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More than Hygiene

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"More than Hygiene"

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ABSTRACT

The profession of Dental Hygiene from beginning to end is an evolving into an overall health care profession not just oral health care. The history of how hygiene evolved and moving forward to where the profession is today. Each state across the United States has different scope of practice and regulations in which a hygienist is permitted to practice.

Dental Hygiene is a profession that has always been umbrellaed under a dentist. Moving through time this is evolving to not always be the case. Some states are even allowing dental hygienist to open their own practices.

Colleges and Universities offering the dental hygiene degree across the United States all follow the same accreditation standards. One state in the United States has laws where that hygienist can only practice in that state, in this state the colleges and universities are not accredited programs. Unfortunately, dental hygiene is not a profession that you can move anywhere you want and practice, you must take more exams in each different state.

Dental Hygiene is a profession that is rapidly on the progression with new career paths for graduates. Dental Hygiene Therapist and Public Health Hygienist are terms that are becoming popular across the United States. Offering more career paths for graduates that is different than just a hygienist

Dental hygiene is now more than oral health care, it is a integrate component of overall health care. Not only is the profession changing, but the technology and the education are evolving to meet the growth of the profession.

Where will dental hygiene be in the next 5-10 years, practicing in hospitals, nursing homes, long term care facilities, cancer centers, pediatric offices or cardiology offices? The opportunities are endless and now is the time for progression.

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HISTORY

Over 100 years ago the first "Dental nurses" were providing treatment to patients to prevent diseases. The treatment was prophylactic in nature to help to prevent diseases. Irene Newman was Dr. Alfred C. Fones dental assistant and he trained her to act as an apprentice, he taught her to scale and polish teeth. Dr. Alfred C. Fones changed the term "dental nurses" to dental hygienist because he did not like the term "dental nurses." Other dentists began to train their dental assistants to scale and polish teeth, by the year 1910 at the Ohio College of Dental Surgery formal courses were offered to teach students how to scale and polish teeth. During this time the dentists in Ohio were in strong opposition against the formally trained students and those students were not allowed to practice after completing the formal training. Many years after the Ohio College program closed, Dr. Fones trained 97 students in three classes, these hygienists were licensed and were allowed to practice. The dentists in Connecticut were concerned about hygienist that were trained by Dr. Fones, giving them the opportunity to perform hygiene duties could lead to more extended functions. By 1915 in Connecticut the state dental practice act was amended so that it included regulations on dental hygienists. Dentists in other states begin to follow by placing dental hygiene regulations under the states dental practice acts. This was only the beginning of dental hygiene being regulated by dentists (Milling, L.A., 2010).

Dr. Fones and his cousin Irene Newman were the beginning of the dental hygiene profession, Dr. Fones was a visionary dentist that saw the need for someone to remove the bacteria and deposits from the tooth surfaces. Many believe that his vision would never "catch on" and the profession of dental hygiene would not exist. Now over a hundred years later the profession is growing and developing at a steady pace, the biggest hurdles are still the same

issues that Dr. Fones had over one hundred years ago, the dentists. Dr. Fones continued for many years perfecting the prevention of dental diseases through the new profession of dental hygiene ("A Centennial Celebration...", pg. 14).

The legacy of dental hygiene continued on with Esther M. Wilkins, BS, RDH, DMD. Dr. Wilkins was a professor emerita at the Tufts School of Dental Medicine in Boston and she was the author of the textbook, *Clinical Practice of the Dental Hygienist.* Dr. Wilkins was a hygienist and a periodontist, and she has been the single most influential educator and mentor to several generations of dental hygiene students and hygienists. The *Clinical Practice of the Dental Hygienist* textbook is still used today as Dr. Wilkins updated it every four years with the final version being the 12th edition. Dr. Wilkins had a depth of commitment to the profession of dental hygiene and advancing the prevention of disease with in the oral cavity. Dr. Wilkins had a unique mastery of dental hygiene and was a body of knowledge which has established her to be a true leader of the dental hygiene profession ("A Centennial Celebration...", pg. 16).

Many other dental hygiene educators and leaders have helped to contribute to the rich history of dental hygiene. Michele L. Darby, BSDH, MS and Margaret M. Walsh, RDH, MS, EdD, have authored the textbook, *Dental Hygiene Theory and Practice*, this textbook is in its 3rd edition and highly regarded. Irene Woodall, RDH, MA, PhD, wrote *Comprehensive Dental Hygiene Care.* The National Center for Dental Hygiene Research and Practice is co-directed by Jane L. Forrest, RDH, EdD, and Ann Eshenaur Spolarich, RDH, PhD. The American Dental Hygienists' Association scientific research publication, *Journal of Dental Hygiene*, editor in chief Rebecca S. Wilder, RDH, BS, MS. The president Maria Perno Goldie, RDH, MS and president-elect JoAnn Gurenlian, RDH, PhD, of the International Federation of Dental Hygienists. The American Dental Hygienists' Association is led by Chief Executive Officer Ann Battrell. These

dental hygienists and many others have paved and are leading the profession of dental hygiene to the future (Pattison, A.M., 2013).

Dr. Fones started his first school of dental hygiene in 1913 in his carriage house, then in 1914 the first class graduated, and the first dental hygiene association was formed in Connecticut. In 1915 Connecticut and Massachusetts made dental hygiene legalized, New York followed the trend legalizing dental hygiene in 1916. In 1917 the first dental hygiene licensure was granted to Irene Newman. The American Dental Hygienists' Association was formed with 46 members in 1923. The first dental hygiene journal was published, *Journal of the American Dental Hygiene Association*, in 1927. In 1932 the African American dental hygienists form the National Dental Hygienists' Association. The University of Michigan introduced the first Baccalaureate dental hygiene degree in 1939. In 1947 all dental hygiene programs across the United States become a minimum of a two-year program. The American Dental Hygienists' Association discusses expansion of the dental hygienists' duties to improve access to care in 1949, the association adopted the term "registered dental hygienist" as the official credential for the profession of dental hygiene. In 1959 the first dental hygiene aptitude test is created. Columbia University in New York began the first master's degree in dental hygiene in 1960. In the 60s was when the profession of dental hygiene really started to move forward. In April of 1962 the first national board exam for dental hygienists was administered. The University of New Mexico graduated the first male dental hygienists in 1965. The national board exam is still prevalent today with regular modifications and changes to the questions but that is the one written examination that dental hygiene students take across the United States. This examination is solely an examination over the educational competency that are taught during the courses of dental hygiene. The examination has been modified to 300 questions of which 150 questions are associated with

patient case study materials. The American Dental Hygienists' Association defines the practice of expanded function dental auxiliaries in 1968 (ADHA, 2019). During the 70s dental hygienists actually began to wear uniform pants instead of dresses. Over 100 hygiene schools were opened across the United States, dental auxiliary utilization and four-handed dentistry was being promoted in dental schools. The first four dental hygienists were commissioned into the Medical Service Corps of the US Army in 1972. In 1974 the first dental hygienist served on a state board of dentistry in Maryland. The US Army in 1975 approved for a community health dental hygienists to provide services to soldiers and their families. In the 80s is when the profession really started to make changes and the progression of the profession began. In 1980 Colorado was the first to enact legislation allowing independent dental hygiene practices to open. In 1984 dental hygienist in 12 states can legally administer local anesthesia. The American Academy of Dental Hygiene was founded in 1985 (Furnari & Gladstone, 2013). During the 80s is when dental hygienists stopped wearing caps and schools begin to replace pinning ceremonies with capping ceremonies (Milling, L.A., 2010). By 1988 the first commercial home kits for tooth whitening were marketed. The Hispanic Dental Association started in 1990. The National Center for Dental Hygiene Research was founded in 1993. In 2000 the Surgeon General's Report, "Oral Health America," actually linked dental hygiene to general health. Now dental hygienist can administer local anesthesia in more than half of the states across the United States. In 2002 *Dimensions of Dental Hygiene* publications began. In 2004 the American Dental Hygienists' Association made the first proposal of the Advanced dental hygiene practitioner. Dental hygienists in many states are able to receive Medicaid reimbursements starting in 2005 (Furnari & Gladstone, 2013).

