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Guest Editorial
Roy Thompson, DDS
American Dental Association, Sixth District Trustee

I am on the extreme end of the Bell curve when it comes to my views on ADA membership and value. I’m certain I will be a member until the time I die and will never doubt belonging. I came into the profession when everyone was just expected to join and so I did. Times are different now and the ADA realizes it. The value of membership is always a concern of the Board of Trustees yet here I will discuss the value and benefits of membership from my personal anecdotal perspective. Allow me to present some ABCs of value for me.

ADVOCACY is always rated as one of the highest perceived values of our association. There is no way an individual can lobby in the state or federal legislature effectively as a solo individual. When we speak for 160,000 dentists, though, we are heard. I get to choose to participate in whatever insurance plans I desire. I get to choose to whom or if I donate charity care. I get to open and close my office at my leisure. These are freedoms of America and of my profession that I value. When I am sleeping at night or practicing dentistry during the day, the ADA is busy behind the scenes taking care of my profession.

BUSINESS RESOURCES are plentiful within the ADA structure. Regularly when I speak to a group someone will suggest the ADA start a novel program. My role is to guide that individual to the right resource. Most of what you need to be successful in business can be found within the Center for Profession Success on the ADA website.

COLLEAGUES – I need a close network of friends that will keep me in line if I stray to far from a life of good values, ethics and morals. I can count on my close friends, many of whom are dentists, who would have a heart to heart talk with me if I go off the deep end in my thinking, in my practice or in my daily actions. A vast majority of dentists practice in the solitude of their office. They must police themselves and their patient care individually and this can be a lonesome life. It is said that ‘no man is an island’ and I suggest the healthiest individuals have a large network of close friends and colleagues to lean on for support. The ADA and Dentistry provides a wonderful network of friends.

DENTISTRY alone is why you need the ADA. Much of our lives are consumed with dentistry. I don’t adhere to the philosophy of being a dentist only from 8-5 on Monday through Thursday. We have the ability to leave the worries of patient care and running a business when we depart from the office but we are dentists 24/7/365. Each of us are professionals in the community, in our churches, in the PTA for our children and our affiliation with a national organization gives us credibility in our lives. Other than my family and my God, dentistry has provided me everything I desire and a lifestyle far above the average person in America.

ENGAGEMENT, ENERGY AND ENTHUSIASM for our profession can be built from our involvement in our organization. The ADA is continually promoting the practice of dentistry. Dentists have for decades been one of the most trusted professionals in the United States. This isn’t by coincidence. Patients need confidence in our abilities and when we are engaged and energized daily in our offices we become better dentists and leaders. When I’m around dentists that love their profession and love what they do I stay motivated to do better also. The ADA powers the profession of dentistry to advance the overall oral health of the public. Each of us can be part of what energizes the profession when we belong and are active.

FINANCIAL SECURITY comes from the ADA. I’m confident that by taking an active role in the ADA my practice benefits financially. I am around successful people, I attend stimulating continuing education courses, I have learned leadership and business principles and have had numerous mentors through the years. You can gain this same exposure and when put into action can lead you to greater success financially.

GRATITUDE does not come from membership in the American Dental Association. Gratitude has to come from our heart. As in marriage any one of us can find something we would prefer to change about our spouse. If we dwell on it long enough, that one thing we may dislike can fester until we end up bitter, despondent and in a divorce. The same applies in dentistry. I’m absolutely certain every one of us can find something about the ADA we don’t like or we think they can do better. We can choose to dwell on that one thing and become bitter to the point of dropping our membership. Conversely, we can choose to look at the multitude of things at which the ADA excels and be grateful that it is being done with skill and professionalism and, by far, the ADA is the best show in town.

Later this year our ADA dues statement will arrive asking for $1500 or so. You can shake your head and debate writing the check yet I ask that you make up your own ABC list of what you have in life that dentistry has provided. I ask that you see your dues as a business investment that has returned and will continue to return better dividends than any other investment you will make in your life.
Actions of the 2018 TDA House of Delegates

SUNDAY, MAY 6, 2018

The meeting of the 151st Session of the TDA House of Delegates was called to order at 9:00 a.m. in Salon 6 of the Franklin Marriott Cool Springs Conference Center, Franklin, Tennessee, Dr. Chip Clayton, Speaker of the House, presiding.

Dr. Clayton called on Dr. David McNeely, past Speaker of the House of Delegates and First District Dental Society member, to deliver the invocation.

After the invocation, the Speaker led all present in the Pledge of Allegiance to the Flag and read the ADA Ethics Pledge.

At this time, Speaker Clayton called forward Dr. Jerald Bryant, President of the Fourth District Dental Society, for welcoming remarks.

Dr. Clayton then introduced those seated at the head table: Dr. Dan Meadows, Vice President, West Tennessee; Dr. Chad Edwards, Vice President, Middle Tennessee; Dr. Roy Thompson, ADA Sixth District Trustee; Dr. Joseph Crowley, ADA President; Mr. Jack Robinson Jr., General Counsel; Mr. Mike Dvorak, Executive Director; Dr. Jeannie Beauchamp, Secretary; Dr. Richard Dycus, President; Dr. Paul Cullum, President-elect; Dr. James Avery, Treasurer; and Dr. Rick Guthrie Jr., Immediate Past President. Noted as absent was Dr. Rachel Hymes, Vice President East Tennessee, who was unable to attend as she is on maternity leave.

Other special recognition was given to: past Speakers of the House; Dr. Bill Powell, Past ADA Trustee, Knoxville; the Journal of the Tennessee Dental Association Editor, Dr. H. Clifton Simmons III; student delegates from Meharry School of Dentistry and UT College of Dentistry; and new delegates.

Dr. Clayton introduced the ADA Alliance President, Mrs. Susan Hadnot from Montana, who addressed the House with brief remarks about Alliance programs across the country and requested delegates to continue support of the Alliance.

At this time, Dr. Dale O. Hunter Jr., Chair of the Committee on Annual Session, was called upon for his report. Dr. Petty reported that there were 1,269 registrants at this year’s meeting, of which 475 were dentists.

Dr. Roy Thompson, ADA Sixth District Trustee and Past President of the TDA from Murfreesboro, addressed the House of Delegates about happenings at the ADA. Dr. Thompson said that there are three high-level things facing the ADA: Membership, Money and Medicare. Dr. Thompson said that the ADA goal is to add 3,500 members by the end of
Dr. Joseph Crowley, a general dentist from Cincinnati, Ohio, and President of the American Dental Association, addressed the House of Delegates. Dr. Crowley was very complimentary of the meeting and was especially impressed to experience his first podcast interviews. Dr. Crowley spoke of streamlining association business to use ADA resources better with focus on the ADA’s vision statement: Empowering dental professionals to achieve optimum health for all. Dr. Crowley spoke of much success with advocacy in Washington, D.C. Regarding the national opioid crisis, dentistry has gone from being perceived as the problem to be the heroes with the policies we have established with mandated CE and prescribing limits. Regarding Medicare, Dr. Crowley supported Dr. Thompson’s earlier statements that the ADA is at the table to gain information and be part of the discussion. Without the ADA’s presence, other groups could enact policies that would be devastating to the practice of dentistry. Dr. Crowley encouraged all members to sign up for the credentialing program on their ADA profile whereby major payors in America will accept their profile page for credentialing with one click. It is free and third-party payors will be encouraging it to be used. The site is: ADA.org/credentialing. Dr. Crowley said he is proud that the ADA Seal of Acceptance program is at a height that has never been realized before. The ADA signed a three-year agreement with CVS Pharmacies where CVS will feature products with the ADA Seal. And if someone comes to CVS with a dental health issue and doesn’t have a dental home, CVS will refer them to a dentist through the Find-a-Dentist program. Dr. Crowley spoke of another exciting pilot program called Mortar where the ADA will purchase two practices that are economically sound and connect the seasoned dentists with interested young dentists who lack the financial resources to purchase the practice on their own. The ADA basically becomes a transition company and will teach the young dentist how to manage the practice, stay in the community and profit the community. This will be discussed at the ADA House of Delegates and there will be research provided that indicates that this program has sustainable dollars in it, perhaps with the potential to make dues stabilization a reality at the ADA.

Then, Dr. Petty presented two awards:

- Dr. Dennis Gardner, Sixth District, with the Distinguished Service Award for serving six years on the Board of Trustees.
- Dr. Rick V. Guthrie Jr., First District, with the Distinguished Service Award as a member of the Board of Trustees for the past ten years.

Dr. Crowley presented President Dycus with the ADA Past President’s pin as well as a challenge coin, much like is presented in the military for a job well done and confidence in the person’s ability to meet challenges ahead.

Dr. Clayton opened the floor for nominations of individuals to serve in the elective offices of the Association for the year 2018 - 2019. The nominations were as follows:

- President-elect – Dr. Terryl Propper
- Secretary – Dr. Jeannie Beauchamp
- Treasurer – Dr. James Avery
- Speaker of the House – Dr. George “Chip” Clayton
- Vice President, East Tennessee – Dr. Heath Blockley
- Vice President, Middle Tennessee – Dr. Jay Davis
- Vice President, West Tennessee – Dr. David Magee
- ADA Delegate, East Tennessee – Dr. Kevin Bryant
- ADA Delegate, East Tennessee – Dr. Walt Fain
- ADA Alternate Delegate, East Tennessee – Dr. Randy Montgomery
- ADA Alternate Delegate, East Tennessee – Dr. Susan Orwick-Barnes

As these offices were uncontested, Speaker Clayton declared those listed above duly elected. In addition, Dr. Clayton reported to the House that Dr. Steve Nowlin was elected by the Sixth District Dental Society as their trustee to the TDA Board of Trustees.

Dr. Clayton called on TDA President, Dr. Richard Dycus, for his President’s Address. (See Page 11 for Dr. Dycus’s address in its entirety.)

Dr. Jeannie Beauchamp, TDA Secretary, was called upon for the Necrology Report. Dr. Beauchamp expressed great sadness in paying tribute to those who have passed away since the last House meeting. In respect, the House paused for a moment of...
silence in remembrance of these former colleagues.

At this time, Dr. Clayton requested that Dr. Beth Randall, Chair of the Reference Committee, present the Reference Committee report. (Other members of the Reference Committee were: Drs. Jake Bateman, Taylor Jarrell, Matt Gorham III, and James R. Hight Jr.) Dr. Clayton informed the House that B&F-18-1 relating to dues increases did not meet the Bylaws requirement for adequate notification to members and therefore was not in order. The following resolutions presented by the Reference Committee were considered by the House with the result noted:

**Resolutions**

**B&F – 18 – 2**  
2018 – 2019 Budget

RESOLVED, that the 2018 – 2019 Tennessee Dental Association budget of $1,987,701 as prepared by the Budget and Finance Committee, be approved.


**BT1 – 18 – 1**  
Transfer of Membership from One Component to Another Component

RESOLVED, that Bylaws CHAPTER II Section 30, MEMBERSHIP: be changed by deleting Item E and replacing with:

E. If a member in good standing of this Association moves their practice from the jurisdiction of one component society to another, the TDA shall transfer membership to the new component and notify the secretary of the component to which the member has moved.

The House of Delegates adopted BT1 – 18 – 1.

**BT1 – 18 – 2**  
TDA Vice President Term Extended to Two Years

RESOLVED, that Bylaws CHAPTER VII ● Elective Officers, Section 50, TENURE OF OFFICE be changed by adding to the first sentence to read as follows:

_The elective officers shall serve for a term of one (1) year or until their successors in office are elected and installed, except for Vice Presidents who will serve a two-year term._

and be it further

RESOLVED, that the Tennessee Dental Association Bylaws be amended accordingly.


**BT1 – 18 – 3**  
Reduce the Size of the TDA House of Delegates

RESOLVED, that Bylaws CHAPTER III, Section 10. A. first sentence change the number of delegates from 102 to 50;

and be it further

RESOLVED, that Bylaws CHAPTER III, Section 20. first paragraph, last sentence be changed to delete “Method of Least Proportionate Error” and reworded as follows:

_The remaining number of delegates shall be allocated to component societies proportionally based upon their active, life and retired members._

and be it further

RESOLVED, that the Tennessee Dental Association Bylaws be amended accordingly.

