

DDHK

DIGITAL DENTISTRY & HEALTHCARE KNOWLEDGE
M A G A Z I N E

Technology Trends

Amid a COVID
Dental World

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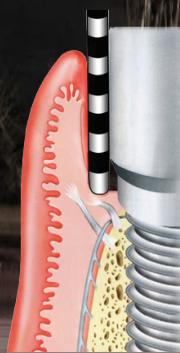
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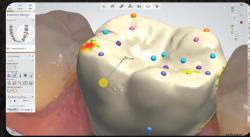
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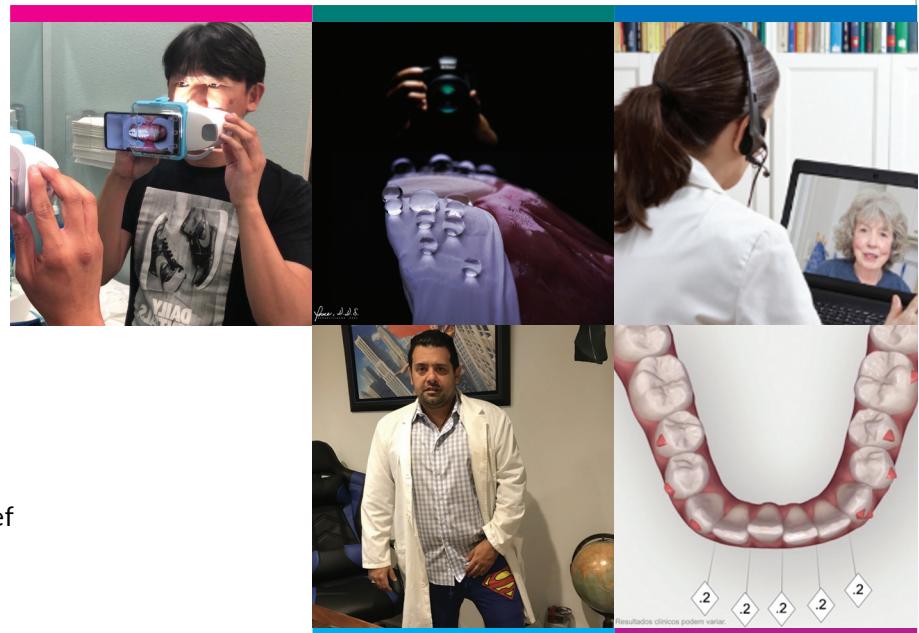


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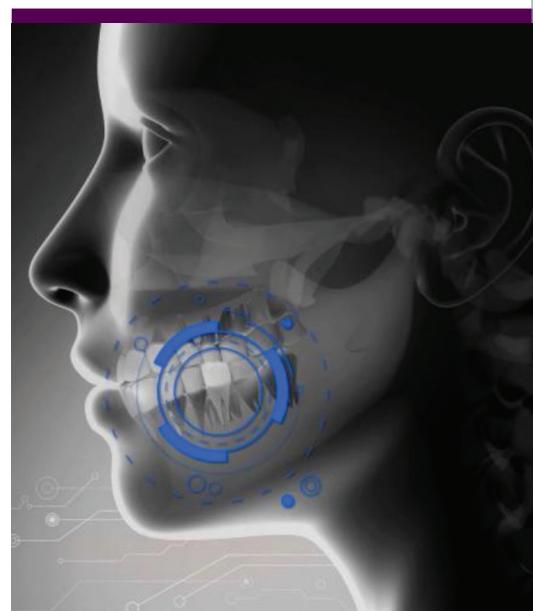
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EDITOR'S DESK



A NOTE FROM OUR EDITOR IN CHIEF

KRISTY A. MONTOYA

Dear Colleagues and Friends,

It brings us great pleasure to release our 2nd issue of Digital Dentistry & Healthcare Knowledge (DDHK) Magazine! We continue to be inspired by the everchanging world of digital dentistry and enjoy pushing the boundaries. We are continuing our venture into the depths of technology which has elevated a curiosity and enthusiasm from our readers worldwide. I am not able to express enough gratitude towards the talented and passionate superstar members of our editorial board. Each strive to master their abilities by spreading knowledge and proven workflow efficiencies, influencing their peers who also appreciate the art of creating healthy beautiful smiles! I am blessed to work alongside some of the most talented, inspirational, dedicated, and kindhearted professionals in the dental world.

It is amazing how rapidly technology has transformed the way we practice dentistry today, especially during these unprecedented times. Now more than ever, we encourage one another to share best practices as new workflows are being developed and monitored in this ever-changing world. The new standard of care has ultimately taken us to a higher level of awareness and implementation when it comes to infection prevention.

Visualize as you read through this issue, how many dentists are operating today with the use of virtual communication through



photography, teledentistry, artificial intelligence, and remote monitoring. Valuable information is being shared with you in hopes to provide ideas on how you too can ease the fear of patients, staff and their families due to the uncertainties brought forth by the COVID-19 pandemic, as we face the "new norm". Implementation of before nonexistent protocols can be performed without compromising quality and communication between the patient, dentist, and lab. This allows dentists to provide treatment solutions that fit the requirements and demands of their patients!

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Stay safe and hope to see you soon!

All my best,

Kristy A. Montoya – Editor in Chief

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ON THE SCENE!



^ Kristy Montoya and Dr. Varo Boyer



^ Dr. Sam Bakuri



^ Dr. Hugh Flax



Dr. Luis A. Alicea ^



Dr. Sammy Noumbissi and Susan Wingrove >



Dinner Time in New Orleans!

Kristy Montoya enjoyed attending The International Academy of Ceramic Implantology event in New Orleans, where she launched the premiere issue "Spring 2020" of DDHK Magazine and met a few of its contributing authors.