SCOPE OF PRACTICE

History has moved the profession of dental hygiene forward and now the progression of the profession begins. The constant uphill battle against dentistry still remains, but more are beginning to see that dental hygienists just truly care about the needs of the society and want to treat those needs. In 2009 a pivotal moment for dental hygienist began, the American Dental Hygienists' Associations very own Senator Ann Lynch introduced legislation authorizing licensure of dental therapists. By 2011 Minnesota is the first state to license a dental therapist and now there are 99 licensed dental therapists (Wilson, W., 2019). A dental therapist is licensed by the Minnesota Board of dentistry as a mid-level provider. The dental therapist complete examination, provide preventative, restorative and minor surgical dental care that is within their scope under the direction of a dentist (Wilson, W., 2019). Minnesota also created an Advanced Dental Therapist which are certified by the Minnesota Board of Dentistry. An Advanced Dental Therapists can perform all the duties of a dental therapist and also provide additional services such as a treatment plan formulation, non-surgical extractions of diseases teeth and provide an oral evaluation and assessment. They practice under the supervision of a licensed dentist, but the dentist does not have to see the patient prior to an advanced dental therapist providing care, nor does the dentist have to be on site. There are two schools in Minnesota that offer dental therapy education, Metropolitan State University and Normandale Community College - Advance Dental Therapy Program and The University of Minnesota School of Dentistry - Dental Therapy Program (Wilson, W., 2019). Minnesota laws limit the dental therapist and the advanced dental therapist to practicing in low-income, uninsured and underserved population of patients or in what Minnesota classifies a Health Professional Shortage Area. The laws are very strict and

restrictive on the dental therapist and advanced dental therapists with stiff fines and penalties if they are not followed accordingly (Wilson, W., 2019).

Maine in 2014 passed legislation permitting direct supervision of dental hygienist. This direct supervision included being able to administer local anesthesia and or nitrous oxide if the hygienist has completed the mandatory course, irrigate a dry root canal, record readings from a digital caries detector, remove socket dressing and take a cytological smear. The Commission of Dental Accreditation (CODA) in 2015 adopts accreditation standards for dental therapy education programs. Requiring a minimum of 3 years education, there is no degree specified and this gives advanced standing for dental hygienists. In 2016 Maine enacted a new Dental Practice Act that established the scope for dental hygienists and dental therapists. The states Board of Dentistry will be the regulatory agency that will governor the practices. This law allows that a public health dental hygienist can provide dental hygiene services in a public health setting under a supervision agreement with a dentist. Under this act a dental hygienist that has obtained additional education and experience may become an independent practice dental hygienist. When you become an independent dental hygienist supervision by a dentist is not needed. As an independent dental hygienist, they can take and record vital signs, apply fluoride to control tooth decay, apply topical anesthetics and more. This law also allows for a dental hygiene therapists, this therapists provides services in limited practice setting with a written practice agreement with a licensed dentist. A dental hygiene therapist provides oral health assessments, prepare and place stainless steel crowns and they provide referrals to the appropriate dentists ("Dental Hygienist and Dental Therapy in Maine," 2017).

Washington in 2017 passed a bill allowing dental hygiene therapists to practice on tribal lands only. More legislation has been introduced to broaden the populations that a dental hygiene therapists can serve but they have stalled in legislation (High, M., 2019).

Arizona most recently in May 2018 passed legislation to allow a dental therapists to practice tribal settings, federally qualified health centers, federal look-alike facilities, community health centers and private dental practices that have contracts with federally qualified health centers. A dental hygienists must be licensed and have passed the Western Regional Examing Board clinical competency examination. Arizona also requires that a dental hygienists must first work 1000 hours under a licensed dentist, before they can begin a collaboration agreement. This agreement would allow the dental hygienist to work under general supervision. Dental therapists in Arizona are not allowed to bill third party payers or the public for the services they provide (ADA, 2018).

December 28, 2018 Michigan passed into law that allows graduates of an accredited dental therapy program and have competed 500 hours of clinical practice under the supervision of a licensed dentist to provide preventive and specific restorative dental services. The dental therapists in Michigan will work under the general supervision of a dentist. These therapists will have a written practice agreement with a licensed dentist that will provide the general supervision (Lohr, K.F., 2019).

The dental hygiene profession still remains under the supervision of a dentist across most of the states. As of January 2019, 48 of 51 states had some form of general supervision in place. General supervision allows the dental hygienist to perform limited dental hygiene duties without the dentists being present. The dental hygienists can perform the basic prophylaxis and radiographs without the dentists present under general supervision. States such as Alabama,

Georgia, Maine, Mississippi and New Jersey allow dental hygienists to mainly practice under direct supervision laws. Direct supervision means that the dentist has to be present in the same building as the dental hygienist while they perform dental hygiene services. New York is the only states currently that has Collaborative Practice for dental hygienists. Collaborative Practice allows a registered dental hygienist to practice without supervision of a dentist and they have a signed collaborative agreement between the dental hygienists and a licensed dentist (ADHA, 2019).

Not only is there supervision and restrictions by each state on a dental hygienists performing the dental hygiene services that she was taught in school there are laws that also restrict the dental hygienists from administering local anesthetic to patients for comfort while completing a dental procedure. There are only 8 states of 46 that allow a dental hygienist to administer local anesthetic under general supervision (ADHA, 2019). These 8 states also require that the dental hygienist take another examination to give local anesthetic along with that have to complete a certain number of didactic hours before the licensure can be granted to administer local anesthetic. The remainder of the 38 states with the exception of 2 dental hygienists are allowed to administer local anesthetic under the direct supervision of a dentist. Missouri and Wisconsin are the only two states that allow the dental hygienists to administer local anesthetic under indirect supervision of a dentist and the dental hygienists in these two states do not have to take an examination in order to be licensed in that state to administer it. Delaware, Georgia, Mississippi, North Carolina and Texas do not allow dental hygienist to administer local anesthetic. Dental Hygienists have regulations when it comes to administering nitrous oxide. Currently there are 34 states that allow the dental hygienist to administer nitrous oxide to a patient. Florida, Mississippi, New Jersey, North Dakota, South Carolina, Texas and West

Virginia only allow a dental hygienist to monitor a patient that is receiving nitrous oxide. Alabama, Connecticut, Georgia, Delaware, Hawaii, Indiana, Massachusetts, North Carolina, Pennsylvania, Vermont do not allow dental hygienist to administer nitrous oxide or monitor the patient receiving the nitrous oxide (ADHA, 2019).

Further restrictions are placed on dental hygienists even when they want to work in the expanded roles of dentistry such as placing restorations. The states that allow a dental hygienist to place amalgam and composite restorations, remove temporary crowns, place cavity liners and bases can complete these tasks under the dental assistants' scope of practice. There are only 14 states as of 2016 that permit these types of procedures can be completed by a dental hygienists (ADHA, 2019).

ADVISORY COMMITTEES & SELF-REGULATION

There are 20 states throughout the United States that have dental hygiene advisory committees of varying degrees of self-regulation for dental hygienists. Arizona has the Arizona Dental Hygiene Committee that consists of one dentist and one dental hygienist from the board, plus four additional dental hygienists and one public member. The committee serves as a forum for discussion of dental hygiene issues and advises the board on rules and proposed statute changes concerning dental hygiene education, regulation and practice. In addition, the committee evaluates continue education classes for expanded functions and monitors dental hygienists' compliance with continue education requirements ("Self-regulation," 2018) (ADHA, 2019).

California has the Dental Hygiene Committee of California that is a self-regulating dental hygiene committee in conjunction with the Department of Consumer Affairs. The committee

consists of four dental hygienists, four public members and one dentist appointed by the governor. The responsibilities of the Dental Hygiene Committee of California include issuing, revoking and reviewing licenses as well as developing and administering examinations. Additional functions include adopting regulations, determining fees and continuing education requirements for all hygiene licensure categories ("Self-regulation," 2018) (ADHA, 2019).

Connecticut is very fortunate as dental hygiene is directly under the Department of Public Health. Although there is no standing dental hygiene committee the department director has the ability to appoint an ad hoc committee of dental hygienists, if there is a need to address rules or disciplinary matters ("Self-regulation, 2018) (ADHA, 2019).

Delaware's Advisory Committee is appointed by the governor and consists of three dental hygienists. The committee writes the examination for dental hygiene licensure along with the dental board. The committee votes with the board on issues of dental hygiene licensure by credentials, disciplinary decisions, continuing education requirements for dental hygiene licensure, disciplinary action involving dental hygienists and issues involving the policy and practice of dental hygiene but not the scope of practice ("Self-regulation," 2018) (ADHA, 2019).

Florida has both dental hygiene and dental assisting councils. the dental hygiene council is composed of four dental hygienists, one of whom sits on the board, and one dentist member of the board. The council is expected to develop all dental hygiene rules to submit to the board for its approval ("Self-regulation," 2018) (ADHA, 2019).

Georgia has a Dental Hygiene Committee. This committee is comprised of a dentist and a dental hygienist ("Self-regulation," 2018).

Iowa has a committee that was formed in 1999 of both dental hygienists on the dental board and one of the dentists became a dental hygiene committee of the board. This committee

has the power to make all rules pertaining to dental hygiene. The board is required to adopt those rules and enforce the committee rules ("Self-regulation," 2018) (ADHA, 2019).

Maine has a Subcommittee on Dental Hygienists. The subcommittee consists of five members: one dental hygienist who is a member of the board; two dental hygienists appointed by the governor; two dentists who are members of the board and appointed by the president of the board. The duties of the subcommittee are to perform an initial review of all applications for licensure as a dental hygienist, submissions relating to continuing education of dental hygienists, and all submissions relating to public health supervision status of dental hygienists ("Self-regulation," 2018) (ADHA, 2019).