The House of Delegates did not adopt BT1 – 18 – 3.

**BT2 – 18 – 1**  
Waiver of Dues and Board of Trustees Approval

RESOLVED, that Bylaws Chapter II, Section 30, Paragraph C shall be amended by substituting “An active member who has suffered a significant financial hardship that prohibits them from payment of the full dues and/or any special assessment may be excused from the payment of twenty-five percent (25%), fifty percent (50%), seventy-five percent (75%) or all of the current year’s ADA, TDA and component society dues and/or any special assessment as determined by their constituent and component dental societies. The component society shall certify the reason for the waiver, and forward to the TDA Board of Trustees for consideration and action. The ADA, the TDA and the component society shall provide the same proportionate reduction in any approved waivers. See Chapter X, Section 10, Paragraph J.”

and be it further

RESOLVED, that Bylaws Chapter X, Section 10, Paragraph J shall be amended by substituting “An active member who has suffered a significant financial hardship that prohibits them from payment of the full dues and/or any special assessment may be excused from the payment of twenty-five percent (25%), fifty percent (50%), seventy-five percent (75%) or all of the current year’s ADA, TDA and component society dues and/or any special assessment as determined by their constituent and component dental societies. The component society shall...
certify the reason for the waiver, and forward to the TDA Board of Trustees for consideration and action. The ADA, the TDA and the component society shall provide the same proportionate reduction in any approved waivers. Additionally, a member of this association, while receiving assistance from the Relief Fund of this Association or from the Relief Fund of the American Dental Association, shall be exempt from the payment of dues during the period of such assistance.

and be it further

RESOLVED, that the Tennessee Dental Association Bylaws be amended accordingly.

The House of Delegates adopted BT2 – 18 – 1.

BT3 – 18 – 1

Merge the Annual Session Committee into the Council on Scientific Programs and Continuing Education

RESOLVED, that Bylaws CHAPTER VI, Scientific Session, Section 30. MANAGEMENT, delete the phrase “and the Committee on Annual Session” to read as follows:

*The Council on Scientific Programs and Continuing Education shall have full charge of all details relating to the annual scientific session and shall operate in accordance with the procedural manual adopted by the Board of Trustees.*

and be it further

RESOLVED, that the Tennessee Dental Association Bylaws be amended accordingly.

The Reference Committee recommended that BT3 – 18 – 1 be referred back to the Board of Trustees for development of a policy and procedures manual regarding the duties of this council to accompany the resolution before reconsideration.

The House of Delegates voted to uphold the Reference Committee’s recommendation to refer the resolution back to the Board of Trustees.

Because Resolutions BT3-18-2 and BT3-18-3 were contingent on passage of BT3-18-1, they were ruled out of order and were not considered.

BT3 – 18 – 4

Appointments to Councils and Committees

RESOLVED, that the complete list of nominees for membership on the Councils and Committees of the Association, submitted and proposed by the Board of Trustees, in accordance with Chapter IV, Section 70 of the Bylaws, be elected.


ND – 18 – 1RC

The Reference Committee recommended the following amended resolution:

RESOLVED, that Bylaws Chapter I, Section 20, Paragraph E shall be reworded as follows:

E. Student Member:

1. A predoctoral student of a dental school accredited by the Commission on Dental Accreditation and located in the State of Tennessee, and who is an ASDA member, will automatically be a student member of the Tennessee Dental Association.

2. A dentist who is engaged in a full-time postdoctoral program of not less than one (1) academic year in a CODA accredited education facility located in the State of Tennessee, may make direct application to the ADA. Upon enrollment in the ADA, the dentist will automatically be a graduate student member of the Tennessee Dental Association.

and be it further

RESOLVED, that the Tennessee Dental Association Bylaws be amended accordingly.

The House of Delegates adopted ND – 18 – 1RC.

BT4 – 18 – 1

Add Affiliate Membership Category

RESOLVED, that Chapter 1, Membership, Section 10, CLASSIFICATION be changed to add:

E. Affiliate

and re-letter:

F. Student

G. Retired

and be it further,

RESOLVED, that Chapter 1, Membership, Section 20, QUALIFICATIONS add:

E. Affiliate Member:

A person not eligible for Active, Life, Student, or Retired membership in this Association, but is a member of a health-related organization. Affiliate membership will be granted automatically upon subscription to certain Association products and/or services.
and re-letter:

F. Student Member

G. Retired Member

and be it further

RESOLVED that Chapter 1, Membership, Section 40, PRIVILEGES add:

E. Affiliate Member:

An affiliate member shall have the privilege of attending all scientific sessions of the Association but shall have no vote nor be eligible to hold any office in the Association.

and re-letter items E through I to F through J

and be it further

RESOLVED that Chapter X, Finances, Section 10, MEMBERSHIP DUES change item D to read:

Honorary, Associate, and Affiliate Members: Honorary, associate, and affiliate members shall be exempt from the payment of dues.

The House of Delegates adopted BT4 – 18 – 1.

Dr. Randall thanked the members of the Reference Committee as well as Mrs. Amy Williams who assisted the Committee.

Dr. Clayton asked that all newly elected officers as well as ADA Delegates and Alternate Delegates and new trustees come forward. Dr. Dycus performed the installation duties.

Newly installed TDA President, Dr. Paul Cullum, addressed the House of Delegates with a pledge to serve the TDA to the best of his ability with honor and integrity. Dr. Cullum said that he is blessed to be surrounded by a talented and experienced Board of Trustees, and together they will work to serve the TDA membership and “... move the Association forward with our feet firmly planted in the history of this great Association that has stood the test of time for over 150 years.”

Dr. Clayton then asked for any new business. There being none, he adjourned the 151st TDA House of Delegates at 11:00 a.m.
President’s Address
By President Richard W. Dycus, D.D.S.

This year has been eventful and exciting. After 31 years of being a member of the TDA, I look back at where we started and I can’t believe I am here today.

I must acknowledge all my friends that have made this happen. My 4th District friends, My Annual Session committee John Petty - general chair, Jerald Bryant- local arrangement chair, Tim Brown- Registration chair, David Owsley exhibits chair, Terryl Propper my Sponsorship chair, my devoted staff, and my family. Particularly I must praise my wife Patty who has been by my side since dental school.

I stood here a year ago and listed 3 goals. The first to increase non-dues revenue. We have done that. We have increased our non-dues revenue from TDA insurance agency, the MEWA, endorsed products and with the exceptional leadership of Terryl Propper raised over 100K in sponsorship for this meeting.

The second goal was to have this be the Best Annual Session ever. You will have to be the judge of that. We will know more about how we did in 3 or 4 weeks when we look at all the details.

I praise all our committees and work on strategic plan. Our legislative agenda and teamwork.

My third goal was to have the shortest speech. In that tradition I bid you farewell and thank you for allowing me to serve. It has been fun. Thanks.
2018 Dr. Jack Wells Memorial Dedication to Dentistry Award

Jack Wells Award Winner Dr. Fred Heros, TDA President-Elect, Dr. Terryl Propper and TDA Treasurer Dr. James Avery.

2018 Fellowship Award Recipients

2018 Fellowship Award Winners Dr. David Storie, Dr. Vicki Guffey, Dr. Douglas Hunter, Dr. Cherae Farmer-Dixon, Dr. Lanora Bryant, Dr. Larry Higginbotham.
2018 Fifty-Year Award Recipients

TDA's 50 year in dentistry award recipients present: Front row, left to right: Mike Law, Barry Hopper, Curry Sullivan, Richard Berryman; Back row, left to right: Lawson Schroeder, James Owen, Ronald Johnson, Ed Vaughan, Charles Harbison, John Douglass Jr.

TDA Journal Editor Dr. Henry Clifton Simmons III and TDA Executive Director Mr. Mike Dvorak pictured with the 2017 Journalism Award Golden Pen.

The Past Presidents of the Tennessee Dental Association
Introduction

From 2009 to 2012, 46% of US adults, representing 64.7 million people, had periodontitis, with 8.9% having severe periodontitis. Overall, 3.8% of all periodontal sites (10.6% of all teeth) had pocket depth (PD) ≥4 mm, and 19.3% of sites (37.4% teeth) had AL ≥3 mm.

The severity of periodontal diseases has been staged into four categories, which includes; the greatest interdental clinical attachment loss (CAL), radiographic bone loss, and tooth loss due to periodontitis. Periodontal disease is also graded as A, B and C according to the progression of the disease; which is evidenced by bone loss over time. In addition, risk factors; such as, severity of Diabetes and smoking, are factored into the grading of the periodontal disease. Periodontitis has shown to have different contributing etiological factors, and a progression pattern that can vary from continuous, random, to asynchronous with multiple bursts.

At the present time, it is not possible to distinguish, prior to treatment, which individuals will respond to therapy and which will not. However, if signs and symptoms are detected early, the periodontist may have an opportunity to address treatment early, and control its progression.

In an attempt to develop objective measures of detecting the onset of periodontal disease, a wide variety of studies have been undertaken using saliva, blood, microbial plaque, and gingival crevicular fluid (GCF) as the specimen source. These methods used may be time consuming and exert considerable expenses to the patient.

Periodontitis often does not cause any symptoms until it has become advanced. Besides signs of erythematous and bleeding gingival tissues, periodontitis may show symptoms of teeth sensitivity, pain and oral malodor.

Teeth with a history of periodontal abscess can be treated and maintained for several years if patient is kept in successful periodontal maintenance program. It has been shown that 62% of patients with periodontal abscesses reported symptom of moderate to severe pain. Pain levels can be monitored during periodontal maintenance phase with the assistance of a mobile monitoring system (MMS). MMS have been used for evidencing diagnostic accuracy in the medical field. This prospective study showed that the MMS had a comparable accuracy rate, and importantly, had a shorter response time compared with an in-person visit.

Knowing that the severe forms of periodontitis may be accompanied by pain, and that currently, there is no method available to distinguish, prior to treatment, which individuals will respond to therapy and which will not. The present case report proposed the use of a MMS to detect disease activity in order to conduct treatment in a timelier fashion for a patient presenting generalized moderate, localized severe chronic periodontitis with periodontal abscesses.

Case Report

A 40-year-old male African-American presented with a chief complaint of “I want the gaps closed around my teeth.” The patient was seen regularly by a physician and did not present any medical diagnosis. Blood test requested showed normal levels of glucose, and hematocrit was within normal limits. Patient also showed absence of overt swelling or lymphadenopathy. The Patient was not compliant when scheduled dental appointments. During consultation, he reported pain, increased mobility of teeth at different periods of time, indicating a possible episodic burst.

ABSTRACT

Treatment of aggressive periodontal disease may require prompt monitoring of signs and symptoms in order to reduce periodontal breakdown. The purpose of this case presentation is to introduce a new method to facilitate promptness of treatment of a patient presenting generalized chronic moderate and localized severe periodontitis with periodontal abscesses (GCPPA) by means of a mobile monitoring system (MMS). One patient with GCPPA was chosen for this case report after being consented to the use of the MMS. A thorough periodontal examination was conducted at baseline, re-evaluation and at follow-up appointments. Systemic antibiotics were administered when required. The patient was placed on a MMS. Symptoms were monitored during patient’s surgical treatment. Osseous surgery was conducted in all four quadrants, antibiotic therapy was used as adjunct to therapy. The GCPPA patients showed decreased probing pocket depth, bleeding on probing index, and increased clinical attachment loss at seven months when compared to baseline. The MMS allowed prompt treatment. The proposed patient MMS allowed for prompt attenuation of the acute phase of the patient’s periodontal disease in order to treat it in a timely fashion.