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SAM BAKURI, DMD, MSD

POST COVID-19 DENTAL WORLD

Recently, a friend mentioned to me that his two daughters take piano lessons once a week. Due to the coronavirus pandemic, they decided to continue with the lessons online with a national piano teacher. As it turns out, it actually cost them less than the lessons in person and the kids like the teacher so much that they requested two lessons a week, (despite the hefty homework she is handing out!). My friend said that even when things go back to normal, they will stick with the online teacher. So, their old teacher has lost two students and no doubt this is only the tip of the iceberg in her piano lesson career.

The world after COVID-19 will be different than the world before COVID-19. Many aspects of the new, post COVID-19 digital world will be faster, cheaper and more convenient. Even though the stock market has plummeted due to the pandemic, Amazon shares went up. Computer stores like Best Buy are running out of stock. This virus situation has clearly expedited our movement into the digital world, possibly faster than many people would like.

So how will this movement affect the world of dentistry? Let's start with continuing education. For decades we have been creating study club agendas by bringing national and even international speakers to our cities. Many of them have to be scheduled at least a year in advance. We have to coordinate their schedule with our schedule and the schedule of the venue. We have to pay for the speaker's travel and lodging. (Many will only travel with a first-class ticket!). Some refuse to travel mid-week. Our venues often have to be centrally located since we coordinate programs with other study clubs in our area. We are at the mercy of venue availability, parking fees, traffic, other city events and the weather! Let's face it; it costs our study clubs a lot of money and energy to put these events together.

It is only natural to conclude that by taking advantage of the online world, we can eliminate most of the challenges that come with our old study club model, while lowering the cost as well. We have the capability to do live webinar lectures and our members can participate in the comfort of their own homes. Consequently, the expense of



**Meet the Author -
Sam Bakuri,
DMD, MSD**



- Owner, Full-time Fee for service Private practice limited to Periodontics Pittsburgh, United States.
- BDS Bachelor of Dentistry University of Baghdad 2002.
- DMD Doctorate of Dental Medicine University of Pennsylvania (IVY League School) 2011.
- Periodontics residency Virginia Commonwealth University 2014.
- MSD Master of Science in Dentistry Virginia Commonwealth University 2014.
- Assistant professor University of Pittsburgh School of Dental Medicine.
- Board certified Periodontist and national speaker 17 years of Dental experience.
- Attending Periodontist, UPMC GPR residency program.
- Director, Pittsburgh Institute of Dentistry Seattle Study Club.
- Fellow International team of implantology (ITI).

He has published abstracts and articles in peer-reviewed dental journals and lectures internationally.

venues, audio visuals, food and travel would be drastically reduced. Perhaps honorariums would be lower as well. By controlling these costs we can also control the cost of tuition for our members, perhaps opening the door for even more new members to join the world of continuing education.

Does that mean our old model is gone for good? Absolutely not! However, we will see a shift toward a "hybrid" study club model. As what Michael Cohen (the head of Seattle Study Club) says, "There will always be value in personal interaction and having the opportunity to ask the person next to you a question". There is no substitute for seeing friends and colleagues in person and shaking their hand! (Ok, elbow bumping, the new norm).

Another area in the online world that has surged and will continue to do so is the world of telemedicine. You may be familiar with the "virtual consult" that Brian Harris started. If not, it is definitely worth taking a look at, because this too will be the post-corona trend. Following exams with online consults, instead of a second patient

visit, will save time and offer incredible convenience to our patients. (Convenience is a HUGE factor in treatment acceptance!) For some cases, particularly cosmetic cases, we may have our initial meeting with the patient online, even before seeing them in the office. There are many advantages to this approach.

Finally, we also need to consider the future of robotic, "hands-free dentistry". The new 5G internet speed will expand the possibilities. For example in medicine, a surgeon sitting in Pittsburgh will be able to do a procedure on a patient in an operating room in San Francisco!

The new internet speed will enhance the robotic communications and this could absolutely mean robotic dental procedures. It will not happen as fast in dentistry as it will in medicine, but it surely will happen.

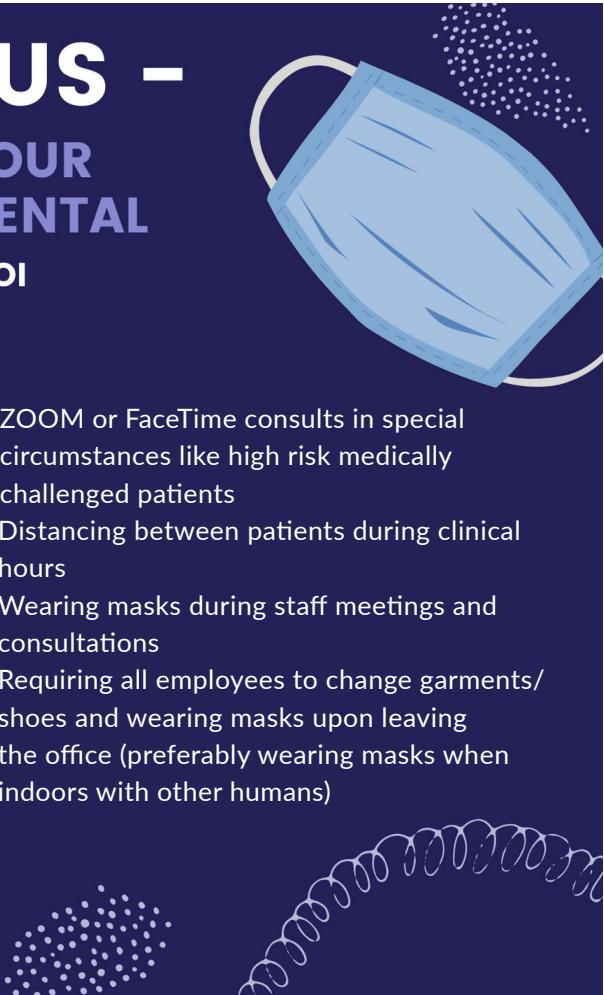
The coronavirus has certainly pushed us full force into the reality of the virtual world. Do I like it? It really doesn't matter. It's coming, ready or not. I know I'd rather be ready!