Maryland's committee consists of three dental hygienists, one dentist, and one public member, all of whom are full voting members of the dental board. The committee was created during a sunset review as a compromise to the creation of a separate dental hygiene regulatory board. According to statute, all matters pertaining to dental hygiene must first be brought to the committee for its review and recommendation ("Self-regulation," 2018) (ADHA, 2019).

Michigan has a six-member committee, comprised of two dental hygienists and two dentists, on dental assistant and one public member, considers matters related to the dental hygiene profession and makes recommendations to the full board of dentistry. All members of the committee are voting members on the board. The existence of the committee is not mandated by state rules or statutes, but instead is a committee appointed by the chairperson of the board ("Self-regulation," 2018) (ADHA, 2019).

Missouri has a five-member advisory commission, composed of the dental hygienist on the dental board and four dental hygienists appointed by the governor was created by the state legislature in 2001. the commission makes recommendations to the board concerning dental

hygiene practice, licensure, examinations, discipline and educational requirements ("Self-regulation," 2018) (ADHA, 2019).

Montana in 2002, the board assigned both dental hygienist members and one dentist member to be a standing committee to consider and address dental hygiene issues in a timely fashion. The committee formulates specific recommendations to bring to the entire board for action ("Self-regulation," 2018) (ADHA, 2019).

Nevada legislation in 2003 added a third dental hygienist to the board who, together with a dentist appointed by the board, constitute a dental hygiene committee that formulates recommendations on dental hygiene rules for the board ("Self-regulation," 2018) (ADHA, 2019).

New Hampshire has the New Hampshire Dental Hygienists' Committee and it is a five-member advisory committee, comprised of one dental hygienist member of the board, one dentist member of the board and three additional dental hygienist members appointed by the governor. The Dental Hygienists' Committee proposes rules concerning the practice, discipline, education, examination, and licensure of dental hygienists. The rules proposed by the committee may be accepted by the Board of Dental Examiners for adoption ("Self-regulation," 2018) (ADHA, 2019).

New Mexico has a Board of Dental Health Care comprised of five dentists, two dental hygienists and two public members. There is a dental hygiene committee comprised of five dental hygienists, two public members and two dentists. The committee selects two of its dental hygiene members to serve as the dental hygienists on the board. The board's public members and two of its dentist members are the dentist and public members of the committee. The committee adopts all the rules pertaining to dental hygiene and is also responsible for the

discipline of dental hygienists. The board enforces the dental hygiene committee's rules (“Self-regulation," 2018) (ADHA, 2019).

Oklahoma the Dental Hygiene Advisory Committee is comprised of the current dental hygienist on the Oklahoma dental board, and four additional dental hygienists appointed by the board ("Self-regulation," 2018) (ADHA, 2019).

Oregon under the authority to create standing committees, the Oregon dental board has appointed a dental hygiene committee to advise the board concerning dental hygiene issues ("Self-regulation," 2018) (ADHA, 2019).

Rhode Island Dental Hygiene Licensing, Dental Hygiene Disciplinary and Public Health Licensure committees exist in Rhode Island. The Board Chair appoints three members of the board, one of whom is a licensed dentist, one of whom is a public member, and one of whom is a licensed dental hygienist, to serve as an examining committee for applicants applying for licensure as dental hygienists. the examining committee for dental hygienists shall recommend to the full board, which shall recommend to the director, applicants for licensure to practice dental hygiene who meet the requirements for licensure ("Self-regulation," 2018) (ADHA, 2019).

Texas in 1995, a dental hygiene advisory committee, comprised of three dental hygienists and two public members appointed by the governor and one dentist appointed by the board was established ("Self-regulation," 2018) (ADHA, 2019).

Washington has a uniform disciplinary code which applies to all health professions and creates the regulatory bodies to implement each practice act. Dentistry and dental hygiene have separate practice acts. Dentists are regulated by the Dental Quality Assurance Commission and the dental hygienists are regulated by the Department of Health, but the statute requires that the department develop rules and definitions to implement the dental hygienist act in consultation

with the Dental Hygiene Examining Committee. The committee is comprised of three dental hygienists and one public member appointed by the department ("Self-regulation," 2018) (ADHA, 2019).

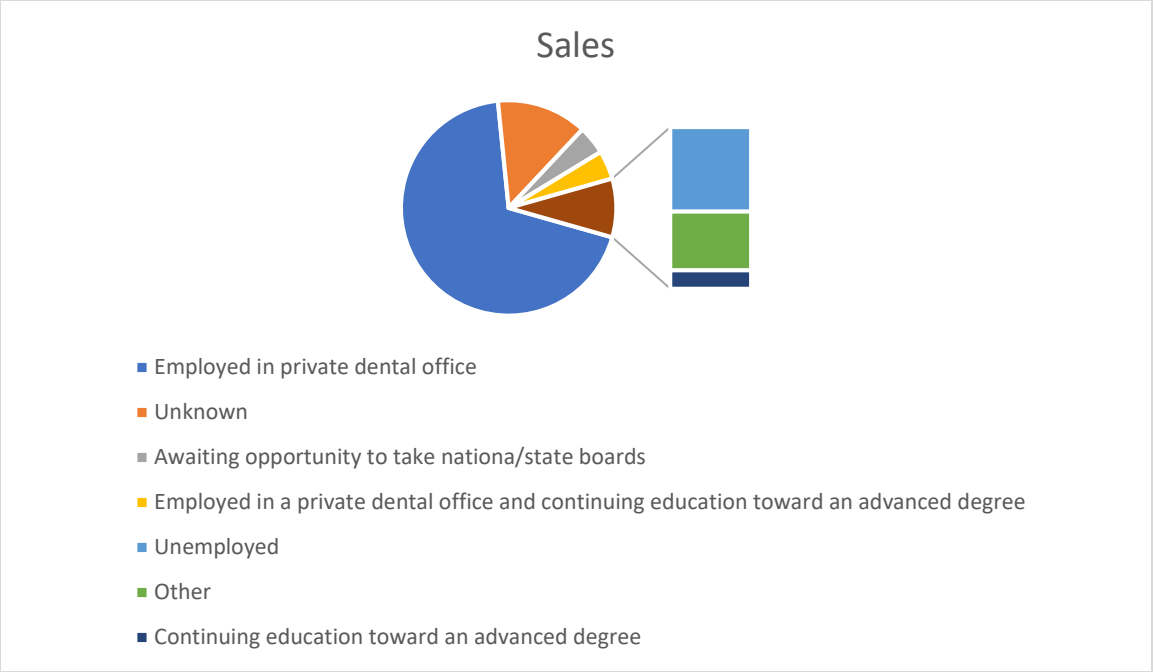
The remainder of the 50 states across the United States are regulated by the state dental boards. These boards review and monitor all continue education and licensing for the dental hygienist. Some of the state board do have dental hygienists that serve on the boards.

EDUCATION

According to the American Dental Association (2018), dental hygiene education has transitioned from an apprenticeship to formal education programs. In 1916 dental hygiene education had the formalization of higher education. One of the first programs was Forsyth Training School for Dental Hygienists in Boston, Massachusetts, which still exist today. In the beginning dental hygiene education was a 9-month to 1year program. In 1935 a high school diploma was a requirement for admission, by 1947 the dental hygiene education had expanded to a 2-year program. One of the first benchmarks that the dental hygiene profession achieved was the creation of the American Dental Hygienists' Association in 1923. In 1952 dental hygiene education became accredited with the joint effort of the American Dental Association and the Commission on Dental Education. Dental hygienists are under very strict regulations of state practice acts and dentist in order to practice, therefore the education for dental hygienist is a set standard that is put in to place by the Commission on Dental Accreditation (CODA). In 1962 the first national board examination was introduced to dental hygiene students. To be license in 1966, 40 states adopted this examination as a requirement for licensure. Between 1945 and 1975 were considered the mass education era in dental hygiene. Between 1960 and 1980 there was the

rapid expansion of 201 entry level dental hygiene programs. As of 2013 there are 334 entry level dental hygiene programs, with 54 of the 334 programs located in a 4-year university, 56-degree completion programs and 21 master's degree programs (ADHA, 2019). The entry level programs are for students that have no prior dental hygiene education and they want to pursue a degree to become a clinical dental hygienists. Degree completion programs are intended for those dental hygiene students who have their dental hygiene license and have completed their associate degree. The schools that offer the degree completion program are varying depending up on the school, some are online only, and others are online and in person coursework. Master's degree programs in dental hygiene prepare graduate students to be researchers, educators or managers in allied dental health or education. To work as a dental hygienist clinically an associate degree is all that is necessary. There is an increasing number of dental hygienists completing their doctoral degrees and these are essential for the development of researchers and scientists in the profession. In 2005 the American Dental Hygienists' Association recommended that a doctoral degree program in dental hygiene be created. If a dental hygienist wants to practice in more setting and pursue a dental therapists, then one must complete the degree completion program in order to move forward. On the average less a third of those who apply to dental hygiene programs get accepted. In the 2017-2018 school year there was 34,410 people that applied to a dental hygiene program and only 9,921 were accepted. The process of being accepted into a dental hygiene program is a point system, each of the programs calibrate the point differently. Of the 329 dental hygiene programs, 97 score points using the ACT, 61 score points using the SAT, 145 score points using another means. Points are also given for other experiences as well, 15 programs give points from taking a manual dexterity exam, 116 programs give points for a pre-admission interview, 76 programs give points for letters of