Key Words
periodontal abscesses, periodontitis, patient monitoring system
model of a chronic periodontal disease. The patient reported history of sporadic abscess formation with exudates and intense pain, foul smell emanating from oral cavity and loosening of teeth. Patient informed that the symptoms occurred during personal stressed periods of time in his life. During his periodontal evaluation, the clinical exam of gingival tissues showed severe marginal erythema and edema, blunted gingival margins, fibrotic gingival tissues, and gingival racial melanin pigmentation. Patient presented a thick biotype (Figure 1). Periapical radiographic exams were taken (Figure 2). Teeth #1, 16, 17, 26 & 32 were missing and there was presence of spacing between several teeth. Initial periodontal exam (Figure 3) revealed plaque index (PI) of 100%, bleeding on probing index (BOP) of 100%, and 60% PD ranging from 4-6 mm and 12% PD of 7 or more. Patient presented 22% (#10, 12, 14, 15, 19 and 30) of teeth with suppurative involvement. Teeth #6, 9, 10, 22 & 23 presented pathological migration. Teeth #30 (lingual), 31 (lingual and buccal), 18 (lingual), 14 (lingual), 15 (lingual) showed furcation involvement grade I, teeth #3 (buccal and lingual), 15 (buccal), 18 (buccal), 30 (buccal) grade II and tooth #19 grade III. Patient presented with generalized severe interproximal clinical attachment loss (CAL). The mandibular incisors showed 30% of localized slight horizontal bone loss (BL). There was presence of teeth with slight, moderate and severe vertical BL. Patient presented with Miller’s class I mucogingival defect and Miller’s grade I & II mobility for several teeth. Periodontal diagnosis is generalized stage IV, grade C periodontitis with periodontal abscesses (Teeth #6, 9, 11, 22, 30). The primary etiological factor for periodontal disease is microbial plaque in a susceptible host. Secondary etiological factors are malposed teeth, furcation involvement, subgingival calculus, smoking, presence of ill-fitting bridge, open contacts and deficient dental care. The supra-gingival calculus was addressed by initial periodontal scaling in all four quadrants. For probing depths of 5 mm or more, osseous surgery was planned. Hopeless teeth were extracted. Provisionalization was conducted by the use of removable partial dentures to replace hopeless teeth after programmed extractions. Secondary occlusal trauma was corrected by means of occlusal adjustment.

After initial non-surgical periodontal treatment using ultrasonic and periodontal manual instruments the patient returned 6 weeks later for re-evaluation. At this appointment, the patient showed the following periodontal findings: severe marginal erythema and edema and blunted gingival margins. Suppurative and spacing of teeth were same as recorded at baseline. Slight reduction of PI from 100% to 90% and BOP from 100% to 80% from baseline to re-evaluation exam. PD between 4-6 mm varied from 60 to 58%. PD of 7 mm or more varied from 12 to 17%. CAL between 3-4 mm varied from 60 to 65%. CAL of 5 mm or more varied remained as baseline (23%) (Figure 3).

**Mobile monitoring system**

The patient’s mobile monitoring (FollowApp Care, Ltd.) system was tailored to function under HIPPA compliance. This integration involves: BAA agreement signed with the UTHSC College of Dentistry; FollowApp Care developers to comply by the encryption requirements of the FIPS 140-2 compliance law; and, Smartphones have a lock system in order to protect the personal information. Patient consented to the mobile monitoring system. The study was approved by the University of Tennessee Health Sciences College of Dentistry Institutional review board protocol no. 15-04317-XP.

The mobile monitoring system consisted of phone messages sent automatically through a patient communication services (FollowApp.

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**Figure 1:** Pre-treatment lateral views of initial frontal view

**Figure 2:** Peri-apical radiographs of the upper left quadrant. Note presence of moderate-to-severe vertical BL on mesial and distal aspect of #9, 10 and 11.
This service allows the provider to verify patient recovery, or questions during recovery period using a website access. This study used a surgical template that was sent to this patient 1-day, 4-days and 7 days post-operatively. This surgical template consisted of questions that would allow the provider to update on patient compliance to the use of pain medication; verify patient pain and swelling levels; verify presence of localized post-operative pain; and, provide a platform for the patient to ask questions to the doctor. Detailed questions are in Figure 6. This system allows settings to be modified in order to alert the provider for pain above a certain level and if the patient had any questions. Alerts can be set-up by means of phone messages or emailing the provider. If alerts are not set in the system, the provider can still keep track of the patient’s recovery just by logging into the FollowApp Care website, which is a secure network, and reading the patient reports. This study had an alert set-up for patient’s that reported pain above 6 and when patients had questions to the provider.

In order to participate in the mobile monitoring system, the patient is initially requested to consent to obtaining personal information. The patient is then given the opportunity not to answer the questionnaire. If the patient chooses to participate, then he/she will receive pre-made questions during specifically designed times during his/her treatment recovery period.

**Executed treatment**

Osseous surgeries were scheduled every 2 weeks. Osseous surgery was conducted for UR and UL quadrants without inter-occurrences. One week after osseous surgery (Figure 4) of the LR quadrant the patient reported pain in the LL quadrant using the mobile monitoring system. Interestingly, the LL quadrant had not been submitted to surgery, but scheduled for surgery the following week. As soon as the patient response was received, a prescription of antibiotic therapy using metronidazole (500 mg) and ciprofloxacin (500 mg) twice daily for 7 days was prescribed as adjuvant to periodontal therapy. Pain symptoms subsided within 24 hours after systemic antimicrobial therapy.

**Figure 3:** Periodontal evaluation showing mobility, furcation involvement, mucogingival defects, clinical attachment loss, gingival recession, probing depth, bleeding on probing and suppuration for buccal and lingual/palatal aspects of maxilla and mandible.

**Figure 4:** Pre-operative left buccal view. Note presence of moderate amounts of calculus on buccal surface of #14.
was initiated. Seven days later, the patient was submitted to periodontal osseous surgery for the lower left quadrant and had no further significant signs or symptoms. Tooth #19 was not extracted during osseous surgery due to patient’s request. The periodontal osseous surgery is described in Figures 4 & 5. Clinical re-evaluation after surgical therapy showed reduction in the periodontal parameters (BOP, CAL, PD & FI) (Figure 7). Post-treatment periodontal diagnosis reduced to localized stage III, grade C periodontitis. Patient was placed on a 3-month periodontal maintenance recall. Two months after finalizing osseous surgical treatment, note reduction of PDs, increase in the clinical attachment levels (Figure 8), absence of suppuration, reduction in PI and BOP (Figure 9).

**Patient response to mobile monitoring**

Mobile monitoring was used for pain level, number of pain pills taken, discomfort of the neighboring teeth and reduction or increase of swelling. Note 1 day after osseous surgery of UR quadrant the pain level was 7. On day 4 it reduced to 4 and increased on day 7. It was expected that the pain level would reduce; however, the patient was reporting pain in the quadrant that did not have surgery, LL quadrant (Graph 1, Figure 6). Patient was asked about his pain and if he would have addressed it if he didn’t have access to the mobile monitoring system. The patient indicated that he would have taken a pain pill instead of calling the doctor and waited for the next appointment. He indicated to have taken pain pills in previous times that he had acute pain and that the pain would subside.

**Discussion**

There is a clear need to detect, address and control severe forms of periodontal disease in a timely fashion. The association of tooth loss due to periodontal abscesses was made in a retrospective study. Patients were grouped according to the number of teeth lost following active periodontal treatment. The frequency of periodontal abscess and tooth loss per patient was greater in the downhill (4-9 teeth absent) and extreme downhill (10-23 teeth absent) response groups than the well-maintained (0-3 teeth absent) group. Forty-two percent of these patients had one or more periodontal abscesses, in which 45% lost their teeth and 55% were successfully maintained over an average of 12.5 years. The frequency of periodontal abscess and tooth loss per patient was greater in the downhill and extreme downhill response groups than the well-maintained group. This suggests that teeth with a history of periodontal abscess can be treated and maintained for several years if patient is kept in successful periodontal maintenance program. The present case report showed the use of a MMS for a patient presenting generalized chronic moderate and localized severe periodontitis with periodontal abscesses. The application used was successful in allowing the patient’s surgical treatment to finalize as scheduled, even with the advent of a flare-up of his periodontal abscess 7 days prior to his last scheduled periodontal osseous surgery.

The literature shows that periodontal disease may progresses in alternating periods of activity and quiescence, the periods of inactivity may remain for weeks to months or even years and will be followed by periods of active disease. During this period, there will be active bone destruction and

![Figure 5: Trans-operative view of osseous surgery of upper left quadrant. A: Primary incision on buccal aspect. B: Primary incision on palatal aspect. C: Buccal flap elevation. D: Palatal flap elevation. E: Removal of the buccal collar after debridement using ultrasonic and manual instruments. F: Simple interrupted simple suture was conducted using 4-0 chromic gut thread.](image)
attachment loss. When the patient presents in this stage, the gingiva will show all signs of mild to severe inflammation. Gingiva may be tender, erythematous, edematous, soft, and boggy. Bleeding on probing or even spontaneous bleeding and purulent exudation may be evident. The majority of the patients refer to dental consultation at this stage of the disease. The present case report shows a patient with history of asynchronous multiple bursts of the periodontal disease, as depicted by Page et al. (1983).

Candidates for systemic antimicrobial therapy are those exhibiting attachment loss after conventional therapy, or patients with aggressive forms of periodontitis or associated with predisposing medical conditions or refractory periodontitis. Patients with acute or severe periodontal infections (periodontal abscess, acute necrotizing gingivitis/periodontitis) may also benefit from antibiotic therapy. The present case report showed the use of systemic antibiotic to control the acute phase of the periodontal abscesses presented by the patient, allowing for the periodontal treatment to continue without interruptions.

The systemic use of antibiotics as adjuvant to periodontal disease has been proposed to support the host defense system in overcoming the infection by killing subgingival pathogens that remain after conventional mechanical periodontal therapy. Metronidazole (500mg) in conjunction with ciprofloxacin (500mg) twice daily, has been recommended for treatment of recurrent adult periodontitis. The objective of this combination is to target periodontal pathogenic bacteria that are more prone to be present during the burst of the disease activity. Ciprofloxacin is the only antibiotic in periodontal therapy to which all strains of A. actinomycetemcomitans are susceptible. It is also effective against anaerobes such as Porphyromonas gingivalis and Prevotella intermedia. In addition to this combination being effective for patients presenting recurrent periodontitis, it offers prophylactic benefit by giving rise to streptococcal microbes. In the present case report, metronidazole was used in conjunction with ciprofloxacin according to the benefits this combination may have for patients with a history of recurrent periodontitis and...
for the additional beneficial effect of stabilizing the microbiota.

Pathologic tooth migration is a complication of moderate to severe periodontitis. Etiological factors of pathologic tooth migration can be periodontal bone loss; Occlusion; Soft tissue forces of the tongue, cheeks, and lips; Pressure produced from inflammatory tissues; and, oral parafunctional habits. After periodontal surgery, spontaneous repositioning of migrated teeth has been reported. This was noticed in the presented case report on teeth #6, 9, 10, 22, and 23. Same sites showed reduction of the pathological tooth migration after treatment.

In the present care report, the hopeless teeth were not extracted due to patient’s request. The literature indicates that retained hopeless teeth have shown to have no effect on the periodontal status of adjacent teeth if the patients kept on a periodontal maintenance program after therapy, even after 8-years of follow-up.

It is now considered likely that emotional, behavioral, and psychosocial stressors are capable of activating the stress system, along with associated immune system effects. Psychological stress can down regulate the cellular immune response. Communication between the central nervous system and the immune system occurs via a complex network of bidirectional signals linking the nervous, endocrine, and immune systems. In the present case report, a possible trigger for the patient’s periodontal disease acute phase could have been the stress he reported having, which was temporarily linked to the increased malodor and pain.

The MMSs are a method that has shown to be successful in the medical field to monitor post-operative quality of patient recovery. Studies have shown that patient-provider communication have significantly improved by means of MMSs. In university hospitals, MMSs have shown to be the primary communication method for 57.8% of respondents, as opposed to the traditional paging system which showed only 1.3% of the respondents. The authors suggested abandoning the traditional paging system and considering facilitating better use of residents’ mobile

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**Figure 8:** Frontal view 6 months after initial therapy. Highest probing depth is 5 mm on distal palatal aspect of tooth #9.

**Figure 9:** Periodontal evaluation 2 months after periodontal osseous surgery of all 4 quadrants, and six months after initial periodontal treatment. Note reduction of PDs, increase in the clinical attachment levels, absence of suppuration, reduction in PI and BOP.
The present case report shows an effective means of communication between provider and patient using a MMS. The present reported patient also indicated that if the system was not available, he would have taken pain medication instead of calling the doctor. The pain medication would not have addressed the cause of the pain and the scheduled surgery would have been delayed if the patient had not been given the MMS as a means of communication.