CORONAVIRUS - WHAT WE ADDED TO OUR PROTOCOL AT FLAX DENTAL

Dr. Hugh Flax, DDS, AAACD, MICOI

- 1. Thermometer testing and screening of staff and patients
- 2. Filtration systems
- 3. Continuous masking of all team members with highest filtration of personnel closest to aerosols
- 4. High velocity suction for hygiene rooms with Isovac
- 5. High level PPE in gowns and faceshields for all aerosol risk situations
- 6. Eliminating the use of blankets
- 7. Defogging of the entire facility with hypochlorous acid (1:10 dilution)
- 8. ZOOM or FaceTime consults in special circumstances like high risk medically challenged patients
- 9. Distancing between patients during clinical hours
- 10. Wearing masks during staff meetings and consultations
- 11. Requiring all employees to change garments/shoes and wearing masks upon leaving the office (preferably wearing masks when indoors with other humans)



MELISSA D. SHOTELL, DMD, MS

FOCUSING ON REMOTE MONITORING & TELE-ORTHODONTICS DURING COVID-19

The COVID-19 pandemic has been a significant challenge for many clinicians; forcing the closure of many dental practices resulted in treatment coming to a grinding halt. Elective dental services were postponed in most states and patients were left with cancelled appointments unable to reschedule due to the uncertainty of the timeline for resuming clinical practice. During this trying and difficult time, clear aligner therapy was one aspect of dentistry that pushed on through the office closures and allowed me to keep patient treatment on-track. This forward progress in clear aligner treatment was facilitated by the new technology of remote dental monitoring.

For many, the journey with remote dental monitoring & tele-dentistry begins out of necessity – such as a patient going on vacation for several months, students moving away to college, and working in an adult-focused orthodontics practice where many are focused on careers more than their straight smile. The COVID-19 pandemic has made many of us feel like we are pausing our dental practices and making us re-focus how we manage dental care with patients being in the office less to avoid potential exposures and to respect social distancing guidelines. This, for many, is an opportunity for integrating remotely monitoring our dentist-centered orthodontic care.

As an Orthodontist, I was introduced to tele-orthodontics/tele-dentistry with Dental Monitoring - an early pioneer of remote monitoring specifically for orthodontics. I immediately felt it was going to be a game changer in the way we offer orthodontic treatment, yet I could have never foreseen the impact this technology would have for my practice during a pandemic. There were several clinical factors that attracted me to the idea of using remote monitoring in my practice that encouraged me to take the leap of offering this new technology for my patients.

My office is an interdisciplinary orthodontic and prosthodontic practice in a rural part of the country where it is not uncommon for patients to travel one to two hours for a dental appointment. Due to the rural nature of my practice I have a strong demand for clear aligner therapy as I can extend time between appointment without having to activate wires, avoid poking wires, and extra visits for broken brackets and appliances. Many of my patients are also adults seeking pre-restorative orthodontic treatment and do not want to endure the teenage symbol of braces. With the dynamics of my practice I felt that Dental Monitoring would offer me a modality to monitor my patients progress without a visit to the office.

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Meet the Author - **Melissa D. Shotell DMD, MS**

Dr. Melissa Shotell is a Board Certified Orthodontist and practices in a multi-specialty practice in Sonora, CA focusing on the interplay of Orthodontics and restorative treatment. Dr. Shotell received her DMD at Nova Southeastern University and advanced hospital training a General Practice Residency Certificate from The Ohio State University. After spending years in general practice treating a broad range of patients, Dr. Shotell returned to complete a certificate and master's degree in Orthodontics from Loma Linda University. At Loma Linda University, Dr. Shotell focused her training on cutting-edge three dimensional imaging technology for diagnosis and treatment planning for interdisciplinary dentistry. Dr. Shotell considers education to be her passion and regularly consults and lectures on dental technology, clear aligner therapy, orthodontics, office efficiency and workflow, and teamwork.

As I began to utilize remote monitoring, I realized there were so many advantages of this style of practice than typical practice with office visits for clear aligners every 4-6 weeks. In the conventional model we give our patients three or four sets of aligners and request they wear them for one to two weeks each, however the science of estimating the wear cycle is based on the clinicians experience and prediction of tooth movements. Applying remote monitoring to this problem allowed me to set an estimated wear time for the patient, then having the patient take a scan of their teeth through the phone app for assessment. The photos from scan can be assessed and the fit of the aligner can be meas-

ured; following the assessment, customized wear cycles per aligner can be established. The true magic in the patient scan is the style of assessment - I can choose to review the scan myself and assess the fit of the aligner, or I can utilize the Artificial Intelligence (AI) platform for a generated report and assessment of the aligner fit. The scope of the AI assessment is remarkable as the software has the ability to recognize over one hundred and eighty different dental conditions. It is possible to customize the results of the AI reports to automatically notify both doctor and patient of findings to enable a quick resolution of problems or encourage the patient with continued excellent results.