recommendation and 154 programs give points for previous dental office experience. Points are also given for you high school GPA, 56 programs give points for the science portion on their high school GPA, 29 programs give points for the non-science portion of their high school GPA and 67 programs give points for the overall high school GPA. Programs also give points for previous college GPA, 241 programs give points for the science portion, 159 programs give points for the non-science GPA and 237 give points for the overall GPA. In 2017 there were 7,294 students that graduated from an accredited dental hygiene program, that is 2,627 less than the number of students who were accepted into the dental hygiene programs. The 2017-2018 school year the average cost of tuition for a dental hygiene program was $28,476 for In-District tuition, $30,996 for Out of District tuition and $41,398 for Out of State tuition. During the 2017-2018 school year there were 356 male students and 7,423 female students enrolled in dental hygiene programs. Of the 16,118 first- and second-year students enrolled in the 2017-2018 school year 9,243 students had a job and/or family care responsibility, 11,767 students requested financial aid and 10,552 students received the financial aid. After graduation and completing all the required test 68% of the graduates are employed by private dental practices, 4.3% of the graduates are employed by a private dental practice and continuing their education toward an advanced degree, 1% is continuing their education toward an advanced degree, 4.3% were awaiting taking their national/state boards, 4.6% were unemployed, 3.2% were doing something else and 13.6% was unknown what they were doing (Dental Education, 2019).



The faculty that taught the 2017-2018 dental hygiene students consisted of 758 males and 4,243 females. The education level of the faculty that are teaching in the dental hygiene programs is shocking as 36.6% have a bachelor's degree, 31.6% have a master's degree, 17.7% have a Doctor of Medical Dentistry (DMD) or Doctor of Dental Surgery (DDS), 7.9% have an associate degree, 4.6% have a doctorate degree and 1.7% have a certificate or diploma. The academic rankings of the faculty members include 45.5% are clinical instructors, 22.4% are instructors, 9.0% are assistant professors, 7% are professors, 6.8% are associate professors and 9.2% are other faculty members. There are 1,480 full-time faculty members and 3,549 part-time faculty members in the dental hygiene programs across the United States. Less than 29.4% of dental hygiene faculty have a full-time position (Dental Education, 2019).

Dental hygiene education is taught today at community colleges, universities, dental schools and technical colleges. Students graduating from the community college or technical colleges are completing their degree in two years allowing them to graduate with an associate degree. The associate degree will allow them to become licensed, by completing the national,

state and regional examination, and they can work in a dental office. Students graduating from university-based dental hygiene programs may be able to receive a baccalaureate or master's degree. Those hygienists holding these degrees may choose a career in teaching and/or research, or they could practice clinically in a school or public health program. Across the United States dental hygiene programs all have their own program admissions requirements. Many dental hygiene programs will show a preference to choosing a student that has already completed one year of college and already has successfully passed courses such as; biology, psychology, health, speech, mathematics, and chemistry. Once a student is accepted into a dental hygiene program they will then be required to complete clinical education in the form of supervised patient care. These students are also required to take liberal arts classes such as; English, speech, psychology and sociology. Basic science classes such as; microbiology, chemistry, immunology, pharmacology, physiology, anatomy and pathology. The students as part of their clinical requirements will take courses such as dental hygiene, dental materials and dental radiology. After the completion of all academic requirements dental hygiene students will then take the national board examination, the state in which they wish to pursue employment state examination and a state jurisprudence exam. The national board examination covers materials that the student learns through the didactic courses taken during their education, this examination cost $425.00. The state and/or regional examination is the clinical examination where a student is asked to take a live patient and clean a portion of their mouth while examiners check the competency of their work. The patient that the student takes must meet certain criteria to be considered a patient for the examination. There are 5 different regional testing agencies that administer the regional examination. Council of Interstate Testing Agencies (CITA) cost depends upon the facility in which the exam is administered and ranges from $1,075 - $1,375.

Central Regional Dental Testing (CRDTS) cost $1,095 and the facility may charge an additional fee. Commission of Dental Competency Assessments (CDCA) cost $975 and the testing facility may charge an additional fee. Southern Regional Testing Agency (SRTA) cost $1000 and the testing facility may charge and additional fee. Western Regional Examining Board (WREB) cost $1,075 plus the testing facility fee. Below is a chart of the 5 testing agencies and what states accept those examinations:

CITA	CRDTS	CDCA/ADEX /NERB	SRTA	WREB	STATE
AL	AL	AL	AL	AL	CA
CO	CO	CO	AR	AK	DE
KS	CT	CT	CO	AZ	FL
KY	GA	DC	CT	CA	KS
LA	HI	FL	IL	CO	MT accepts CA
MS	ID	ID	IN	ID	NV
MO	IL	IL	KS	IL	
MT	IN	IN	KY	IN	
NE	IA	KS	MO	IA	
NY	KS	KY	MT	KS	
ND	KY	ME	NM	KY	
OR	MN	MD	OH	MN	
RI	MO	MA	OR	MO	
TX	MT	MI	RI	MT	
VA	NE	MO	SC	NE	
WA	NM	MT	SD	NM	
WV	ND	NV	TN	ND	
WI	OH	NH	TX	OH	
WY	OR	NJ	UT	OK	
	RI	NM	VA	OR	
	SC	NY	WV	RI	
	SD	OH	WI	SD	
	TX	OR	WY	TN	
	UT	PA		TX	
	VT	RI		UT	
	VA	SC		VA	
	WA	TX		WA	
	WV	UT		WV	
	WI	VT		WI	
	WY	VA		WY	
		WA			
		WV			
		WI			
		WY			

The jurisprudence is an examination of the state laws in which the dental hygienist plans to pursue license. Each state has a separate examination and a fee for that state to take the examination. All of the states have different regulations to renew their license including continue education requirements, fees to renew license and the cycle of year for renewal.

STATE	CE	FEES	RENEWAL CYCLE YRS.
AL	12/YR	$75/YR	2YRS
AK	20	$150.00	2YRS
AZ	54	$300.00	3YRS
AR	40	$100.00	2YRS
CA	25	$160.00	2YRS
CO	30	$90.00	2YRS
CT	16 every 2yrs	$105.00	1YR
DE	24	$66.00	2YRS
DC	15	$136.00	2YRS
FL	24	$85/2 YRS	2YRS
GA	22	$85.00	2YRS
HI	20	$164.00	2YRS
ID	24	$150.00	2YRS
IL	36	$150.00	3YRS
IN	19	$70.00	2YRS
IA	20	$200.00	2YRS
KS	30	$125.00	2YRS
KY	30	$125.00	2YRS
LA	24	$220.00	2YRS
ME	30	$175.00	2YRS
MD	30	$182.00	2YRS
MA	20	$60/2YRS	2YRS
MI	36	$75.00	3YRS
MN	25	$150.00	2YRS
MS	20	$150.00	2YRS
MO	30	$60.00	2YRS
MT	36	$140.00	3YRS
NE	30	$145.00	2YRS
NV	30	$300.00	2YRS
NH	20	$165.00	2YRS
NJ	20	$120.00	2YRS
NM	45	$325.00	3YRS
NY	24	$88.00	3YRS
NC	6	$106.00	1YR
ND	16	$150.00	2YRS
OH	24	$120.00	2YRS
OK	30/3YR	$100.00	1YR
OR	24	$155.00	YRS
PA	20	$42.00	2YRS
RI	20	$65.00	2YRS
SC	14	$80.00	2YRS
SD	75	$95/YR	5YRS
TN	30	$110.00	2YRS
TX	32	$222.00	2YRS
UT	30	$37.00	2YRS
VT	18	$125.00	2YRS
VA	15	$75.00	1YR
WA	15	$50.00	1YR
WV	20/2YR	$75.00	1YR
WI	12	$123.00	2YRS
WY		$95.00	1YR

Every state has continued education requirements with the exception of Wyoming, they only require continue education courses in the dental hygienist has not practiced for 5 years. Once a hygienist has completed all examination and paid all of the appropriate fees they are then

licensed in that state and must maintain continue education requirements for that state (Dental Education, 2019).

