclinical dental laboratory learning. Journal of dental education. 2014;78(2):250-8. PubMed PMID: 24489032.

12. Benson AA, Bobo LS, Green MS. Comparison of video and real-time scoring techniques. Journal of allied health. 2012;41(3):118-22. PubMed PMID: 22968773.

13. Albanese MA. Challenges in using rater judgements in medical education. Journal of evaluation in clinical practice. 2000;6(3):305-19. PubMed PMID: 11083041.

14. Yaphe J, Street S. How do examiners decide?: a qualitative study of the process of decision making in the oral examination component of the MRCGP examination. Medical education. 2003;37(9):764-71. PubMed PMID: 12950938.

15. Isaacson JJ, Stacy AS. Rubrics for clinical evaluation: objectifying the subjective experience. Nurse Educ Pract. 2009;9(2):134-40. doi: 10.1016/j.nepr.2008.10.015. PubMed PMID: 19083270.

16. Geissler PR. Student self-assessment in dental technology. Journal of dental education. 1973;37(9):19-21. PubMed PMID: 4517642.

17. Bloomfield JG, Jones A. Using e-learning to support clinical skills acquisition: Exploring the experiences and perceptions of graduate first-year preregistration nursing students - A mixed method study. Nurse education today. 2013;33(12):1605-11. doi: DOI 10.1016/j.nedt.2013.01.024. PubMed PMID: WOS:000327002600028.

18. O'Connor AB. Clinical Instruction and Evaluation. 3rd ed: Jones & Bartlett Learning; 2015.