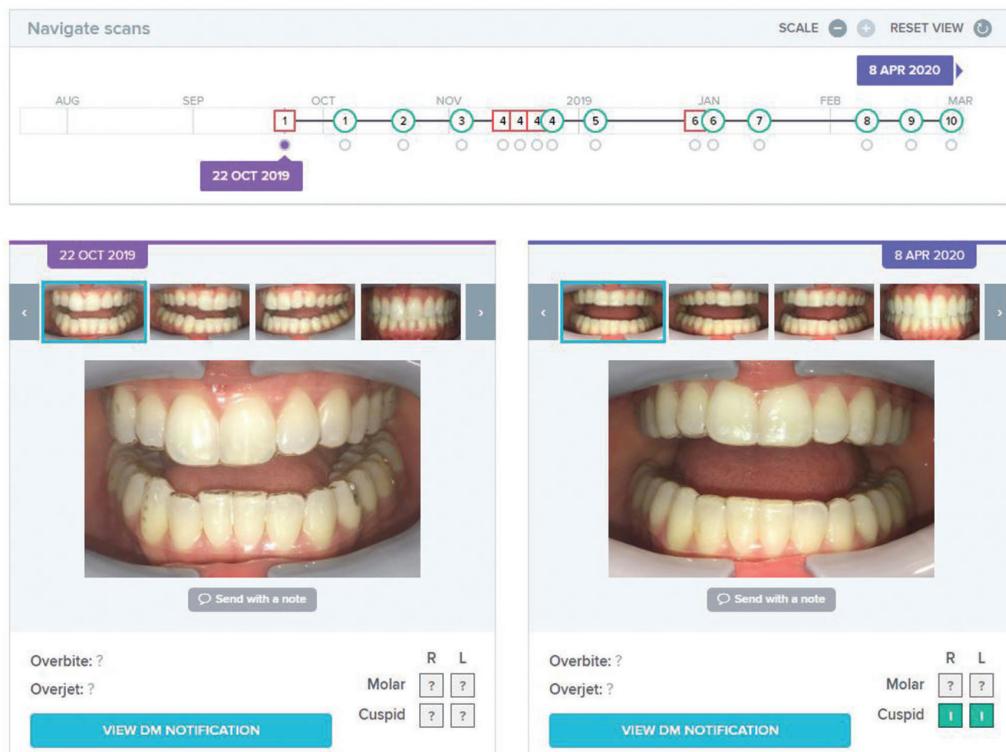


Figure 1. Timeline of patient treatment progress from initial aligner delivery to current aligner.

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Figure 2. Teaching dental monitoring with cheek retractors and smart phone.

Figure 3. Discussing remote monitoring at treatment consultation and use of ScanBox scanning device.





Figure 4. Patient using ScanBox to easily capture accurate scans.



Figure 5. Evaluation of patient scan and sending instructions to patient.

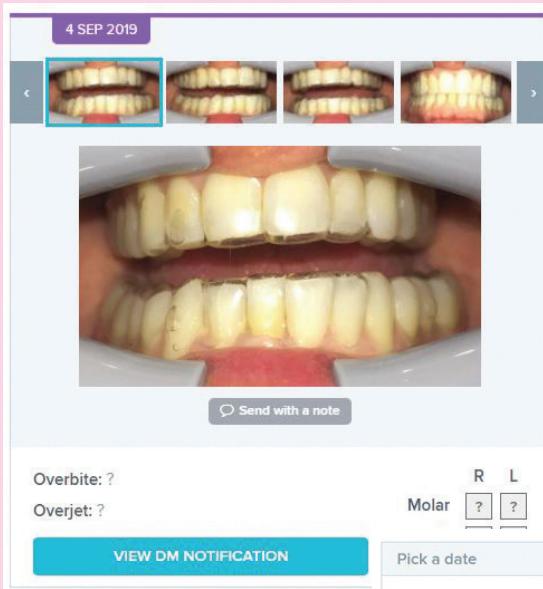
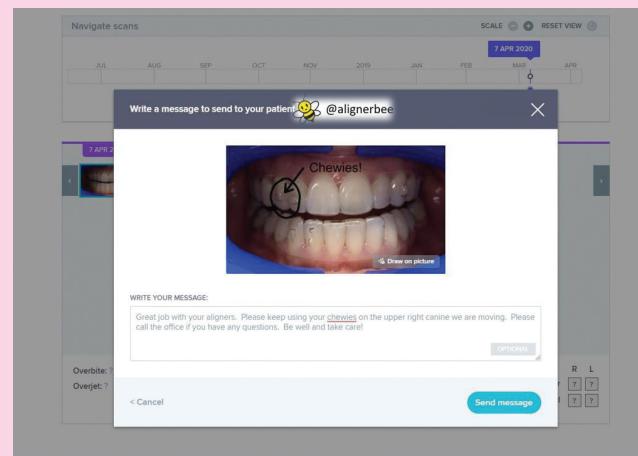


Figure 6. Detecting problems with aligner fit from the patient scan.

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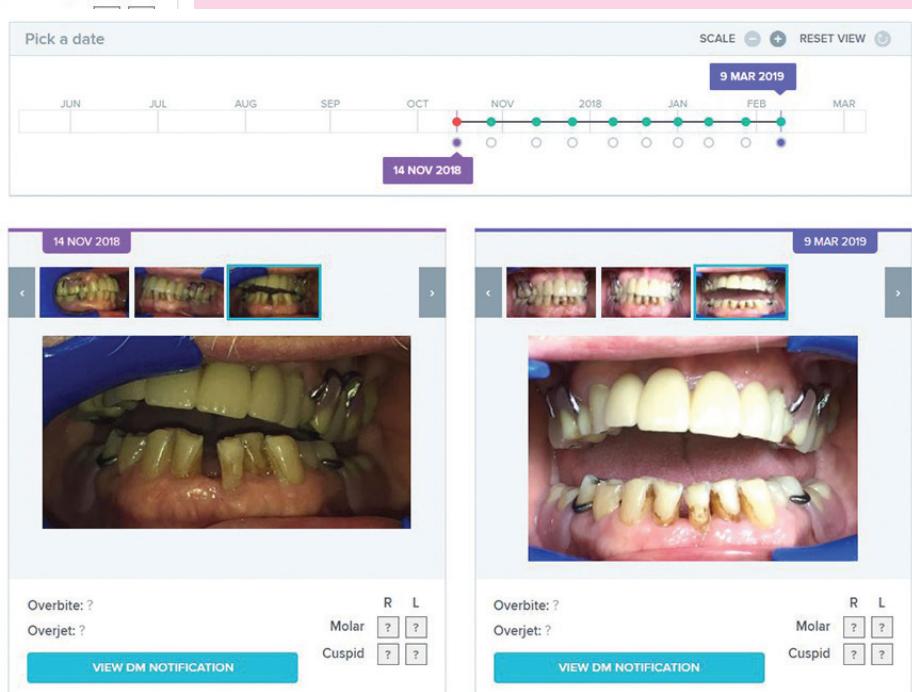


Figure 7. Monitoring extractions space closure with Dental Monitoring.