TECHNOLOGY

Not only is the profession of dental hygiene changing and progressing forward the technology that is used is changing as well. Since the early 1900s, improvements in the design of hand instruments to new techniques in dental radiography have been rapidly changing. These advancements have not only changed to benefit the dental hygienists, but it has they have also made changes to the methods in which dental hygiene is performed on patients. Dating many years back one main revolutionary change has been the toothbrush. The first toothbrushes were referred to as "chew stick," which consisted of an individual chewing on a branch until wood fibers formed a brush. Chinese then invented the first bristle toothbrush by using hairs from a Siberian wild boar and then attached them to a bamboo stick. This brush was very rough on gingival tissue and lead to bacterial growth, because of the bacterial growth they then used horsehair instead of the boar hair. The first modern toothbrush was created in 1780 by an Englishman, William Addis, while he was in prison. The brush had bristles that were created from a bone from his dinner. Once Addis was released from prison he began to manufacture the brush using hair and cow bones. During World War I celluloid toothbrush handles were introduced, and the hair was replaced with nylon bristles in 1938. In 1960 the electric toothbrush was introduced. Now toothbrushes are available with many variations, ultrasonic vibrations, oscillating technology, the brushes even have sensors to notify an individual that maybe brush to hard or holding the brush in the same spot for to long of a time. Electric toothbrushes have really help individuals conquer plaque removal and reduce gingivitis in the oral cavity as they have a

timer incorporated in the brush that allows the brush to brush for the adequate amount of time, since most individuals do not brush their teeth as long as they should (Bruhn, A.M., 2013) (ADHA, 2019).

The next big technology advancement is in the area of infection control. In the beginning there was no method of infection control and dentists or doctors did not even wear gloves when treating a patient. In the 1980s infection control was most focused on protecting against the human immunodeficiency virus (HIV), hepatitis B, and hepatitis C. In 2011 dental waterlines become a target for infections as an Italian dental practice was blamed for the death of and 82-year-old woman who was said to have contracted *Legionella pneumophila* from the dental waterlines in his office, as she had no other medical conditions. Immediately the United States began proactive approach to assure that dental waterlines in United States dental offices were safe. They set the requirement that the waterlines had to meet the Environmental Protection Agency drinking water standards. Now there are tablets that can be placed into the water reservoirs daily to treat the water and make it safe for the patients. No matter what type of practice setting that a dental hygienist works it is so important that they remain on the forefront of change and new methods of stay safe when it comes to infection control, not only with the types of gloves that are wore but mask and protective clothing are a necessity in all dental settings (Bruhn, A.M., 2013) (ADHA, 2019).

Many advancements have also moved forward with dental hygiene handpieces and the prophylactic paste that is used to polish a patient's teeth. It is so important that a dental hygienist chooses the correct polishing agent to use on a patient's teeth, because on the average a patient has their teeth cleaned an average of 150 times in their lifetime. In 2012 it was determined that

hygienist were charged with the responsibility to select the appropriate polishing agent to be the least abrasive when polishing a patient's teeth within their oral cavity (Bruhn, A.M., 2013).

Over the last 100 plus years dental radiography has changed as well. Many dental practices are now shifting from the traditional film to digital imaging. Digital radiography decreases radiation exposure up to 50% more than traditional radiographic film. Digital radiography is instantaneous and does not require the submersion into chemicals to develop the image. Advancements have moved forward to make the digital sensory more comfortable for the patients. The American Dental Association and the Federal Food and Drug Administration have recently updated the recommendations for prescribing dental radiographs. The radiographic examination needs to include the patients age, risk factors for disease, dental development and this should keep the exposure to ionizing radiation to a minimum. There are also portable handheld radiographic devices that can be used in mobile dentistry, they are great to take to in long-term care facilities, in cases of forensic dentistry and areas where access to care is problematic (Bruhn, A.M., 2013) (ADHA, 2019).

Advancements in the manner in which patients' records has changed, now the option for electronic health records. Electronic health records can include patient radiographs and all person information can be scanned directly to the patients record. There are multiple dental software programs that allow for the patients' chart to be electronically stored. Dental charting of existing restorations and the need for dental treatment can all be recorded within these software programs. Many dental offices now have computers in every operatory which enables the use of the dental software. Access to the internet is also easier to use when needing educational tools to educate the patient about a certain dental procedure or a disease that may be evident in the oral cavity (Bruhn, A.M., 2013) (ADHA, 2019).

Dental instruments have changed over time as well, dental hygiene instruments have gone from primitive to futuristic. Instruments have been introduced that have different metals that maintain the sharpness of the instrument longer, eliminating the need to sharpen so often. The handles on the instruments have changed to become more ergonomically correct and cause less stress on the hygienist hands. An ultrasonic scaler was introduced, this instrument helps in the removal of hard deposits that are subgingival, Dental endoscope is a very small magnifying camera that is attached to the end of a probe. This allows the dental hygienist to be able to see what is actually in the pocket around a patient tooth and the hygienist can treat it appropriately, making it more comfortable to the patient. This endoscope can help when it comes to educating the patient about what is going on in their mouth. DentalView is a company that has been working to allow this live streamline between the oral cavity and a computer screen so that the dentist, dental hygienist and patients can see everything. There is a Perioscopy system that allow the dentist or dental hygienist to flush the pocket with water so that you can have a clearer image on the endoscope. Automated dental probes have been around for a few years but the theory and method of using them have not made it into private practice just yet. As the cost is a big issue but the size of the probe is very big which is hard to use with most recare patients. These new technology advancements allow the dental hygienist with many ways of educating the patient about the periodontal involvement that their oral cavity is in. Linking bad breath to periodontal disease by using these means to measure the pocket will definitely get the patients attention (Bruhn, A.M., 2013) (ADHA, 2019).

Dental lasers are being used not only for dental surgery, but dental hygienists are using them to treat periodontal disease. Dental lasers are less pain and less invasive for the patient but are very effective when treating the periodontally involved patient. Dental lasers are also used in

detecting dental decay in the very early stages where remineralization products can be applied to the tooth (Bruhn, A.M., 2013).

Ergonomics is another area of dental hygiene that is advancing rapidly. Changes in the types of lighting, seats, magnification glasses, and instruments have all changed with the operators comfort in mind. Many dentists and hygienist now use loupes as a protective eyewear, these loupes have built in magnification which helps with the operators posture when treating a patient. Brighter led lights are being used in the operatory which reduce the amount of eye strain, the seats that the operators now set in are more ergonomically positioned to allow the operator to have improved posture which eliminates back pain. The new handle designs that are being put on the hand instruments help with the strain that is put on the operator's hands. All of these changes are saving dentist and dental hygienist bodies from pain and poor posture (Bruhn, A.M., 2013).

Toothpaste and mouthrinses have also been changing through the years. The use of antibiotics and antimicrobials have increased in the dental hygiene practice settings. Toothpaste and antimicrobial mouthrinses have the ingredients in them to kill and disrupt biofilm which leads to the reduction of plaque and gingivitis. Chlorhexidine actually remains the best antimicrobial for plaque and gingivitis. There is even a variety of locally applied antimicrobials that can be used in the areas that the antimicrobial or antibiotic is not healing the gingivitis, there is three locally applied antimicrobials used today to treat these areas of gingivitis, they are chlorhexidine, minocycline, and doxycycline. These locally applied antimicrobials when applied in deep periodontal pockets can help improve the tissue attachment and help patients avoid periodontal surgery. The wide variety of mouthrinses are available, with alcohol, without alcohol, with fluoride without fluoride. Now there are more items available to assist a patient in

keeping the oral health in healthy condition. There are more products available than just toothpaste and a toothbrush. Products such as waterpiks, floss holders, floss aids, superfloss, air polishers and perio pics are just to name a few of the new advancements in dental aids that help assisted the patient in keeping the oral cavity ad healthy (Bruhn, A.M., 2013) (ADHA, 2019).

So, looking back over the last 113 years dental hygienist, the education and the profession has made a steady progression forward but there are still many areas for growth and improvement. There are so many more hurdles that the profession needs to conquer to continue the progression of the profession forward. Can the profession move forward as much as it needs to provide service to those who are less fortunate, or any other healthcare settings?

EXPANSION OF THE SCOPE OF PRACTICE

The profession of dental hygiene has had many changes in the state practice acts over the years. The changes are helping with the progression of the dental hygienists to be able to serve those underserved areas across the United States. The progression actually started in 1971 with the states of New Mexico, Oregon, Missouri, California, Colorado, Idaho and Alaska making changes to their practice acts. These 7 states were the first states to allow dental hygienists to administer nitrous oxide and local anesthesia. Alaska has had dental hygiene therapists providing basic dental care and preventative care to families and children in the remote Alaskan villages since 2004. In 2010 a study was completed that showed the dental hygiene therapist were safely and effectively meeting the needs of the people in these remote areas. In California there are registered dental hygienists in alternative practice (RDHAP) who are providing unsupervised dental services in schools, residential facilities, areas where there is a shortage of any dental health professional and homes. California has found that this type of program is

effective and necessary in improving access to care across the United States. Presently there is 15 states who recognize a dental hygienists as a healthcare provider and those dental hygienist are reimbursed as Medicaid providers. The 15 states are Wisconsin, Washington, Oregon, New Mexico, Nevada, Nebraska, Montana, Missouri, Minnesota, Massachusetts, Maine, Connecticut, Colorado, California, and Arizona. Dental hygienist in Oregon can apply for a limited access permit (LAP), this permit allows the dental hygienist to provide services without a dentist's supervision. Under this permit they can provide services to patients who do not have access to dental hygiene services due to their age, disability or infirmity (ADHA, 2019).