Most of the work to date has failed to provide reliable systems for the clinician to detect disease activity. This case report shows a monitoring method of a patient that presented a severe form of periodontal disease that was promptly addressed, reducing the severe form of periodontal disease of the acute phase of the disease.

An additional benefit of MMS is that studies report between 15 and 27% of patients were unreachable by phone after multiple attempts to reach postoperative patient. The MMS allows the patient to respond to the messages at his or her convenience.

**Conclusion**

The authors believe that the use of home monitoring system allowed the patient to promptly attenuate the acute phase of the patient’s periodontal disease in order to treat it in a timely fashion; increasing patient comfort and optimizing treatment time.

**Acknowledgement**

The authors would like to thank the UTHSC College of Dentistry Alumni Foundation for supporting the use of the FollowApp Care home monitoring system in the UT clinics. We are grateful for Mr. Frank Pancratz’s technical support during the implementation of this system for the UT college of dentistry. We also would like to thank Dr. David Holmes, developer; and, Mr. Hansen Tsui, senior product manager of the FollowApp Care home monitoring system.

**References**


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1. What is the percentage of US adults presented severe forms of periodontitis from 2009 and 2012:
   a. 3.8%
   b. 8.9%
   c. 46%
   d. 64.7%

2. The progression pattern of periodontitis has shown to be the following, except:
   a. static
   b. continuous
   c. random
   d. asynchronous with multiple bursts

3. Objective measures of detecting the onset of periodontal disease using specimen sources are below, except:
   a. use of gingival crevicular fluid
   b. use of blood
   c. use of microbial plaque
   d. lacrimal fluid

4. Currently, periodontal disease has been staged into categories that include:
   a. greatest interdental clinical attachment loss
   b. radiographic bone loss
   c. tooth loss due to occlusal trauma
   d. tooth loss due to periodontal disease

5. The present study proposed mobile monitoring system by means of which allowed the following:
   a. treat the patient’s periodontal disease without surgeries
   b. treat the patient’s periodontal disease without initial therapy
   c. treat the patient’s periodontal disease with antibiotics
   d. to attenuate the acute phase of the patient’s periodontal disease and treat it in a timely fashion

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Mobile Monitoring System as a Novel Tool in Periodontology for Optimized Treatment of Patients Presenting Advanced Forms of Periodontal Diseases: A Case Report


Circle the correct letter answer for each CE Exam question:

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- Poor

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Journal of the Tennessee Dental Association • 98-1
Introduction

From a prosthetic perspective, restoring dental implants, in addition to buccally positioned, and being in the esthetic zone, can be challenging. Traditionally, implant-supported restorations can be screw-retained or cement-retained to implant abutments that are screw-retained. Screw-retained restorations may present several disadvantages, such as: compromised esthetics if the screw access opening involves the incisal edge; potential microbial microleakage around light-cured composite resins used in the screw-access holes; and increased risk for porcelain fractures and microfractures.

In certain conditions, axial alignment of the implant for a screw-retained restoration may also generate labial overextension of the restoration and other esthetic and surgical complications. Crowns bonded to screw-retained custom abutments can be a potential solution to these problems; however, they require creating retentive and resistant features for proper cementation. The higher the interocclusal space for fabrication of the crown, the easier it is to reach ideal esthetics.

Metallic abutments may compromise esthetics of dental implant supported restorations. This clinical report presents a solution for single tooth replacement when facing the esthetically compromised buccally positioned implants. A maxillary right central incisor was replaced using a single implant supported screw-retained custom metal ceramic abutment combined with a ceramic restoration.

The strong and reliable porcelain to porcelain bonding approach was used in combination with traditional principles of retention and resistance form of the abutment. This unique restoration design results in optimum aesthetics, despite having a metal ceramic implant abutment.

Case Report & Discussion

A 27-year-old Caucasian female presented with no relevant dental history other than trauma to the maxillary right central incisor. Her chief complaint was partial edentulism due to loss of this tooth, as a result of a motor vehicle accident. While her general dental health was unremarkable, clinical examination of the affected site revealed significant esthetic concerns such as labial bone concavity and partially collapsed restorative space.

The patient presented wearing an interim removable prosthesis replacing the missing tooth (Figure 1-2).

The restorative dentist needed a treatment option that would allow for successful rehabilitation while taking into consideration the anatomical limitations. Tooth replacement with a single implant-supported restoration was selected because the patient rejected any type of interim fixed partial or removable prosthesis. A treatment plan was completed accordingly, and informed consent was signed by the patient.

The surgical flap consisted of one crestal incision and two vertical incisions on mesial and distal aspects of site #8. A cylindrical implant (Straumann - Bone Level, 3.3 mm * 12mm; Straumann, Switzerland) was placed. After 6 months of successful healing, the implant was uncovered using a crestal incision while avoiding a vertical incision. A cemented-retained provisional restoration (Alike GC Japan) was first inserted to condition the soft tissue (Figure 3-4).

The definitive restorative phase began transferring the emergence profile and the architecture of the soft tissue with an individualized transfer which was characterized with the same emergence profile. Final provisional restoration and an individualized open custom tray were fabricated; seating of the impression coping was verified radiographically. An implant level impression was made with vinyl polysiloxane material (Imprint Garant 3M ESPE, Seefeld, Germany) (Figure 5). Additionally, impression of the opposing arch was made with irreversible hydrocolloid material (Heraeus Kulzer, Hanau, Germany).
A definitive cast was fabricated from die stone (Tuff rock formula 44, Talladium, Inc., Valencia, CA, USA). A UCLA type abutment was selected for the fabrication of a custom metal abutment. The metallic structure was previously waxed and cast in a precious alloy base on palladium (Callisto implant 60; Ivoclar Vivadent, Schaan, Liechtenstein) coated with IPS Classic feldspathic porcelain (Ivoclar Vivadent, Schaan, Linchestein). The vestibular and proximal margins were transferred 1mm below to the gingival margin (Figure 5A). The proper fit of the abutment was confirmed clinically and radiographically (Figure 5B). The proper fit of the abutment was confirmed clinically and radiographically (Figure 5B). A porcelain crown was also fabricated with IPS e.max lithium disilicate (Ivoclar Vivadent, Schaan, Linchestein) to generate sub and supragingival margins for the lithium disilicate restoration (Figure 7). Following careful intraoral evaluation (Figure 8A) and adjustment of the interproximal and occlusal contacts, the restoration was glazed and polished with knife edge rubber wheels (Keystone Industries, Gibbstown NJ, USA) and ready for the cementation.

The fitting surface of the porcelain was prepared for adhesive bonding by etching with 9% hydrofluoric acid (Ivoclar Vivadent; Schaan, Liechtenstein) for 30 seconds and rinsing with water for 45 seconds. The etched surfaces were then subjected to post-etching cleaning using a microbrush and 37.5% phosphoric acid (Ultra-Etch; Ultradent Products, Inc., South Jordan, UT, USA) with a gentle brushing motion for 30 seconds, followed by rinsing with water for 20 seconds. Cleansing was completed by immersion in distilled water in an ultrasonic bath for 5 minutes. Following thorough oil free air drying, the intaglio surfaces were then silanated (Excite; Ivoclar Vivadent, Schaan, Linchestein). The previously described surface conditioning was applied to the abutment as well. After the insertion of the abutment, 35 Ncm of torque was applied to the abutment screw. Proper seating of the abutment was verified radiographically (Figure 8B).

A polytetrafluoroethylene tape was used to cover the abutment screw and fill part of the access hole followed by composite resin (Tetric-N ceram: Ivoclar Vivadent, Schaan, Linchestein). The previously etched and silanated porcelain surface were then coated with adhesive resin (optibond FL; Kerr) and the crown was bonded using a resin-
based cement (Variolink; Ivoclar Vivadent, Schaan, Liechtenstein) (Figure 9). The excess cement was removed prior to giving the patient post-cementation instructions of hygiene care and maintenance. The use of dental floss and other hygiene aids were recommended. The 6-year follow-up appointment revealed that the patient had been successful in maintaining an acceptable peri-implant Hygiene without any complications. The final restoration demonstrated ideal aesthetics and successfully blended with the surrounding natural dentition in terms of shape, size, color and texture (Figure 9), and displays optimal function.

The soft tissues and the crown have the same quality, volume, height and shape since it was restored (Figure 10).12

**Conclusion**

This technique uses a standard metallic abutment (not custom or zirconia) over a Morse cone implant platform placed on a buccally positioned implant which still allows a satisfactory esthetic outcome without intercurrences during 6 years in service.

**References**


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Figure 9: A: Frontal view of the implant supported crown at baseline. Note acceptable esthetic appearance in spite of shorter distal papilla of implant #8 when compared to the contralateral implant #10. B: Acceptable smileline, in spite of the difference in the papilla heights indicated in “A”.

Figure 10: A: The 6-year follow-up showing stability of the soft tissues and the crown when compared to baseline. B: Note the unperceivable shortness of the distal papilla of implant #9 during patient’s smile.
1. What anatomical characteristic contributes to darker supportive tissue as a side effect of screw-retained restorations?
   a. Thin peri-implant supporting tissue
   b. Concave labial architecture
   c. Thickness of the bone
   d. Optical illusion

2. Mark the disadvantage(s) of screw-retained implant restorations?
   a. Microbial microleakage
   b. Increase risk for porcelain fractures
   c. Oral toxicity
   d. both a and b are correct answers

3. Which material, listed below, is known to have the best ability to mask metal implant abutments?
   a. Porcelain
   b. Composite
   c. Glass Ionomer
   d. none of the above

4. Which of the procedures below, are crucial in beginning the definitive restorative phase?
   a. Transferring the emergence profile during impression taking
   b. Patient interview
   c. Obtaining Radiographs
   d. Provisionalization

5. How is the intaglio surface of a porcelain-fused-to metal implant restoration prepared for adhesive cementation?
   a. Microabrasion
   b. Etching with 9% Hydrofluoric acid
   c. Treating with Hydrogen Peroxide
   d. Etching with 15% Hydrofluoric acid
Circle the correct letter answer for each CE Exam question:

1. a  b  c  d
2. a  b  c  d
3. a  b  c  d
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Cultural Competency Basics for Dental Teams

Mark Scarbecz, MA, PhD; Nakeshi L. Dyer, MA, EdD; Edward J. DeSchepper, MAEd, DDS, MSD

Introduction

The United States population is becoming increasingly diverse, along many sociodemographic dimensions. In 2014, 42.3 million Americans (13.3%) were foreign-born, nearly 40% of the population identified as other than Non-Hispanic white, and these percentages are projected to increase to 18.7% and 56.4%, respectively, by 2060. The percentage of the population aged sixty-five and older is projected to increase from 14.5% in 2014 to 23.5% in 2060. In 2016, it was estimated that approximately 4% of the U.S. population identified as LGBT. Given this increasing diversity, the effective and successful Healthcare provider is a culturally competent Healthcare provider. The Commission on Dental Accreditation (CODA), which accredits all U.S. dental education programs, recognizes this, and Standard 2-16 of the 2013 CODA standards for dental education programs states that “Graduates must be competent in managing a diverse patient population and have the necessary communication skills to function successfully in a multicultural work environment.” Dental schools, including the University of Tennessee Health Science Center College of Dentistry, ensure graduates meet this standard. Dentists who graduated prior to the 2013 CODA standards may be less certain about how to provide culturally competent care. A search on the term “cultural competence” in the PubMed/Medline database from the NIH/US National Library of Medicine resulted in 1,934 articles, with 835 (42%) of those articles published in the last five years. However, Kleinman argues that no one can define the term (cultural competency) precisely enough to operationalize it in clinical training and best practices. The emphasis in the research literature seems to be on assessing cultural competence, rather than cultural competence training.