Over time I have determined the key for implementing effective remote monitoring strategies is to educate all patients on their use starting at their initial visit. Many patients are used to the traditional office visit and recall system, so the thought of having fewer appointments is enticing. These patients need to be reassured that their result will be the same even with reduced office visits as it is not replacing the patient-doctor relationship, just shifting the physical in-person visits to our office into virtual visits to our office. I am still actively integrated and part of their dental treatment. I explain to the patient that I will not only be checking every third or fourth aligner they are wearing at their office visit, but I will be checking the fit of every aligner. I stress to the patient how with checking the fit of each aligner we can reduce the treatment time and customize their wear schedule, all while being able to limit the number of times they need to physically come to my office. During the introduction of remote monitoring, I also discuss how the technology gives me the ability to recognize problems in treatment that can often be resolved when caught early allowing us to avoid multiple treatment refinements and revisions. Many patients are concerned with the bottom-line cost for treatment, I remind them that there are no additional fees for remote monitoring in my office so patients feel they are receiving an added benefit at no additional cost. In addition, remote monitoring is beneficial to our office as we are minimizing costs and increasing profitability while ensuring treatment results are equivalent to my treatment goals if we were not using tele-orthodontics.

As our office faced closure due to Covid-19 restrictions, the use of remote monitoring allowed me to stay in supervision of my patient's aligner treatment without having to incorporate new systems. For patients that were progressing through treatment as planned I was able to mail new aligners to my patients. We were met with immediate excitement and enthusiasm with our patients as the overwhelming positive response of my patients on social media showing their friends and family how they were receiving new aligners in the mail and keeping treatment on-track. The positive social media has increased interest in my office and has helped to set my practice apart from the competition. In addition, for our patients that were not using remote monitoring when my office was initially closed, we noticed they were reaching out to us asking how to get started with remote monitoring.

With dental offices resuming routine patient care one of the areas we can work toward to help alleviate the stress with thinking of possible future office closures it to develop systems within our offices that we can turn to during these difficult times to help continue care remotely. The new expansion of tele-medicine and tele-dentistry is leading the way with the ability to consult with our patients remotely, yet these require active doctor time and scheduled appointments. Patients take photo and video scans at their convenience, the system analyzes the results, provides an alert on my phone, and I can respond at anytime. All without having to set an appointment and at my convenience.

As we move forward toward the new normal for dental practice in the post-COVID era, dentistry has the unique ability to leverage technology to improve patient outcomes and facility patient treatment even when in-person office visits are not possible. The benefits of remote monitoring will not end as we re-open our practices but will remain giving our patients the confidence to take on new treatment even with uncertainty if practice closures or additional stay-at-home orders are issued. As a clinician I can move forward knowing that I will have the ability to treat my patients and sustain my practice model during uncertain times.

UPCOMING EVENTS

The Digital Workflow II - International Online Congress
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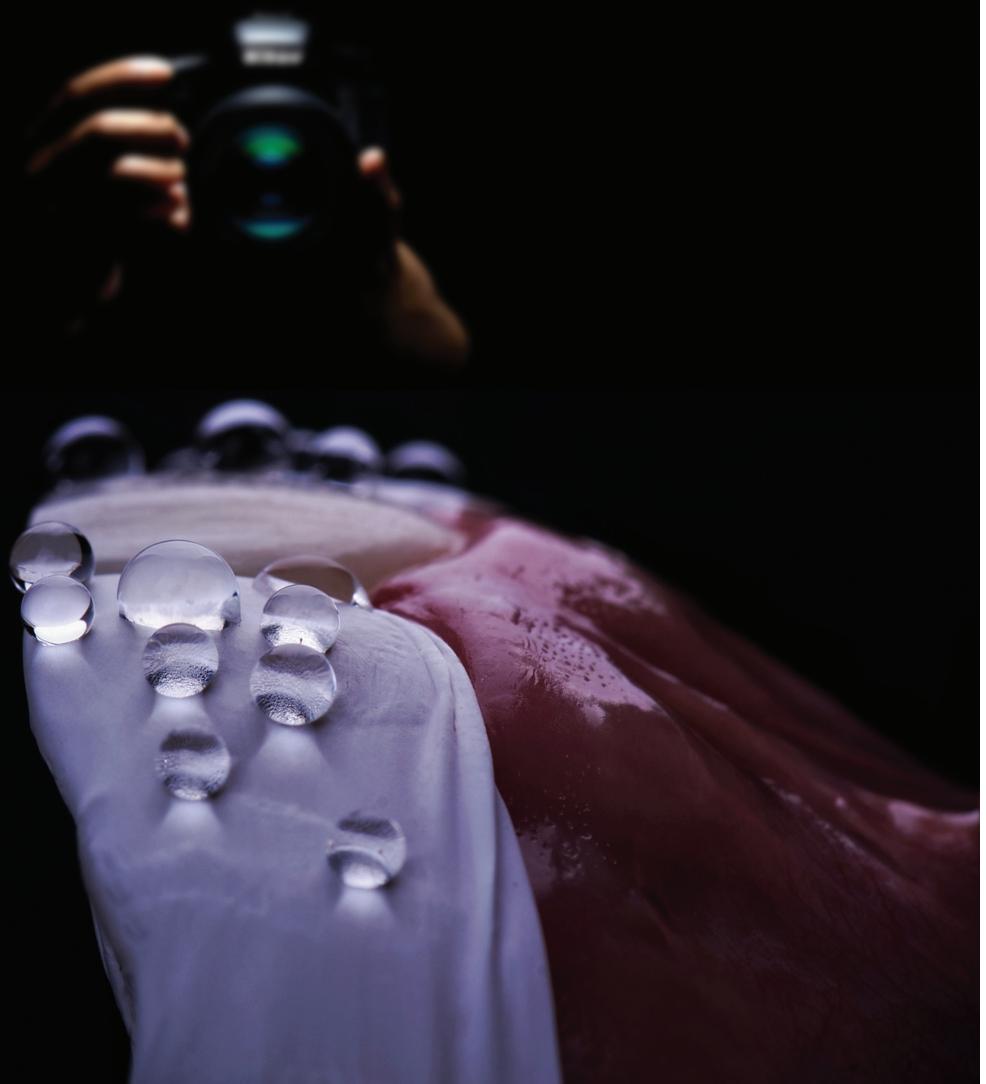
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PHOTOGRAPHY