There are over 900,000 New Mexicans that do not have access to a dentist or dental hygienist. Most of these individuals live in the rural, low income and tribal communities. In February 2019, House Bill 308 was passed in New Mexico which allows for further legislation for dental hygiene therapists in New Mexico. Passing of HB 308 was a huge victory in moving towards improved oral health for the citizens of New Mexico. The dental therapist model is both preventative and restorative which would allow the hygienist to complete normal dental hygiene services as well as simple restorative procedures ("nmlegis," 2019).

Over 97% of the state's land in Idaho has a dental health shortage. In February of 2019 a bill was introduced that would give the Idaho board of dentistry the authority to license a mid-level dental provider and refer to them as a dental hygiene therapist (Glans, 2019). It is necessary that this dental hygiene therapist be able to practice under the general supervision of a dentist in the remote areas that have no access to oral health care now.

In 2019 Montana signed into law where that dental hygienist can provide non-invasive procedures to patients in the tribal areas. Dental hygienist are only able to perform basic dental

hygiene services in the tribal land at this time. Montana is using the same principle that Alaska has been using in the Community Health Aide Program since 2004 (ADHA, 2019).

Nevada most recently pass Senate Bill 366 which is to establish a mid-level provider in the oral health care field. This new provider a dental hygiene therapist would be able to perform simple dentistry such as; extracting loose teeth, placing sealants, prepping and filling cavities. The dental hygienist therapist would be restricted on where they can treat patients, the therapist would only be able to treat patients in tribal clinics, rural health clinics or any clinic that treats the low income, no insurance and Medicaid populations. The dental hygiene therapist must obtain a Public Health Dental Hygiene Endorsement and complete a practice agreement with a licensed dentist after they have completed a certain set of clinical hours (Nelis, June 20, 2019).

Pending the Governor's signature in 2019, Connecticut dental hygiene therapist could perform preventative and restorative dental procedures. These therapists are licensed as a Registered Dental Hygienists and have a dental therapist certificate. They must complete 1000 clinical hours under the direct supervision of a licensed dentist, have a collaborative agreement and complete 6 hours of continue education about dental therapy (ADHA, 2019).

The states of Florida, Kansas, Massachusetts, North Dakota, Washington and Wisconsin all have current legislation within their states about an advanced practice of dental hygiene. Florida's House Bill 649/Senate Bill 684 is seeking the preventative and restorative scope and the advanced practitioner would be licensed. Kansas's Senate Bill is seeking the preventative and restorative scope of practice and the advanced practitioner would be licensed with the possibility of dual licenses. Massachusetts's House Bill 1916/Senate Bill 1215 is seeking the preventative and restorative scope of practice, the advanced practitioner would be licensed with the possibility of dual licenses and they would have to have a master's degree. North Dakota's House Bill 1426

is seeking the preventative and restorative scope of practice with the advanced practitioner being licensed with the possibility of dual license. Washington has House Bill 1317/Senate Bill 5392 that is seeking the preventative and restorative scope of practice as well as dual license. Wisconsin's Assembly Bill 81/Senate Bill 89 is seeking the preventative and restorative scope of practice as well as the advanced practitioner would be licensed with the possibility of dual license (ADHA, 2019)

INTEGRATION OF ORAL HEALTH INTO OVERALL HEALTH

Over the years oral health has come to be recognized as an important component of one's overall health. When the United States Supreme Court made the decision to uphold the Patient Protection and Affordable Care Act (PPACA) in June 2012, this has led to new reform strategies along with providing inspiration for the emergence of new health care models (Brickle, C.M., 2013) (ADHA, 2019). The focus of the new models has included improving the population health, lowering the cost of care by improving the quality of care and patient satisfaction (ADHA, 2019). The PPACA primary focus is on improving the health care services of children, through the health exchanges these changes begin to take place in 2014. This legislation requires that dentist and dental hygienist make the changes that are necessary in how oral health services are provided and to recognize the importance of the connection with other health care providers. The passing of health care legislation like this simple demonstrates how the politics of government, professional organizations, the workplace, and community coalitions have an influence and impact on the profession of dental hygiene (ADHA, 2019). It is more important than ever that the public, coalitions, government and other political powers be educated about the

importance of oral health and the connection with overall health and how dental hygiene can be a profession that can make this a pivotal change for the population (Brickle, C.M., 2013).

There are states that already have hygienist working in medical settings or health clinics. Alaska allows dental hygienist with a collaborative agreement with a licensed dentist to practice in a "setting other than the usual place of practice of a licensed dentist." The collaborative agreement must identify the setting that the hygienist is working in (ADHA, 2019). Arizona allows a dental hygienist to perform services in health care facilities and under an affiliated practice agreement in a health care organization or facility. A dental hygienist may also under the supervision of a physician practice in an inpatient hospital setting (ADHA, 2019). Arkansas allows a dental hygienist under Collaborative Care Permit I or II to provide care in hospital long term care units, local health units, community health centers and free clinics (ADHA, 2019). California allows a dental hygienist to practice within any setting with appropriate supervision. Registered Dental Hygiene Advanced Practitioners may be employed by primary care clinics or specialty clinic, public hospital or health system (ADHA, 2019). Colorado dental hygienists may provide unsupervised dental hygiene services the practice settings are not specified. The law includes hospitals as location for occasional practice (ADHA, 2019). Connecticut dental hygienists with 2 years of experience may practice without supervision in institutions, including: hospitals and outpatient clinics. Florida dental hygienists may provide services in "health access settings." Health access settings include: nonprofit community health centers and federally qualified health centers (ADHA, 2019). Georgia requirement of direct supervision shall not apply to the performance of licensed dental hygienists providing dental screenings in settings which include hospitals and clinics, public health programs, and federally qualified health centers (ADHA, 2019). Idaho dental hygienists can provide services in an extended access oral

health care setting including a hospital, medical office, public health district, tribal clinic, and federally qualified health centers (ADHA, 2019). Illinois only Public Health Dental Hygienists can provide services in public health settings including federally qualified health centers and public health facilities. A Public Health Dental Hygienist is a dental hygienist that has a valid license to practice in Illinois and has practice full-time clinical experience for 2 years or an equivalent of 4,000 hours of clinical experience and has completed at least 42 clock hours of additional structured courses in dental education in advanced areas specific to public health dentistry (ADHA, 2019). Indiana dental hygienists may practice in any setting or facility that is documented in the dental hygienist's access practice agreement (ADHA, 2019). Iowa dental hygienists can administer services in settings including federally qualified health centers, public health vans, free clinics, community centers and public health programs (ADHA, 2019). In Kansas the practice of dental hygiene may be performed at a hospital long-term care unit, local health department or indigent health care clinic on a resident of a facility, client or patient thereof (ADHA, 2019). Maine dental hygienists may provide services in nontraditional practice setting under public health supervision status (ADHA, 2019). Maryland dental hygiene may be practiced in settings including a hospital and health maintenance organization (ADHA, 2019). Massachusetts dental hygienists may provide services without the supervision of a dentist in public health settings including, and not limited to, hospitals, medical facilities, and community clinics (ADHA, 2019). In Minnesota collaborative practice dental hygiene settings include a hospital, public health facility, community clinic, or tribal clinic (ADHA, 2019). Missouri public health settings include locations where services are sponsored by a county health department, city health department, and nonprofit community health centers (ADHA, 2019). In Montana dental hygiene preventive services can be provided in public health facilities such as: federally

qualified health centers; federally funded community health centers, migrant health care centers, extended care facilities, local public health clinics facilities; public institutions under the department of public health and human services; and mobile public health clinics (ADHA, 2019). In Nebraska the Department of Health may authorize an unsupervised dental hygienist to provide services in a public health setting or a health care or related facility such as a hospital, public health department or clinic, and community health centers (ADHA, 2019). New Hampshire dental hygienists under public health supervision may practice in a hospital or other institution (ADHA, 2019). New Mexico dental hygienists can practice in any setting with collaborative agreement (ADHA, 2019). New York dental hygienists under a collaborative arrangement may provide services in a hospital (ADHA, 2019). In Nevada Public health dental hygienists may practice at a health facility and dental hygienists may practice in a clinic established by a hospital approved by the Board (ADHA, 2019). Dental Hygienists in Ohio under the supervision of a dentist may practice in a hospital. Additionally, under oral health access supervision, a dental hygienist may provide dental hygiene services at settings including, a health care facility, non-profit clinic, and mobile dental clinic (ADHA, 2019). A dental hygienist in Oklahoma under supervision of a dentist or authorized in writing, may practice scope of practice in treatment facilities including a hospital, private health facility, public health facility, and federally qualified health centers (ADHA, 2019). In Oregon an expanded function dental hygienists can provide unsupervised services to patients in hospitals, medical clinics, medical offices or offices operated or staffed by naturopathic physicians, nurse practitioners, physician assistants or midwives (ADHA, 2019). In Pennsylvania under a dentist's supervision or as a public health dental hygiene practitioner, dental hygienists may provide services in hospitals and health care facilities (ADHA, 2019). Rhode Island's public health dental hygienists may perform services in hospitals,