A culturally competent dental team will be able to (1) Understand patients’ needs and perspectives, especially if patients’ beliefs about oral health are different from the Western biomedical model of oral health, (2) Ensure patients’ understanding and acceptance of treatment plans, (3) Provide effective oral health care instruction, (4) Motivate patients to practice preventive oral health care, and (5) Create a dental home for all patients in the community and build a successful practice. The objective of this article is to describe some behavioral and communication techniques that dental teams may use to effectively manage and communicate not only with diverse patient populations, but with all of their patients.

Culture typically encompasses many aspects of patients’ lives, from beliefs and attitudes to situational behaviors. Culture may be a function of race, ethnicity, gender identity, sexual orientation, age, religion, social class, geography, occupation, and other factors. For example, dentistry has an occupational culture characterized by the norms and values described in the ADA Principles of Ethics and Code of Professional Conduct. Young, et al., describe several aspects of culture that may affect how patients approach Healthcare or interaction with Healthcare providers:

- **Power distance** refers to the relationship that individuals have with persons in authority and the degree of deference accorded to authority figures. Some patients may defer to dentists, reasoning that the dentist as expert always knows best, whereas others may expect a more participatory model of Healthcare decision making.
- **Individualism** refers to the degree to which individuals make their own decisions or defer to a larger group, such as their family. Thus, some patients may wish to defer treatment decisions until they are discussed with other family members,
especially when there are esthetic or financial issues involved.

- Masculinity/femininity refers to gender-role ideas specific to a given culture. As a result, some patients may be more or less comfortable with opposite-sex health care providers, or may be more or less likely to take the advice of opposite-sex providers.

- Tolerance for ambiguity refers to the degree to which individuals are comfortable with uncertainty. No dental treatment is guaranteed, as the longevity and clinical viability of dental treatment depends upon many factors, including life-style, which is beyond the control of the dental team. For example, a patient may request a ceramic crown, but has a bruxism habit that affects the long-term prognosis of the restoration. Patients with less tolerance for ambiguity may require additional discussions with, and information from, the dental team before making decisions about treatment.

- Time-orientation refers to the degree to which patients focus on long- or short-term time horizons. Young, et al., points out that patients with a long-term time orientation may be more comfortable with treatment plans that require multiple visits and more time before seeing results. For example, while one patient may want a tooth-whitening procedure that produces immediate results, other patients may be comfortable with a whitening procedure that works gradually, such as take-home custom bleaching trays.

Other aspects of dentist-patient interactions that may be affected by cultural differences include forms of address, tolerance for non-clinical touch, such as handshakes, ideas about appropriate personal space, the length of time to build rapport, as well as non-traditional Healthcare practices.

Given the wide variety of patient beliefs and practices that may be affected by culture, dental team members may believe that attaining cultural competence is lengthy and time consuming, if not impossible to achieve. If patients can walk into the door of a dental practice from many different cultures, or social locations different from one’s own, how can team members hope to achieve cultural competence under those circumstances?

The key is that cultural competence is less a laundry list of what to do when a patient from a given culture walks in the door, and more about a set of practices and processes that allow the dental team to understand a patient’s wants and needs. The principle objective is to develop a partnership in the attainment of the shared goal of optimal oral health. Several approaches that are particularly useful for facilitating a long-term relationship and partnership between the dental team and patients from diverse cultures are described below.

The LEARN Model of cultural competence for dental teams describes a five step process for culturally competent health care.

L stands for Listen. Listen in the LEARN model goes beyond hearing the basics of a patient’s chief complaint. To listen to a patient requires empathy, which is defined as “the ability to understand and share another person’s feelings and perspectives and using that understanding and emotion to guide future action.”

Sympathy, in contrast, is not necessarily concerned with understanding. Empathy is central to the notion of patient-centered care, and requires a person to place themselves in the position of the other and to see the world through the eyes of the other. Empathy in the clinical setting has been shown to facilitate patient trust, disclosure (which is important in order to attain a complete understanding of a patient’s health history) and may be directly therapeutic. Additionally, cognitive empathy—understanding a patient’s experience—is distinct from emotional empathy – understanding a patient’s emotions associated with their health condition. A patient from a different culture may have a cognitive belief in weak or soft teeth and express a sense of helplessness or despair (emotion) that anything can be done to improve her oral health beyond extractions: “I come from a family that has soft teeth. My mom had dentures by the time she was thirty.”

Dental phobic patients may be comforted when dental team members demonstrate emotional empathy by expressing an understanding of patients’ fears, or describing their own experience with pain or fear, which can do much to reassure patients and alleviate their fears.

Additionally, listening is an active rather than a passive process. Active listening requires the dental team to attend to the patient at both the interpersonal and intra-personal level. Thus, active listeners respond to their patients with both empathy and reflection, reflecting the patient’s words back to the patient to demonstrate understanding and to verify accuracy: “From what you’ve told me, it sounds like some past dental experiences have made you anxious about seeking dental care.” Intra-personal active listening requires members of the dental team to mentally attend to the patient, rather than clicking through the patient’s electronic health record, or thinking about the next response to the patient. Active listening allows the dental team to fully understand patients with alternative beliefs about oral health care, without making initial, and perhaps faulty, assumptions.

E stands for Explain whereby the team members explain their perception of the patient’s problem from the perspective of modern dentistry. Thus, the dental team might explain to the patient who has a belief in soft (and, perhaps, from the patient’s perspective, hopeless) teeth, that there are new and innovative treatments that may be used to save teeth. The dental team should explain in terms the patient understands, or at least define dental terms as they are used during explanations. Furthermore, asking patients to repeat back their understanding of what was said has been shown to be an effective tool to assess patient understanding. However, a 2012 survey of dentists found that this technique was not used frequently by most dentists.

A stands for Acknowledge whereby team members acknowledge the patient’s perspective, contrasting it with their own perspective, and attempting to find points of commonality between the two. Acknowledgment of others’ perspectives is an integral
part of an empathic, patient-centered approach to care, but empathy does not necessarily mean agreement with another’s perspective. Team members may acknowledge a patient’s mistaken beliefs about oral health, such as the belief that root canals are always painful (cognitive empathy) - while at the same time, accepting a patient’s dental anxiety as a valid concern, based on past negative dental experiences (emotional empathy). Acknowledging a patient’s perspective may also allow team members to identify areas of agreement with the patient. For example, the dental team may acknowledge that a patient’s home-remedy is a viable short-term solution to relieve dental pain, such as a salt-water rinse for bleeding gums, and contrast that with dental treatments as a longer-term solution to the problem, such as a professional prophylaxis and improved home care.

R stands for Recommend, whereby the dental team makes recommendations regarding appropriate treatments for a patient’s oral health problems.

N for Negotiate. Negotiation in partnership with the patient on a treatment plan, or a home oral-health care regimen, becomes easier once the dental team, via an active listening process, has come to a better understanding of the patient’s beliefs, values and motivations. Furthermore, consideration of a patient’s personality, as well as common cognitive biases, may assist the dental team in coming to agreement with patients. For example, a patient may complain of their gingiva being puffy and unsightly. The dental team can motivate this patient to improve their home care regimen by framing better home care as a way to address their esthetic concerns, with the additional benefit being improved oral health.

The Kleinman approach to cultural competence is very similar to the LEARN model, although with less specificity. Kleinman is critical of the “dos and don’ts”/laundry list approach to cultural competence, as it may lead to stereotyping. For Kleinman, culture is not static or homogeneous, but dynamic and frequently changing, especially since cultural groups in the United States, rather than being isolated, are constantly influencing each other via frequent contact. Additionally, it may be a mistake for the dental team to assume that a patient’s dominant cultural trait (such as ethnicity) is the primary driver of a patient’s approach to dental care. A dental team may mistakenly assume that a patient’s missed appointments are the result of dental anxiety stemming from a patient’s cultural beliefs or experiences, whereas the real reason may be a job with an inflexible or frequently shifting work schedule. Thus, dental teams should take care to diligently investigate patients’ motivations, instead of making false assumptions.

Kleinman argues that health care providers, in order to be culturally competent, must practice ethnography. Ethnography is the central methodology of anthropology, whereby a researcher enters a local world or culture in order to obtain a “thick description” of that world. The goal of ethnography is to understand the world from a “native’s point of view.” Hopefully, no patient expects their clinicians to immerse themselves in the local world of their particular culture in order to understand that culture. However, the ethnographic approach does point to the centrality of listening to the patient with empathy, so as to have a complete understanding of the patient’s illness narrative: what the particular illness or problem means to the patient and the patient’s expectations, both long and short term, for their oral health. A springboard for this discussion may be the use of the Oral Health Impact Profile (OHIP-14) (or similar instrument) as an intake form for new patients. The OHIP-14 is a set of fourteen brief, specific questions (such as “uncomfortable to eat any foods” because of dental problems) that assesses patients’ oral health related quality of life, and has been shown to have good reliability and validity. Patients’ answers may be used as points of emphasis for future discussions. Similarly, the Corah Dental Anxiety Scale is a short, four (or five) question inventory, and may be used as an intake form to identify patients with dental anxiety and stimulate further discussion and exploration with the patient. Contrary to the belief of some practitioners, discussions of dental anxiety does not necessarily aggravate anxiety during dental visits.

Motivational Interviewing (MI) is another approach for delivering culturally competent healthcare. MI can be applied to all the patients in a dental practice, not just those with culturally diverse backgrounds, and is primarily geared towards promoting health behavior change among patients. It was first developed to assist alcohol-abusing patients with behavior change. The key insight of MI is that the clinician and patient work together to uncover the patient’s own motivations to change their behavior. The spirit of MI is considered foundational and critical to its successful implementation. The spirit of MI is characterized by active compassion for the patient, the acceptance of patient autonomy, a willingness to work in partnership with the patient, and respect for the patient’s choices. The MI approach may be particularly effective for patients from different cultural groups, as dental team members work with patients to discover patients’ cultural values that are consistent with healthy behaviors and behavior change.

Young, et al., outlines the four primary steps associated with MI, all of which are consistent with the approaches discussed above. The steps are (1) Express empathy, (2) Support self-efficacy, (3) Roll with resistance and (4) Develop discrepancy.

Expressing empathy in the context of MI involves understanding a patient’s expressed reasons for current behavior as well as a patient’s unwillingness, anxiety, or lack of confidence about the ability to make a change. Supporting self-efficacy refers to the dental team working with the patient to help the patient understand that they can make a change. Because people are subject to the availability bias—we form judgments about the world based on examples that are easily available or recalled—standard expressions of support as a way to promote patient self-efficacy may not be effective. Instead, it may be helpful to ask patients to recall similar instances in their own life where they have successfully accomplished a goal or made a change. Additionally, when planning for change, the more
specific the plan — “I will floss right before I feed the dog” — the more likely individuals are to follow the plan. Typically, individuals are more likely to conform to specific, established expectations for themselves.6

Rolling with Resistance refers to the fact, which is probably not surprising to most dental teams, that many patients are resistant to change. In the MI formulation, acknowledging this and continuing to express empathy in these circumstances is likely to be more effective in the long term than pushing against patient resistance. Additionally, the process of shaping — suggesting more modest goals, and rewarding the accomplishment of small successes on the way to the achievement of a larger goal — may be effective when patients express resistance.24 A patient may not want, or be able to, quit smoking cigars cold turkey, but reductions in the frequency or quantity of smoking are still milestones on the road to success, which should be acknowledged and celebrated.

Last, and perhaps most key to the MI process, is Develop Discrepancy. Cognitive dissonance is the psychological discomfort that may be felt by individuals when they hold competing or conflicting ideas, or discrepancies between their values and behavior.25 A patient may be able to express several positive things about smoking cigars. But, dental team members can help the patient to uncover other values that are inconsistent with smoking, as well as the long-term consequences of the behavior. For example, a patient may believe that smoking cigars is a symbol of machismo in his culture, but at the same time, the patient’s culture may highly value loyalty to family members, all of whom are concerned with the long-term health effects of the patient’s smoking. An MI approach may help the patient to discover the discrepancy between the two sets of values, and the primacy of the family values as a motivation to change his smoking behavior.

There are many studies on the effectiveness of MI, although more recent systematic reviews have called into question the degree of efficacy, especially with regard to changing oral health behavior, primarily due to the problematic design of trials which use MI as an intervention.25,26,27 Also, competence in the use of the MI technique takes practice and time.28 Despite this, it is worthwhile to consider MI as another strategy to help patients make positive behavior changes.