14

Andrés E. Ponce, DDS
REHABILITADOR ORAL

As a Communication Tool in Dentistry Today

Andrés E. Ponce, DDS

Images have always been an easy way to show, explain, transmit and connect with our audience, but undoubtedly photography, has set a before and after in the way we can share our experience and knowledge.

Photography is a great ally in modern dentistry. Dentistry as we knew it, is

no longer the same, it has evolved to such point that it seems that analog has stepped aside to give a free way to digital, and as regards to the capture of the image it has not been an exception. The aim of this article is to share a simple guide to dental photography today and its possibilities and reach.

Surely for those who do not have much experience behind the camera it can be something new and irrelevant, at the same time, this happens until you know the possibilities and the potential behind an image.

Uses of dental photography has a wide range, from clinical records to communication with the laboratory. It doesn't only serve as a technical transmission tool, but also, as a language that transcends the office and can be used as a fact as a presentation and marketing tool for our patients. In this article we will review some possibilities that dental photography offers us and how we can apply this to our daily practice.

Equipment

Although there is a variety of brands, models and types of equipment, when we want to invest, we must initially think about the body of the camera, either DSLR or mirrorless. With their pros and cons, evaluating its price, DSLR are increasingly cheaper, or the light weight of the mirrorless; or choose the one that meets our optical resolution needs and should not be less than a body used for semi-professional photography.

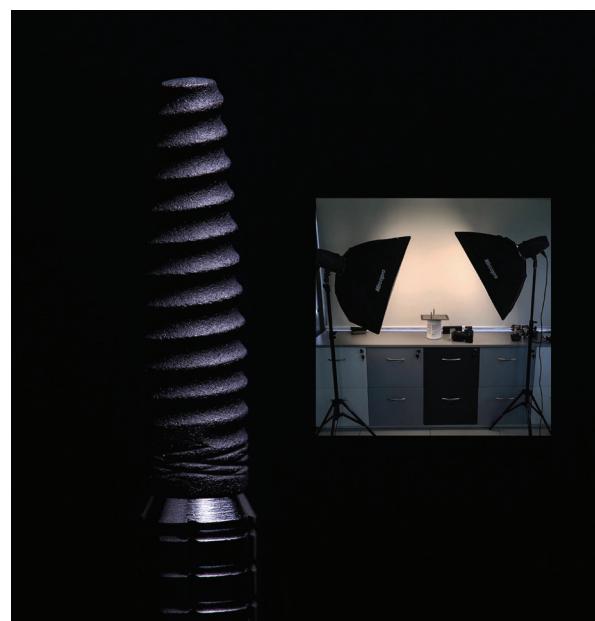
On the other hand, and even more relevant, is the purchase of specific lenses according to our need as a dentist. If you are a prosthodontist or implant dentist, your need may point to a macro lens with a non-variable working distance such as a 105 mm to be able to capture all the details at its best, in addition to being able to exceptionally capture your clinical actions or perhaps be able to analyze that what you thought you were doing correctly was not. Images do not lie, you will see details that are not simple to observe unless you work with magnification or directly with a clinical microscope, so adding photography to your daily practice is a one-way trip, as it will help you improve as a clinician.



The use of a macro lens, like this Nikon 105 mm will give you the chance to watch all the clinical details... or capture images beyond the typical.

On the other hand, if you are an orthodontist, perhaps an 85 or 60 mm macro lens is sufficient, since the shots to be captured are wider.

Another element to consider in your clinical equipment is the light, this is surely one of the key elements, that usually is taken less into account, but will have the biggest influence in making an average quality photo or a spectacular one. The name itself explains it all, photography means, writing with light, so we can understand that illumination is essential. For lighting, options range from a ring flash, twin flashes up to the largest and most powerful studio flash lights. In my case, I have tried them all and I think that all have good and bad, but if I was there to suggest you what to invest in, I think I would definitely recommend studio flashes; although, large and not necessarily more expensive, studio flashes will deliver results that are only seen in books, magazines and advertising; it can be your best ally when it comes to highlighting your work and sharing it with your audience (patients, colleagues, students).



In this case we can appreciate the result of an implant photography using studio flashes from the brand Mircopro

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Clinical Photography

Once you have equipped yourself with your photographic kit, you will want to try it in your dental practice, it is ideal to start with an extraoral photography, which will give you relevant information about the patient, and may even be a nice complement in clinical diagnosis (e.g., digital smile design, morphological diagnosis or mandibular class). It will also become a powerful marketing tool in your hands; for education of your patients, to promote yourself through clinical cases and/or even as decoration of your dental practice.



Extra oral photography protocol, using studio flashes and 50 mm Nikon lense mounted on a D7000 body camera.
Go to the QR code for aditional information.

Once your extraoral photography set is done, you should continue with the intraoral photographs, these will give you relevant information about future procedures, guaranteeing you a safer planning and an execution with less possibilities of error. In addition, the treatment sequence can be documented in detail. It is not necessary to show every single detail, but the most relevant phases of the treatment you will follow. These photos will also serve as an historical record which you can compare with you control follow ups. It has been proved to be an easy way to show evolution of the cases and the improvements achieved over time for the patient, future patients, to share with colleagues, or publications.