clinics, and medical facilities (ADHA, 2019). Dental Hygienists in South Carolina if working in a public health setting with the Department of Health and Environmental Control, may provide services in hospitals, rural and community clinics, and public health facilities. South Dakota dental hygienists may provide services under collaborative supervision in a community health center (ADHA, 2019). In Tennessee under general supervision, dental hygienists may provide preventive dental care through written protocol in settings including nonprofit clinics and public health programs (ADHA, 2019). Dental hygienists in Texas may perform services in settings including a community health center (ADHA, 2019). Utah dental hygienists under general supervision may perform services in a hospital on a dentist's patient of record (ADHA, 2019). In Vermont under supervision of a dentist, "public-health hygienists" may practice in out-of-office settings, including clinics, hospitals, medical facilities and community health centers (ADHA, 2019). Washington dental hygienists may practice without dental supervision if employed, retained or contracted by a hospital (ADHA, 2019). West Virginia dental hygienists may provide dental hygiene services to patients in public health setting, including hospitals and community clinics (ADHA, 2019). Wisconsin dental hygienists may practice in a hospital, outpatient medical facility, and local health department (ADHA, 2019). In Wyoming dental hygienists may provide public health services at federally funded health centers and clinics, public health offices, and free clinics (ADHA, 2019). So, 39 states in the United States allow a dental hygienists to perform services within the dental hygienists' scope of practice for that state. This is a great progression of the scope of practice for the dental hygienists across the United States. Allowing the dental hygienists to be a part of providing oral health care in alternated settings is helping to maintain the populations overall health.

FUTURE OF DENTAL HYGIENE ROLES

How will the professional role of the dental hygienists look over the next 50 to 100 years? The six primary roles that the American Dental Hygienists' Association identified in 1984 were; clinician, educator, researcher, administrator, manager and advocate. What is going to change will be the skills, knowledge and the competencies that are required for the traditional roles to meet the demand of the future. The traditional career paths are going to require more emphasis on public health principles like efficacy, cost effectiveness and access. The alternative career paths for the innovative and future-minded dental hygienists, are going to require new responsibilities, acquiring additional knowledge and skill sets to fulfill roles in corporate arenas, evidence-based, advanced clinical practice, administrative and entrepreneurial endeavors. The American Dental Hygienists' Association have recently updated the career pathways. The new pathways will include, new roles and leadership possibilities that dental hygienists to have different career direction or a new professional challenge. The new pathways are below;

1. Clinician
    * private dental practices
    * community clinics
    * hospitals
    * university dental clinics
    * prison facilities
    * nursing homes
    * schools

2. Corporate
    * sales representatives
    * product researchers
    * corporate educators
    * corporate administrators

3. Public Health
    * clinicians, administrators, researchers

4. Researchers
    * colleges and universities

* state public health officer
* community clinic administrator
* Indian Health Service
* Head Start programs
* local health departments
* National Health Service Corps
* school sealant programs

3. cont.

* rural or inner-city community clinics

5. Educator

* clinical instructors
* classroom instructors
* program directors
* corporate educators

* corporations
* governmental agencies

* nonprofit organizations

6. Administrator

* clinical director, statewide school sealant program
* program director, dental hygiene educational program
* dean of health sciences, educational institution
* executive director state association staff
* director,corporate sales

7. Entrepreneur

* product development and sales
* practice management company
* employment service

* continuing education provider or meeting planner
* consulting business
* founder of nonprofit
* independent clinical practice
* Professional speaker/writer

Now dental hygiene education must begin to prepare dental hygienists not only for employment upon graduation, but careers that could span 30 plus years. The essential critical competencies of all dental hygiene professionals must include critical thinking, problem-solving skills and communication (Brickle, C.M., 2013).

People are living longer healthier lives now due to the technology and scientific achievements. Even though people are living longer, they are doing so with chronic diseases that impacts a person's overall health as well as their oral health and oral functions (Spolarich, A.E., 2013). The successes of organ transplants, pharmacotherapeutics, the use of implantable devices and prosthetics help with long-term survival even though the presence of degenerative or debilitating diseases. This for some people add longevity and independent living, for others, it could mean an extended time in a residential care facility. So, do these achievements add to the quality of life for individuals? Dental hygienists are in constant learning of how to care and treat the aging population. Often these individuals will have many medical issues and adds to the complexity of the dental visit and the time needed to properly care for the individual. Some patients will continue to be able to seek dental care in a typical dental setting while others need the care giver to come to them. Dental hygienists have to make the access to these patients either by way of treating them in a long-term care facility or by using a mobile service for home

health care. A necessity will be reimbursements and the regulatory statues that will have to be in place in order to be able to provide this type of care for individuals (Spolarich, A.E., 2013).

In the United States 10 of the top 50 causes of death are associated with potential oral systemic links. The 2013 list of the leading causes of death with potential oral systemic links in listed below; (Spolarich, A.E., 2013).

RANK	DISEASE
1	coronary heart disease
3	stroke
4	alzheimer's disease/dementia
5	lung disease
7	diabetes mellitus
9	pneumonia
16	pancreatic cancer
19	infammatory conditions of the heart
26	liver cancer
31	low birth weight

As dental hygienist continues to understand the correlation of oral health with overall health it will pivotal that research-supported education, preventative and therapeutic health strategies are developed to reduce disease risk. It will be even more important that the dental hygienist work collaboratively with other health care practitioners to develop treatment plans for these patients. Dental Hygienist in the future may even have specialized training that will allow them to have the skills to treated more targeted oral health care needs in specialty areas such as cardiology, oncology and geriatrics. Hypertension is one of the most common cardiovascular diseases and

since the population is aging, dental hygienists are often the first practitioners to notice this often silent and undiagnosed disease. Older adults will continue to present with a higher risk for cancer, infectious diseases and infections due to their past and/or the continued use of tobacco, alcohol and illicit drugs. It is expected that by 2020 the number of older adults over the age of 50 with substance abuse will double, no matter gender or race/ethnicity. Below is the 2013 list of leading causes of death that impact the dental hygiene process of care (Spolarich, A.E., 2013);

RANK	DISEASE
2	lung cancer
10	hypertension
28	esophageal cancer
29	HIV/AIDS
36	oral cancer
38	Hepatitis C
39	alcohol
40	drug use

The use of tobacco still remains the number one cause of lung cancer to date and remains as the leading cause of lung cancer deaths. Dental professionals over the last 20 years have put more emphasis in education and training for tobacco cessation, there continues to be a greater need for commitment to provide this life-saving training. Intravenous drug abuse is associated with transmission of viruses, which includes infectious diseases such as human immunodeficiency virus (HIV) and hepatitis C. One quarter of all people over the age of 50 represent the population with HIV in the United States. Because these conditions are still prevalent today, it

illustrates that there is still a need for more education for dental hygienists about how to effectively assist their patients to reduce these high-risk diseases (Spolarich, A.E., 2013).

Aging continues to pose many challenges for patients to maintain their oral health, function and quality of life. Individuals tooth loss, neuromuscular impairments, and drug and disease-induced side effects directly impact food choices, eating ability, nutritional status and the ability to communicate and smile, as well as the desire to engage in social situations (Spolarich, A.E., 2013). Physical and cognitive disabilities can make performing daily oral health care needs difficult. Dental hygienists need to be at the forefront of developing aids that can make the simple task easier for individuals. The future may even need to involve a dental hygienists to be on staff at these long-term care facilities. The hygienists would then be the practitioner that would be placed in charge of training the other care givers of how to take care of the necessary daily oral health care needs of those patients. With the projected rates of growth of the aging population, are dental hygienists adequately prepared to address the multifaceted needs of the aging population (Spolarich, A.E., 2013)?

Childhood caries still remains to be the leading infectious disease, even though that water has been fluoridated for over 50 years. There are other risk factors that increase the likelihood that children will develop this disease such as poor oral hygiene and the consumption of foods that promote tooth decay. Caries continues to remain on the rise especially among those with little education, low income and minority populations. Dental hygienists must remain on the front line for caries prevention. Now studies are showing that one on one educating of individuals about dietary interventions are successful in changing fruit and vegetable intake, in reducing alcohol consumption but not as successful in reducing sugar consumption. Dental hygienists must continue to research and learn what preventive strategies are the most effective

in eliminating this disease. Some of the preventive strategies may be family based and others may need to be community based or targeted to certain populations (Spolarich, A.E., 2013).