Clearly, commonalities exist among all these approaches for delivering culturally competent care, which can probably best be summarized with the three E’s:

Engage: Dental team members need to actively engage with their patients and go beyond the basics of medical and social history taking when meeting with new patients. While active engagement takes time, and the efforts of the whole dental team, it is likely to prompt further discussion of patient needs and wants, beliefs, values and practices.

Empathy: Active empathy is the core concept of all patient-centered care. Ultimately, developing both cognitive and affective empathy may, in the long term, increase patient satisfaction and adherence.29

Ethnography: Especially for those patients from different cultures, dental teams need to understand patients’ illness narratives, and develop a deep understanding of their beliefs and values if they are to ultimately deliver effective care.

There are circumstances where dental teams may need a deeper understanding of a particular cultural group than the techniques described above may provide. If a dental practice is located in an area with distinct ethnic or cultural communities, the dental team may need to take additional steps to understand the health concerns of that community. Websites such as culturevision.com may be particularly useful. Additionally, particular communities of patients may have specific health problems or concerns which are likely to affect critical aspects of dental care.30 In these cases, the judicious use of evidence-based resources is the best approach for the competent delivery of care.31

In summary, the notion of culturally competent care may be intimidating for many dental professionals, especially if such training was not included in their dental education. The approaches described in this article may help team members to provide culturally competent health care, such that patients may not only feel welcome in your practice, but will have felt that they have found— perhaps at long last—a long-term dental home.

References


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1. According to the article, what is considered central to achieving cultural competence?
   a. Creating a “laundry list” of things to do or not do according to the culture background of your patient.
   b. Developing a set of practices and processes that allow the dental team to understand the patient’s wants and needs.
   c. Learning the patient’s ethnicity as the principle driver of a patient’s approach to dental care.
   d. Reading about the various cultures seen in the United States.

2. In an attempt to encourage daily flossing, the dental team may suggest flossing at least twice per week, initially, working towards the goal of daily flossing. This would be an example of:
   a. Going with the flow technique
   b. Rolling with Resistance and the Shaping technique
   c. Self-efficacy technique
   d. The Kleinman technique

3. What are three common themes of the various approaches to delivering culturally competent care?
   a. Develop a list of do’s and don’t’s according to ethnicity, inquire about the patient’s religious beliefs, realize that some cultures do not believe in adhering to strict time schedules.
   b. Display tolerance for ambiguity, allow the patient to express individualism, set short-term goals with rapid results.
   c. Engage patients, display active empathy, develop an ethnographic understanding of patient beliefs and values.
   d. Go with the flow, act machismo with male patients, treat female patients very gently.

4. The LEARN Model of Cultural Competence employs the following 5 processes/principles:
   a. Laugh, ethnography, assume, resist, nuances.
   b. Like, engage, affirm, roll with the flow, nullify
   c. Listen, explain, acknowledge, recommend, negotiate.
   d. Litigate, enrage, activate, rule, notarize

5. If one were trying to encourage a patient to refrain from a harmful dental habit (behavior change), the most effective approach for the dental team to use would be:
   a. The Kleinman technique
   b. The Learn Technique
   c. Ethnography
   d. Motivational Interviewing

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**Introduction**

Modern dentistry continues to change with new and exciting areas in which practitioners can avail themselves. In addition, the current volume of new medications and dentally related procedures continues to grow. Our patients expect and demand that we, as professionals, are up-to-date in all areas as we diagnose and treatment plan what is best for their oral needs.

Part of the responsibility of all dental practitioners is the recognition of intraoral lesions as well as lesions in the surrounding perioral structures of the head and neck, areas that are subject to many skin cancers. Although skin cancer is preventable, it is increasing faster than any other form of cancer. During the past three decades, skin cancer has affected more individuals than all other cancers combined. The three most common types of skin cancer; basal cell carcinoma (BCC), squamous cell carcinoma (SCC) and malignant melanoma (MM), often present on the face, head and neck areas. Therefore, the concept that oral health professionals include a skin cancer examination in their routine extraoral clinical assessment is appropriate and not a new concept.

The literature cites many examples of the need for dentists to be involved in the recognition of skin cancer. Examples include Corcoran et al’s 2013 publication titled Head and neck skin cancer: dentist’s responsibility in early detection. The three most common types of skin cancer; basal cell carcinoma (BCC), squamous cell carcinoma (SCC) and malignant melanoma (MM), often present on the face, head and neck areas. Therefore, the concept that oral health professionals include a skin cancer examination in their routine extraoral clinical assessment is appropriate and not a new concept.

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**ABSTRACT**

Dentists have been called physicians of the head and neck. The recognition of perioral lesions remains an important part of the routine examination done at each appointment. Common sites for basal cell carcinoma are the head, nose and facial skin. It is one lesion that every dentist should be able to recognize in its early stage. Early detection by the dentist may prevent potential severe sequelae for the patient.

**Keywords**

Basal cell; nonmelanoma; skin cancer; Mohs
Approximately 90% of NMSC is associated with exposure to UV radiation from the sun. For example, the estimated incidence of NMSC, such as BCC, in South Florida might be among the highest recorded incidences in the world. (Table 1) UV rays from the sun or from a tanning bed are the main cause of BCC. When UV rays encounter the skin, over time, they can damage the DNA in the skin cells. The DNA holds the code for the way these cells reproduce. Prolonged exposure to the sun can cause damage to the DNA and the result is the formation of skin cancer. The process usually takes many years.

BCC is unlikely to spread from the skin to other parts of the body, but it can move nearby into bone or other tissue under the skin. The tumors typically appear on the nose or other parts of the face. But they can appear on any part of the body, including the trunk, legs, and arms. If a person has fair skin, they are more likely to get this skin cancer. BCC usually grows very slowly and often does not show up for many years unless there was a lot of exposure to UV light at a young age. Normally, as long as the individual detects BCC early, it can be cured. At first, BCC shows up like a small “pearly” bump that resembles a flesh-colored mole or a pimple that does not go away. Sometimes these growths can look dark. It may also appear as shiny pink or red patches that are slightly scaly. (Table 2)

### Treatment Choices

The goal is to eliminate the cancer while leaving as small a scar as possible. To choose the best treatment, the treating physician who is usually a dermatologist or plastic surgeon, will consider the size and location of the cancer, as well as how long it has been present. Additional concerns in the treatment that must be taken into account are the chance of scarring and the patients’ overall health.

Currently there are multiple ways of treating BCC, both surgical and nonsurgical. Several popular nonsurgical methods include:

1. **Freezing (cryosurgery).** Freezing the cancer cells allows the physician to kill the cells with liquid nitrogen. With this procedure, there is usually no biopsy taken due to the destruction of the cells in the area by

### Table 2 - Basal-Cell Carcinoma-Classifications based on Growth Pattern

<table>
<thead>
<tr>
<th>Superficial</th>
<th>Infiltrative</th>
<th>Nodular</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Superficial proliferation of neoplastic basal cells</td>
<td>• Encompasses morpheaform and micronodular basal cell cancer.</td>
<td>• Includes most remaining categories of basal-cell cancer</td>
</tr>
<tr>
<td>• Generally responsive to topic chemotherapy, such as Aldara (Imiquimod), or Fluorouracil.</td>
<td>• More difficult to treat with conservative methods, given its tendency to penetrate into deeper layers of the skin.</td>
<td>• Heterogeneous morphologic features can present within the same tumor.</td>
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### Histological Classifications

| Nodular or ‘Classical’ | Most commonly occurs on the sun-exposed areas of the head and neck |
| Cystic | Characterized by dome-shaped, blue-gray cystic nodules |
| Cicatricial (also known as ‘morpheaform’ or ‘morphoic’ basal cell carcinoma) | Aggressive variant with a distinct clinical and histologic appearance |
| Infiltrative | Aggressive and characterized by deep infiltration |
| Pigmented | Increased melanization, uncommon in Caucasian people, account for 80% of cases in Chinese people |
| Rodent ulcer (also known as ‘Jacob’s ulcer’) | A large skin of nodular basal-cell carcinoma with central necrosis. Almost all cancers can metastasize except glioma and the rodent ulcer |
| Fibroepithelioma of Pinkus | Most commonly occurs on the lower back |
| Polypoid | Characterized by exophytic nodules on the head and neck |
| Pore-like | Resembles an enlarged pore or stellate pit |
| Aberrant | Formation of basal-cell carcinoma in the absence of any apparent carcinogenic factor, occurring in odd sites such as the scrotum, vulva, perineum, nipple, and axilla |

### Pathophysiology

- Considered to originate from the folliculo-sebaceous-apocrine germ (trichoblast).
- Overexposure to sun leads to the formation of thymine dimers, damaging DNA.
- Cumulative crosslinks lead to mutagenesis and depression of local immune system, decreasing immune surveillance for new tumor cells.
- Often associated with other skin lesions (actinic keratosis, seborrheic keratosis, squamous cell carcinoma)
- Can develop as a result of basal cell nevus syndrome (Gorlin Syndrome), characterized by keratocystic odontogenic tumors of the jaw, palmar or plantar pits, calcification of the falk cerebi. Caused by mutation in PTCH1 tumor suppressor gene in chromosome 9q22.3, which inhibits the hedgehog signaling pathway; or mutation in the SMO gene, also on the hedgehog pathway
the liquid nitrogen, so follow-up is very important.

2. Radiation. Although not used often in the United States, radiation therapy uses X-rays to destroy the cancer cells. It is done over a several week period, again without a biopsy. There is usually a wide area of tissue destruction with this method so it is usually limited to areas that are hidden, like in the scalp.

3. Topical chemotherapeutic cream. As a non-invasive treatment, the physician may recommend medication that can treat BCC. Two skin creams that are currently used are fluorouracil (5-FU) and imiquimod. Usually, topical creams are applied for several weeks. No biopsy is performed with this treatment.

4. Oral medication. There is also a pill that can be prescribed called Erivedge (vismodegib). This drug is usually used when the BCC has spread to other parts of the body. Again, no biopsy is performed with this treatment.

Current surgical methods include:

1. Curettage and Desiccation. This procedure involves scraping the tumor away and using electricity to kill the cancer cells. First the physician uses a local anesthetic to anesthetize the skin. Then a curette is used to scrape off the tumor. Control of the bleeding is maintained by using an electric needle or “cautery” which kills any other cancer cells. There is usually no biopsy with this procedure due to the destruction of the cells in the surgical site so follow-up is very important.
important to detect any possible reoccurrence.

2. **Excision.** Another popular surgical procedure is excision or cutting out the lesion. This involves anesthetizing the lesion and the surrounding skin around it, then scraping the lesion with a spoon-shaped device. Next, the tumor is excised along with a small surrounding area of normal-appearing skin and after suturing the surgical site, the excised tissue is sent to a lab for examination. If the lab results discover that there are cancer cells in the area around the primary site, additional surgery is usually needed to remove this tissue.

3. **Mohs surgery.** One of the most effective methods of removing BCC is a surgical procedure known as Mohs surgery. This is a technique that is named after Dr. Mohs who invented it in 1933. The surgeon removes the cancer layer by layer by taking out some tissue, then looking at it under a microscope to see if it has cancer cells, before moving on to the next layer. The procedure continues until there are verified cancer free margins.

Today, there are over 900 members of the American College of Mohs Surgery (ACMS), all of whom have received post-residency fellowship training in Mohs surgery, pathology and reconstructive surgery. Currently, Mohs surgery is indicated for BCCs and SCCs and multiple studies have confirmed its superiority over standard excision. In fact, Mohs surgery has been shown to be superior over any other treatment modality used, with five-year recurrence rates as low as 1 percent for BCCs and 3-5 percent for SCCs.12,13

**Case Report**

The following is a detailed look at a typical patient whose lesion was discovered in a routine dental visit and includes the sequence of a Mohs surgical procedure on this same patient. In a patient like this one, a simple observation by the dentist and referral can mean the difference between a great outcome or the spread of the cancer and the possibility of a morbid, non-treatable ending. The lesion in Figure 1 is a perfect example of the appearance of BCC. Visible at the hairline, this lesion should be obvious to the observant dentist as the patient lies back in the chair. Upon locating this change in skin texture and discovering that the patient has noticed that it has been present for some time and itchy, an immediate referral was warranted.