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In the case of intraoral photography, it is important to take into account the need of certain elements for best results; such as retractors, that allow us to visualize in a better way dental structures, contrasters to be able to observe, without distractions, our objective and finally intraoral mirrors (metal or glass), that help achieve clear images of difficult access areas, such as buccal and occlusal views.



Intra oral photography using aid elements like contrastors from SmileLine Brand and custom made metallic retractors painted in opaque black by @focus.chile

Communication with the Laboratory

Photography can help us communicate precisely and clearly what we want from the laboratory, for example, so that we are able to explain errors in the execution of a treatment, or what we specifically want from them, so sending this visual

information to the lab can be essential for communication. Although we can apply everything previously described as a form of clinical registry or under the concept of product photography, in the case of laboratory work; many times, what we need is to be able to get that information quickly and expeditiously. The camera of our cell phone can be a great ally if it has adequate lighting. For this situation, a couple of years ago, the company SmileLine created, Smile Lite, as a way to improve dental clinical photography through cell phones.

Generally speaking, mobile device's camera sensors work better with good light support, and if we add to this, connectivity and versatility of smartphones, the result is power and communication in the palm of your hand.

Knowing the laboratory and its human team, sharing knowledge and experience is essential to improve communication, the importance of the human factor must never be forgotten.

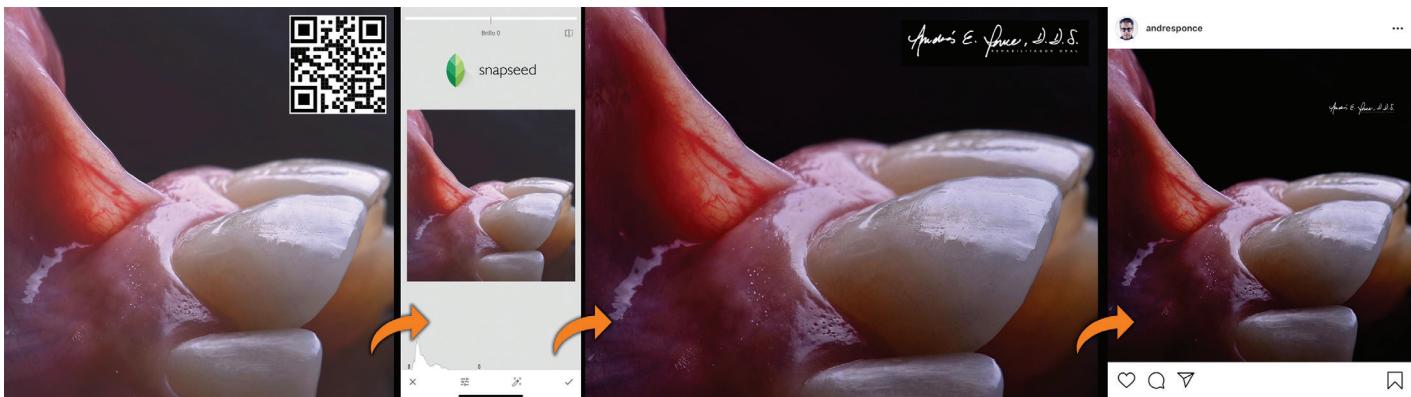


Dental photography as communication tool with the lab, it will be a great ally to inform and request better results.

Apps

Using apps to be able to edit our photography today, is something easy and accessible for most people, we do not have enough time to sit for hours to edit a photo or video on our computer, we want fast results, therefore what we want is to be able to edit only specific elements and correct errors that do not alter the image *per sé* (framing, cropping, contrast, etc.). Miles Cones, DDS once said "even the best dental photographers tweak their images".

The potential of smartphones and tablets gives us the ability to work with powerful image editors such as Google's Snapseed, which allows us to edit colors through image perfection, crop, rotate and define, among other functions, so that we can later export images in JPG format with a resolution up to 4,000 px, these can be used without a problem in social media, presentations, or even as you have seen in this article.



The work flow since you shot until you share with your audience. The power is in your hands, in this case we use Snapseed from Google on a Smartphone. Go to the QR code for more info.

Another great application that has appeared on the market is Enlight Photofox from LightTricks Company, which, in addition to allowing you to edit your photos, gives you the option of working in layers, something similar to how

Photoshop works, so you can add additional elements to your photography as texts, logos or signatures to enhance visual elements of the image or as a complement to it. You can also export in high quality JPG and PNG formats.