There has been a rise of cancers associated human papillomavirus (HPV), including oropharyngeal cancers. In 2013 oropharyngeal cancer was prevalent in 78.2% of human papillomavirus cancers in men and 11.6% of human papillomavirus cancers in women. The vaccine that is been given to individuals in not showing to reduce the amount of head and neck cancers which includes oral cancer. Research is suggesting that dental hygienists continue to recommend to their patients to get the vaccination in hopes that when more people become vaccinated the rates of human papillomavirus oropharyngeal cancers will decline (Spolarich, A.E., 2013).

The above discussed scientific advancements will be just the beginning of how dental hygiene education topics and the practice of dental hygiene will need to be changing over the next years. Because of the need for increasing the more in-depth education realm to include more than just the oral cavity the addition of these courses will require more class time so therefore the 2-year college tract will be eliminated in need for a 3-4-year tract. Dental hygiene education will be changing the entry level to practice criteria over the next years, the dental hygienist may then be required to have a bachelors or even master's degree to practice clinically in the next years. The way in which oral health care will be delivered in the future is going to be changing. In order to reduce the cost, improve access, deliver higher quality and to increase the populations wellness, oral health care will become an integrated part of medical care. The dental hygiene profession will be advancing to the direction of less hygienists practicing in solo dental practices with one dentists. More hygienist will be practicing in large group dental practices, medical practices, and in non-traditional community settings. These changes are going to affect

the way that hygienist is educated. The current curriculums will be modified and redirected to include multi layers of patient care in multiple practice settings. The Patient-Centered Medical Home (PCMH) will become the popular trend for overall health care. The staffs will consist of; physicians, dentists, nurses, dental hygienists, social workers, pharmacists, dietitians, physical therapists, speech and hearing specialists, home visitors and community health workers. Due to the high cost of dental schools so many dentist are now joining large group medical practices or PCMH's, the economic incentives are attracting new dentist and dental hygienist to join these practice settings to deliver oral health care. Since Medicaid dental coverage for children and potentially adults are on the increase, the demands for dental and dental hygiene services is going to grow. In areas of rural and the underserved, dental hygienist maybe the only oral health care provided employed by these facilities to keep the cost lower. The dental hygienist will then be the oral health care provider that will take the primary role and responsibility for the patient's oral health care. These hygienists will have to complete risk assessments, give patient education, be the coordinator of care, refer the patient to the appropriate practitioner for more extensive treatment and provide prevention care to these underserved areas (Fried, et.al.2017).

Possible areas that dental hygienists may be employed in the future;

Administrators - Dental hygienists may have manager, administrative or supervisor roles, this will require knowledge in insurance bidding, accounting, possible grant writing and leadership skills will be necessary (Fried, et.al.2017).

Case Managers - Dental hygienists that will need to provide care to those patients that cannot come to an office setting. The use of teledentistry could be important for treating home bound patients, hygienists will be responsible to be a case manager in these settings and make the necessary referrals to the appropriate practitioners (Fried, et.al.2017).

Hospitals - there will be an increase in dental hygienists in the hospital setting. This allows for the dental hygienists to provide oral health care to extended stay patients and educate staff and families on oral health care (Fried, et.al.2017).

Public Health Practice - dental hygienists could be working more with programs such as head start, women, infant and children (WIC), and health departments. In these settings the hygienists could be more actively involved in public education, developing public health policies and coalition building (Fried, et.al.2017).

Community-based settings - these types of setting allow the dental hygienists to bring dental services to children who need care. Childhood caries can cause difficulty in eating, talking, pain and infections and the dental hygienists will be able to help eliminate these needs (Fried, et.al.2017).

Primary Care - dental hygienists could become an important component of the primary health care team. Educating patient and diagnostic testing are just a few of the roles that dental hygienists could provide in these settings. Dental hygienists with the education that they have can identify disease and make the necessary referrals that need to be made (Fried, et.al.2017).

CONCLUSION & RECOMMENDATIONS

The dental hygiene profession has been a developing profession since the early 1900's. Dr. Alfred C. Fones of Bridgeport, Connecticut paved the pathway for the profession. Dr. Fones trained his cousin Irene Newman, that was his dental assistant, to perform preventative services and the dental hygiene profession began.

The dental hygienist began by providing basic preventative services to people and educating patients about the importance of oral health care. Now the profession is progressing,

and education is advancing so that hygienists can help with the access to care problem throughout the united states. Hygienist are continuing their education and becoming advanced practitioners or dental hygiene therapists and perform simple dentistry on the underserved population. Since hygienist are getting more education and the scope of practice is changing so are the places that hygienists are going to be working.

Universal licensure and self-regulation practices for all states could happen and hygienists would be able to practices independently without the supervision of dentist. Education will be changing so that the hygienist can give diagnosis, prevention, restorative and therapeutic services to the underserved communities (Bruhn, 2013). There will be a need for more dental hygiene educators as the profession continues to progress and more state allow the advanced practitioners. Dental hygienist are going to have to be prepared to meet the needs of the underserved population and deliver oral health services to this population.

See appendices below, that is an action plan of things that are recommended to help with the progression of the profession of dental hygiene. Most of the action plans needs changing of the scope of practice for dental hygienists. If the scope of practice was the same across all of the states this would allow for more uniformity and greater access to care for the underserved population. A higher entry level of education needs to change in order for the hygienists to get more education in research and be able to provide patient with the adequate care that they need. Dental hygienist needs to be able to make decisions about their careers and be able to practice independently without the supervision of a dentist. Dental hygiene reimbursement needs to be across all states. If a dental hygienist is going to provide care to the underserved population, they should be the practitioner to receive the reimbursement for the services not a dentist. This would require that insurance companies would provide dental hygienist with a number that

identifies them specifically with the insurance company. If dental hygienists were getting reimbursement for services that they provide this may make the advanced practitioner more attractive to others to complete and get the degree, which in turn would increase access to care for the underserved population. Dental hygienist wants to meet the needs of the underserved population that have no dental home and are being held back due to dentist not allowing the advancement in the profession. Once dentist begin to realize that hygienists are wanting to treat this underserved population and make the appropriate referrals to the dentist or specialist that needs to treat the more serious problems, then that population will receive the oral health care that is needed. Main leaders across the states that advocate for other health care professionals should join forces and educate the public about oral health and how it relates to overall health, and how important the role of the dental hygienists, advanced practitioners or dental therapists are. Now is more important than any to have coalitions and groups that have the same beliefs and want to work to achieve the same common goals. Some of the states that already have an advanced practitioner degree have coalitions with all types of health care providers. Now more than ever dental hygienists should be able to practice with physicians and not have to be under the supervision of a dentist. As hygienist are working in more health care setting and not just in solo private dental practices, it is imperative that the scope of practice change across all states that will not limit where the hygienists can practice at. It takes many to build a mountain or conquer a battle so dental hygienist need to stand strong and work with those that want to achieve the same goal.

Dental Hygiene profession has moved forward at a rapid pace and significant changes have been made. Many time we are influenced by negativity that makes headlines and causes people to be skeptical about the future. However, if history and a strong belief our examples of

the future, there will be no need for skepticism. Great things never come from comfort zone so dental hygienist need to step out of the comfort zone and move the dental hygiene profession to the next level.

APPENDICES

ACTION PLAN

ACTION	RESOURCES	OUTCOMES	TIMELINE
Universal Licensing	*State Licensing Boards *State Scope of Practice *State Dental Hygiene Associations *State Dental Hygiene Lobbyist	*Dental hygienist that are able to move from state to state and practice without taking another exam. *A more uniformity of the licensure. *Allowing hygienist to move from state to state without re-exam, could help with shortage that some states have of hygienists.	Completed in 2 years
Advanced Practitioner in all states	* State Colleges & Universities * State Licensing Boards *State Scope of Practice *State Dental Hygiene Associations *State Dental Hygiene Lobbyist	*More Dental therapist would help with the shortage of dentistry that do not want to treat the underserved population. *Access to care would increase. *Populations without a dental home would have choices.	2-4 years depending upon colleges and university curricula
Reimbursement for hygienists across all states	*State Licensing Boards *State Scope of Practice *State Dental Hygiene Associations *State Dental Hygiene Lobbyist *Insurance Companies	*Reimbursement could attract more hygienists to become a dental therapist and help with the shortage of caregivers.	3 years, this would require the laws to pass and then the insurance companies would have to give all advanced practitioners a reimbursement number.
Minimum entry-level requirement a bachelor's degree	*Colleges & Universities *State Licensing Board	*More education will enhance learning. *Broaden the scope of education. *Prepare the hygienist to have more education in	1-2 years

		research.	
Dental Hygiene Self-regulating board	*State Licensing Boards *State Scope of Practice *State Dental Hygiene Associations *State Dental Hygiene Lobbyist	* Self-regulation would allow hygienist to be more in control of their profession and be able to move the profession forward without being held back by dentist.	3-4 years

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