In this case, one week after being informed by the dentist of the strange appearance of an area on the forehead, the patient was seen by a dermatologist for a simple biopsy which came back positive for BCC. The patient was immediately referred to a local Mohs surgeon for evaluation and removal of the lesion. Mohs surgery was performed on March 17, 2015 and is represented in the following figures:

**Figure 2:** Represents the surgical site after the administration of 2% lidocaine via local injection

**Figure 3:** The surgical site with surrounding marginal tissue removed

**Figure 4:** The surgical site sutured after the tissue sample revealed cancer free margins

**Figure 5:** The typical post-operative edema from the lymphatic drainage below the Mohs surgical site

**Figure 6:** Additional bilateral suborbital post-operative edema from the lymphatic drainage below the Mohs surgical site

**Figure 7:** The surgical site 24 days post-surgery after suture removal

**Figure 8:** The surgical site 2 ½ years post-surgery

This case represents a successful outcome that may not have happened without the observation of the dentist. This case report illustrates how the clinical findings of a routine dental examination discovered a suspicious skin lesion that was then referred to a dermatologist. After biopsy, it was ultimately diagnosed as BCC and the follow-up medical treatment using Mohs surgery is presented. Many individuals would not consider a small itchy area to be of any concern. Delaying the diagnosis and treatment of this BCC could have easily led to a much more aggressive surgical procedure, and potential spread of the cancer to neighboring tissue and the underlying bone. Although rare with BCC, metastases can occur that usually result in extensive invasive treatment, including radiation and chemotherapy. Left untreated, it can lead to the death of the individual.

Therefore, it is incumbent that all dental personal be educated in the detection of any unusual appearance in the tissues of the head and neck region. As professionals, we owe it to our patients to be able to recognize and promptly inform them just as we would inform them of a lesion in the mouth.

**References**


Timothy L. Hottel, DDS, MS, MBA* is the Director of Statewide Oral Health Initiatives, Office of the Executive Vice Chancellor at the University of Tennessee Health Science Center College of Dentistry in Memphis, Tennessee.

Chris S. Ivanoff, DDS is the Associate Professor, Department of Bioscience Research at the University of Tennessee Health Science Center College of Dentistry in Memphis, Tennessee.

John Antonelli, DDS, MS is the Professor, Department of Prosthodontics, Health Professions Division at the Nova Southeastern University in Ft. Lauderdale, Florida.
1. Human skin contains how many layers?
a. 2 layers  
b. 3 layers  
c. 4 layers  
d. 5 layers

2. Approximately what percent of NonMelanoma Skin Cancer comes from UV radiation from the sun?
a. 70%  
b. 80%  
c. 90%  
d. 95%

3. Non-surgical treatment of Basal Cell Carcinoma treatment includes which of the following?
a. Cryosurgery, Radiation, Topical Chemotherapy cream, Oral medications  
b. Deep massage, trigger point injections  
c. Proliferative therapy injections  
d. Dry needling

4. Mohs Surgery involves which of the following?
a. Curettage and desiccation  
b. Excision of a block of tissue  
c. Layer by layer removal of cancerous tissue and microscopic evaluation  
d. Cryosurgery

5. Mohs Surgery has which of the following five-year recurrence rate?
a. 5% for Basal Cell Carcinoma  
b. 1% for Basal Cell Carcinoma  
c. 10% for Squamous Cell Carcinoma  
d. 15% for Squamous Cell Carcinoma

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Circle the correct letter answer for each CE Exam question:

1. a b c d
2. a b c d
3. a b c d
4. a b c d
5. a b c d

Date exam taken: ________________________

Please complete the following course evaluation. These answers do not affect the grading process.

Assess your mastery of the material
- Full
- Partial
- No

Your comprehension of material
- Excellent
- Fair
- Poor

Appropriateness of the material
- Excellent
- Fair
- Poor

Was the material adequately in-depth?
- Yes
- No

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Introduction

A number of chairside CAD/CAM restorative materials demonstrate predictability and longevity. These materials include esthetic ceramics that contain a glassy phase, allowing restorations to be etched and bonded to the tooth. Feldspathic (Vitabloc Mark II) and Leucite reinforced (IPS Empress CAD) are examples of such ceramics. High-strength ceramics, such as IPS e.max CAD, offer an increase in flexural strength compared to esthetic ceramics.1,2

Two types of composite resin blocks commercially available include Paradigm MZ100 that is recommended for final restorations, and Vita CAD Temp and Telio CAD used primarily in long-term temporization. Hybrid Nanocomposite is a unique dental material combining the best characteristics of a high strength ceramic and a composite. In addition to its high degree of flexibility, glossy surface finish, strength, and breaking energy, this material helps to ensure better edge quality and smooth margins. As a result, this material is ideally suited for inlays, onlays, veneers, and crowns. Lava™ Ultimate Restorative and CERASMART are two examples of hybrid nanocomposites. A diverse variety of CAD/CAM materials function in multiple clinical applications, making CAD/CAM technology so vital to dentistry.1,3,4

Color stability is a critical parameter of aesthetic restorative materials. Maintenance of color throughout the lifetime of restorations is important for the longevity of treatment. Color stability varies among dental restorative materials. Color stability is defined as resistance of the materials to a change in color that can be caused by light.5,6

The popularity of CAD/CAM restorations is increasing; however, the color stability of these materials is poorly understood. Discoloration may happen by exposure to different liquids such as soda, tea, coffee or red wine. Other causes of discoloration may include incomplete polymerization, water sorption, chemical reactions, diet, or surface roughness of the restoration. Discoloration can be caused by extrinsic or intrinsic sources. Intrinsic discoloration is attributed to the system of initiator, polymerization of the resin and chemical changes of the restorations. An esthetic concern for CAD/CAM restorative materials is the monochromatic nature of the CAD/CAM blocks in appearance. Ceramic and composite restorations can be improved by adding stain and/or glaze after milling.7,8

There are two main parameters used to measure the color stability and the translucency of dental materials:

1. Contrast Ratio (CR) - Contrast Ratio is the ratio between the light reflectance of a specimen over a black background and light reflectance over a white background.
2. Translucency Parameter (TP) - TP represents the color difference, determined by L*a*b values between a material of uniform thickness over a black and a white background. Corresponds

ABSTRACT

Objectives

The objectives of this study are to evaluate the effect of thermocyclic aging on the color stability of chairside CAD/CAM restorative materials

Materials and Methods

Color stability of Lava Ultimate Restorative, Telio CAD, Vita CAD Temp, CERASMART, Paradigm MZ100 and IPS e.max CAD in hot water and dry were tested. Twenty specimens from each material were prepared. Color changes values (Delta E) after 3 weeks, 6 weeks, 8 weeks and 12 weeks were calculated.

Results

After 3 weeks of hot water exposure: Lava Ultimate Restorative = 3.55, CERASMART = 1.82, e.max CAD = 0.89, MZ100 = 0.85, Telio CAD = 0.43 and Vita CAD Temp = 0.75. After 6 weeks of exposure: Lava Ultimate Restorative = 4.06, CERASMART = 1.74, e.max CAD = 1.05, MZ100 = 1.14, Telio CAD = 0.57 and Vita CAD Temp = 0.92. After 8 weeks of exposure: Lava Ultimate Restorative = 3.98, CERASMART = 2.22, e.max CAD = 1.10, MZ100 = 1.48, Telio CAD = 0.76 and Vita CAD Temp = 1.130. After 12 weeks of exposure: Lava Ultimate Restorative = 4.18, CERASMART = 2.16, e.max CAD = 1.85, MZ100 = 2.83, Telio CAD = 1.46 and Vita CAD Temp = 1.44.

Conclusion

Materials type, treatment method, and treatment time showed significant effect on the color differences. Lava Ultimate has significant higher color change than other tested materials.
CIELAB (CIE L*a*b*) is an analytical color investigation system. The International Commission on Illumination summarized the first phase of CIELAB in 1931. In 1976, the CIE recommended the CIE L*a*b*, or CIELAB, color scale for use. CIE was intended to provide a uniform color scale. It initially was developed as an objective, color evaluation method using a light source, a sample, and an observer. This method of showing a sample is equivalent to what the human eye could see from a distance.

The CIELAB system analyzes the differences between the sample and the standard and makes numerical assignments dependent on the color difference:

L* values represent the luminosity of the color, so the lightness and L* value for darkest black is L* = 0, and for pure white L* = 100.

The A* values scale reveals Red vs. green where a positive number represents red and a negative number represents green on the horizontal axis.

The b* values scale reveals yellow vs. blue where a positive number represents yellow and a negative number represents blue on the horizontal axis. Yellow and blue usually are not the main colors of the material but sometimes these colors are used to counterbalance each other.

In 2008 Samra AP et al. studied the assessment of the color stability of five aesthetic restorative materials when immersed in a coffee solution. One direct composite resin (Tetric Ceram, Ivoclar/Vivadent - G1), three indirect composite resins (Targis, Ivoclar/Vivadent - G2; Resilab Master, Wilcos - G3; belleGlass HP, Kerr - G4) and one porcelain (IPS Empress 2, Ivoclar/Vivadent - G5) were tested in the study. 17mm X 1mm specimens were prepared and divided into five groups then immersed in a coffee staining media for 15 days and stored in the dark at 37 degrees C +/- 1 degrees C. The measurements were collected after 1 day, 7 days and 15 days by using a spectrophotometer. They concluded that G1 and G3 showed significantly higher discoloration than the other groups. G2 and G4 showed intermediary pigmentation, while G5 shows less color changes.3,7

Bogna Stawarczyk et al., 2012 investigated the effect of coffee, black tea and red wine on discoloration of five CAD/CAM and four traditional polymerized resins in comparison to glass-ceramic. The materials used in this study are Blanc High-class (HC), ZENO PMMA (ZP), artBloc Temp (AT), artegral ImCrown (AI) and CAD-Temp (CT), four manually polymerized resins: Unifast III (UF), Gradia GD, CronMix K (CM) and Integral esthetic press (IE), and one glass-ceramic empressCAD (CG) as the control group. Specimens were prepared with a 5mm X 1mm diameter thickness and then divided into three groups and stored in coffee, black tea or red wine. Using the spectrophotometer, readings were collected after 1, 7, 29, 90 and 180 days. They found that the four of the five CAD/CAM resin materials showed similar color stability compared to the control. Traditional polymerized resins showed similar color stability as the control. Composite-based resins presented greater discoloration than the PMMA-based resins, except CT.3,6,9,10

Materials and Methods

2-1 Materials

This in-vitro study examined the color stability properties of six different materials after hot water and light exposure.

I. Vita CAD Temp. is a cross-linked acrylate polymer with microfiller manufactured by (VITA Zahnfabrik, Bad Säckingen, Germany)

II. Telio CAD. Is an acrylate polymer (PMMA) block manufactured by Ivoclar Vivadent, Schaan, Liechtenstein.

III. IPS e.max CAD. IPS e.max is a lithium disilicate glass-ceramic block manufactured by Ivoclar Vivadent, Schaan, Liechtenstein.

IV. Paradigm MZ100. Paradigm MZ100 block material consists 85% by weight of ultrafine zirconia-silica ceramic particles and reinforced by high cross-linked polymeric matrix manufactured by 3M ESPE, USA

V. CERASMART. Is a CAD/CAM block that is comprised of a flexible and evenly distributed nano ceramic matrix that is manufactured by GC America.

VI. Lava Ultimate Restorative. Ultimate Restorative is a Nano composite resin reinforced by Matrix (Bis-GMA, Bis-EMA, UDMA, TEGDMA). That is manufactured by 3M ESPE, USA

2-2 Methods

Twenty specimens of each material (VCT, TC, LUR, MZ 100, EM and CS) were cut into an average of thickness of 1.5 mm using an ISOMET 2000 Precision Saw. Specimens were polished on both sides by a Buehler grinding-polishing system beginning with graded diamond grits of 70, 45 and 15 μm in size under water and then with 6-μm and 1-μm polycrystalline diamond suspensions applied to special pads. Specimens were then mounted on a custom made holder as shown in (Figure I).

Mounted specimens were divided into two groups, in the first (group one) specimens were stored in a dark and dry place. In the second (group two) specimens were placed in hot water at 60°C and ambient light as shown in (Figure 2).

Color readings were taken by a Color i5 spectrophotometer (X Rite-Gretag Macbeth) (Figure 3). Delta-E (∆E) was calculated for the second group then compared to the control group.

Measurements

Color was measured for groups one and two before any exposure and after exposure to the different treatments. Calculate ∆E among the measurements of color before exposure (I) and after 3 weeks of treatment (II), 6 weeks (III), 8 weeks (IV), and twelve weeks (V) for both groups.

Steps

I. Measure color for both groups before any exposure
II. Measure color at 3 weeks of exposure for group one and group two and calculate ∆E between the measurements of color before exposure (I) and after 3 weeks of exposure (II) for both groups.
III. Measure color at 6 weeks of exposure for group one and group two and calculate ∆E between the measurements of color before exposure (I) and after 6 weeks of exposure (II) for both groups.

CONTINUING EDUCATION EXAM #101
two and calculate ΔE between the measurements of color before exposure (I) and after 6 weeks of exposure (III) for both groups.

IV. Measure color at 8 weeks of exposure for group one and group two and calculate ΔE between the measurements of color before exposure (I) and after 8 weeks of exposure (IV) for both groups.

V. Measure color at 12 weeks of exposure for group one and group two and calculate ΔE between the measurements of color before exposure (I) and after 12 weeks of exposure (V) for both groups.

First Measurement

After polishing the specimens, they were dried in an oven at 45°C for 12 hours. The first reading of color with the spectrophotometer was taken before initiation of treatments.

Second Measurement

After completion of the first measurement, specimens of the first group were stored in a custom-made light-safe box at room temperature for 3 weeks. Specimens of the second group were mounted in custom-made holders and placed in a 60°C hot water bath for 3 weeks. Subsequently, group two specimens were dried in a 45°C oven for 12 hours. The second reading of color was taken after 3 weeks for both groups using the Color i5 spectrophotometer. The differences in color (ΔE) were calculated for readings before exposure (I) and after 3 weeks of exposure (II).

The formula used for ΔE calculations:

$$\Delta E_{ab} = \sqrt{(L_2 - L_1)^2 + (a_2 - a_1)^2 + (b_2 - b_1)^2}$$

Third, fourth and fifth Measurements

The third, fourth and fifth measurements followed the same protocols as described in the second measurement except color was assayed after 6 weeks (III), 8 weeks (IV) and 12 weeks (V) of exposure.

Results

*Five spectrophotometer readings were taken:

I. Baseline before exposure (dry and wet)

II. After 3 weeks of exposure

III. After 6 weeks of exposure

IV. After 8 weeks of exposure

V. After 12 weeks of exposure

*ΔEs were calculated from the following readings:

1. I and II (color differences after 3 weeks)

2. I and III (color differences after 6 weeks)

3. I and IV (color differences after 8 weeks)

4. I and V (color differences after 12 weeks)

Delta E (ΔE) for color changes (spectrophotometer readings I and IV) after 8 weeks for the 6 materials is presented in (Table 3) and (Figure 6).

Delta E (ΔE) for color changes (spectrophotometer readings I and V) after 12 weeks for the 6 materials is presented in (Table 4) and (Figure 7).

The results were expressed as means standard deviations. Multiway ANOVA was used to analyze the color differences (Delta E). The ANOVA test shows that significant differences among materials type (P<0.001), treatment methods (P<0.001), and treatment times (P<0.001) each significantly effect on color change. To clarify the differences among the groups a Post Hoc Tukey test for multiple analyses was presented.

Discussion

This in-vitro study evaluates the color changes for six different dental materials after dry or hot water exposure. Change in the material color (delta E or ΔE) was compared after either dry or hot water exposure for 3, 6, 8 and 12 weeks. ΔE values of 2.3 or above have noticeable changes in color that are detectable by the human eye.

1.) The ΔE to measure color changes after 3 weeks of exposure for 6 dental materials.

When a comparison was done at 3 weeks for samples stored dry and in the dark, the six materials have small but not statistically significant changes in color. For samples stored in hot water at 60°C, six materials have the least changes in color however these changes...
were statistically significant.

The descending order of ΔE values for samples stored dry and in the dark for Lava U R is 0.990, CERASMART is 0.662, e.max CAD is 0.477, MZ100 is 0.462, Telio CAD is 0.455 and Vita CAD Temp is 0.520 respectively, each without statistically significant differences. The descending order of ΔE values for samples stored in hot water are Lava U R 3.559, CERASMART 1.828, e.max CAD 0.896, MZ100 0.858, Telio CAD 0.437 and Vita CAD Temp 0.754 and each have statistically significant differences.

Samples stored dry and in the dark have ΔE values below 1 and these color changes are not detectable by the human eye. The human eye is unable to detect color changes if ΔE ≤ 2.3.

Lava U R and CERASMART had significantly higher ΔE values compared to the other materials after 3 weeks of hot water at 60°C. The ΔE value for Lava U R of 3.559 was above the threshold for human eyes to detect a change in color. These findings demonstrate that Lava U R is more prone to discoloration after 3 weeks in a 60°C aquatic environment.

These changes in the dental materials could be the result of staining or chemical reaction induced discoloration. Chemical discoloration may be attributed to degradation of the polymer matrix via breaking the chemical bonds between a silane coupling agent and the nanoceramic and/ or resin matrix. Water uptake by the resin polymer containing nanoparticles can cause swelling of the polymer network and reduce frictional forces in the polymer. The water absorbed by the resin polymer can also cause breakage of the nanocluster-nanomer bond or hydrolytic degradation of the fillers. Degradation of the nanoparticles may create voids on its surface that cause a change in color.

2.) The ΔE to measure color changes after 6 weeks of exposure for the 6 dental materials

When a comparison was done at 6 weeks of exposure for the 6 dental materials

Table 1: ΔE (ΔE) of spectrophotometer readings I and II for color changes after 3 weeks.

<table>
<thead>
<tr>
<th>MATERIALS</th>
<th>DRY (ΔE)</th>
<th>WET (ΔE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lava U R</td>
<td>0.990</td>
<td>3.559</td>
</tr>
<tr>
<td>CERASMART</td>
<td>0.662</td>
<td>0.477</td>
</tr>
<tr>
<td>e.max CAD</td>
<td>0.477</td>
<td>0.896</td>
</tr>
<tr>
<td>MZ100</td>
<td>0.462</td>
<td>0.858</td>
</tr>
<tr>
<td>Telio CAD</td>
<td>0.455</td>
<td>0.437</td>
</tr>
<tr>
<td>Vita CAD T</td>
<td>0.520</td>
<td>0.754</td>
</tr>
</tbody>
</table>

Table 2: ΔE (ΔE) of spectrophotometer readings I and III for color changes after 6 weeks.

<table>
<thead>
<tr>
<th>MATERIALS</th>
<th>DRY (ΔE)</th>
<th>WET (ΔE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lava U R</td>
<td>1.345</td>
<td>4.069</td>
</tr>
<tr>
<td>CERASMART</td>
<td>0.744</td>
<td>1.762</td>
</tr>
<tr>
<td>e.max CAD</td>
<td>0.683</td>
<td>1.059</td>
</tr>
<tr>
<td>MZ100</td>
<td>0.934</td>
<td>1.141</td>
</tr>
<tr>
<td>Telio CAD</td>
<td>0.503</td>
<td>0.577</td>
</tr>
<tr>
<td>Vita CAD T</td>
<td>0.702</td>
<td>0.925</td>
</tr>
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5). For samples stored in hot 60°C water, six materials had the least color changes with significant differences.

Samples stored dry and in the dark have ΔE values below 1.4. Hence, their color changes are below the threshold of detection for the eye.

Lava U R and CERASMART have statistically significantly greater ΔE values than the other materials after exposure for 6 weeks to hot water. The ΔE value for Lava U R is 4.069 well above the 2.3 threshold for human eyes to detect color change. The ΔE value of CERASMART is 1.745, which is below the threshold of the eye to detect a change in color. The ΔE after 6 weeks of exposure differs from 3 weeks. At both times, Lava U R displays the greatest change in color.

When a comparison was done at 6 weeks of group one (dry/dark), six different materials had the least color changes with no significant differences. Group two (hot water at 60°C), six materials had the least color changes with significant differences.

Group-one all had ΔE values below 1.4 and their color changes cannot be detected by eye at this stage.
The human eye cannot detect color changes if ΔE ≤ 2.3.

Lava U R and CERASMART had a significantly higher ΔE values than other materials at 6 weeks of hot water at 60°C exposure. The ΔE value of Lava U R = 4.069 was above 2.3 eye detecting limit. The ΔE value of CERASMART = 1.745 which below 2.3 eye detecting limit at this time. ΔE at 6 weeks of the exposure did change from 3 weeks and still Lava U R had the most color changes at 6 weeks.

3.) The ΔE to measure color changes after 12 weeks of exposure for the 6 dental materials

When a comparison was done at 12 weeks for materials kept dry and dark, six different materials had small significant changes in color. Of the materials stored in hot water, six materials had significant color changes.

The ΔE values for samples kept dry and dark are Lava U R 1.449, CERASMART 0.775, e.max CAD 1.852, MZ100 0.674, Telio CAD 0.354 and Vita CAD Temp 0.566. Each exhibited significant differences after dry storage in the dark. The ΔE values for hot water stored materials are Lava U R 4.182, CERASMART 2.162, e.max CAD 1.856, MZ100 2.839, Telio CAD 1.469 and Vita CAD Temp 1.446 and each material exhibits significant changes in color.

Samples stored in the dark and in dry conditions all have ΔE values below 1.9 and their range of color changes are less than the detection limit for the human eye.

Lava U R and MZ100 have significantly higher ΔE values than other materials after 12 weeks of storage in hot water. The ΔE value of Lava U R is 4.069 and for MZ100 is 2.839 and these changes are detectable by the human eye. The ΔE at 12 weeks of exposure demonstrates that the Lava U R and MZ100 consistently display changes in color. It seems likely that the color changes of MZ100 at 12 weeks may be attributed to changes in the chemical properties of the material such as hydrolysis, leaching, precipitation and swelling that produce voids and cracks.

Conclusions

Within the limitations of this in-vitro study, the following conclusions can be drawn:

- Materials type, treatment method, and treatment time showed significant effect on the color differences. Wet treatment has significant higher color change than dry treatment.
- Lava Ultimate has significant higher color change than other tested materials.

References

3. 3M Paradigm MZ100 Block Technical Product Profile. 3MDental Products; 2000.
1. Contrast ratio is the ratio between light reflectance of a specimen over:
   a. A blue and green background
   b. A black and a white background
   c. A yellow and green background
   d. A purple and yellow background

2. In 2008 Samra AP et al studied color stability in five aesthetic restorative materials when immersed in:
   a. Red wine
   b. Tea
   c. Coffee
   d. Black tea

3. Delta E changes in color can be detected by the human eye when above:
   a. 1.5
   b. 1.8
   c. 2.1
   d. 2.3

4. In this study color stability was of 6 different materials examined after:
   a. Cold water and light exposure
   b. Hot water and light exposure
   c. Ambient temperature water and darkness
   d. Ambient temperature water and light

5. After 12 weeks how many of the examined materials had significant color changes?
   a. One
   b. Two
   c. Five
   d. Six

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2. a b c d
3. a b c d
4. a b c d
5. a b c d

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<th>☐ Partial</th>
<th>☐ No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your comprehension of material</td>
<td>☐ Excellent</td>
<td>☐ Fair</td>
<td>☐ Poor</td>
</tr>
<tr>
<td>Appropriateness of the material</td>
<td>☐ Excellent</td>
<td>☐ Fair</td>
<td>☐ Poor</td>
</tr>
<tr>
<td>Was the material adequately in-depth?</td>
<td>☐ Yes</td>
<td>☐ No</td>
<td></td>
</tr>
</tbody>
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