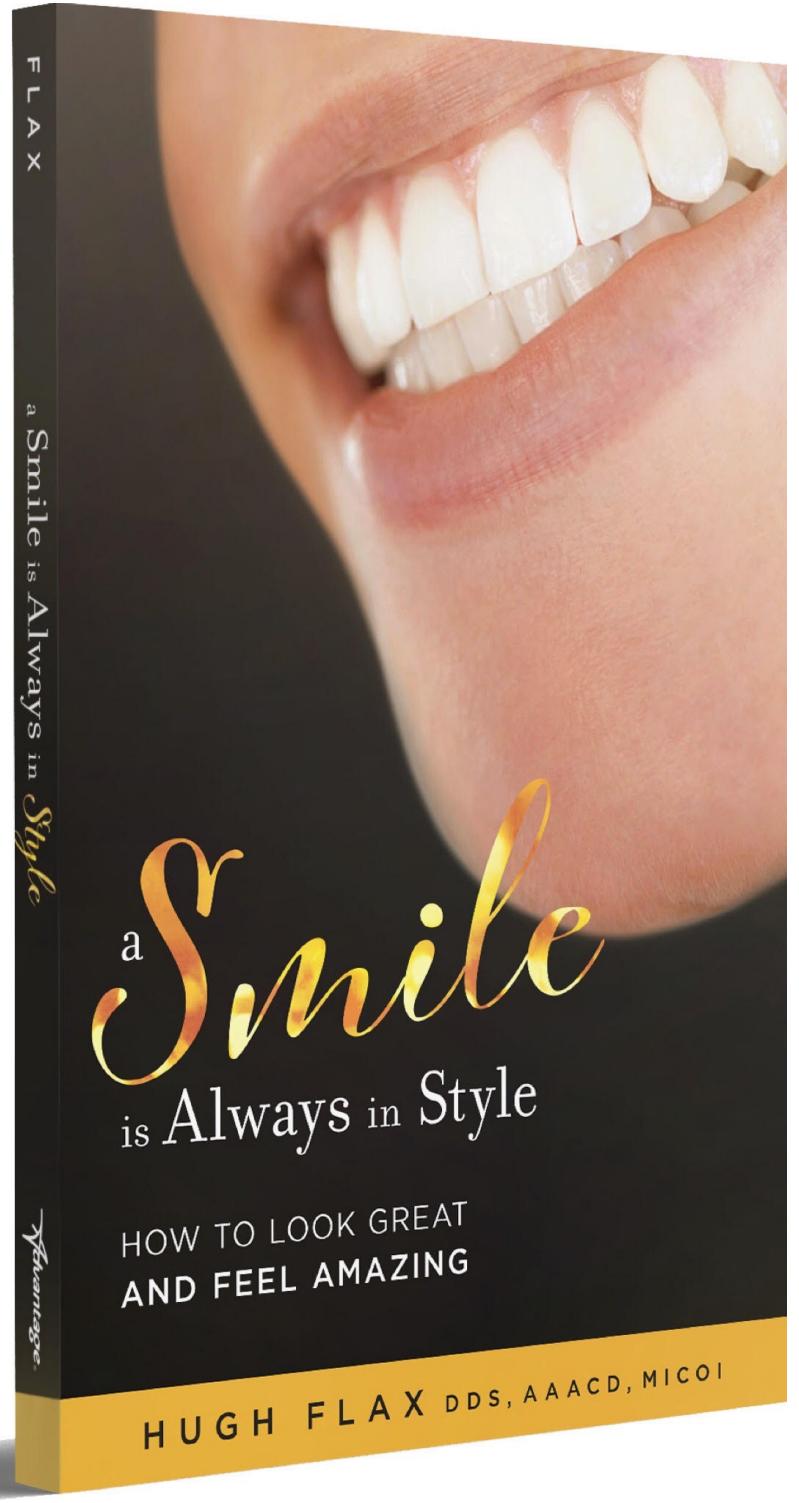
Summary

As you have been able to analyze, the options are many, but the path is only one. Adding photography to your clinical arsenal will always be an improvement. It is an investment that can be profitable even in the short term, but will be an important factor of change and differentiation if you know how to use and take advantage of it. This is only a partial summary guide to what dental photography is today, much of what is exposed here, is part of what I have learned over the years, many of which others have taught me, but also many times by trial and error, even though, the results are positive, and I share it with you, because I think it can be the beginning of a very rewarding journey for you as it has been for me.



Meet the Author -
Andrés E. Ponce,
DDS

Dr. Ponce is a graduate of La Frontera University, Chile and completed a two-year prosthodontic residency program at Del Desarrollo University, Chile. Also he has a Marketing Diploma from Adolfo Ibanez University, Chile. Actually, he is a clinician and independent dental marketing advisor for many brands like BioHorizons, Neobiotech, Versah, GMI, and organizations like the International College of Prosthodontists. Active member, past President and part of board of the Chilean Prosthodontist Society. Additionally, he dictates courses inside and outside of his country, about esthetics and prosthodontics as a 3M Oral Care Company speaker and StyleItaliano Trainer. Dr. Ponce also provides courses on photography and marketing with Focus Chile (@focus.chile) as part of their team.



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Written from the perspective of a layman by an AACD Past President, whose mom was a dental phobic, it is very effective with simplifying complex care and improving case acceptance.





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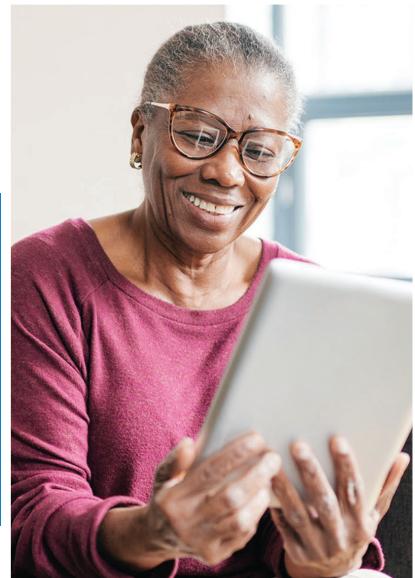
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CONTRIBUTOR SPOTLIGHT

The TeleDentists®

In a Time of Uncertainty and Fear, The TeleDentists are Ready to Help



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In a recent article by the New York Times, comedian and actor Larry David was asked what he fears most during this crisis, and he replied: "Anarchy and a potential dental emergency — and not necessarily in that order." Fortunately for Larry David, and the millions of quarantined people throughout the United States, The TeleDentists is here to help (with dental emergencies, not anarchy). Before the Covid Crisis, on average, in The United States, six million people annually experience an urgent dental problem but lack access to a regular dentist or are unable to find a dentist who can see them quickly. The American Dental Association documents over two million annual ED visits in the US for nontraumatic dental problems. However, with the pandemic that is plaguing our world, the hospital is the LAST place anyone wants to go for dental problems. Teledentistry is quickly becoming a popular option for dentists seeking to stay open and see emergency dental patients during the coronavirus outbreak.

Much like any other specialty using tele-medicine, dentists can perform video consults connecting through the patient's laptop, tablet or smart phone to a virtual dentist. The TeleDentists deliver vital dental services virtually wherever, whenever a dentist is needed. They provide help with dental emergencies, answers to oral health issues, and education for patients. People in need of support can consult with their dentist online and get the benefits of speaking with the right specialist, and never leave their living room.

Here's how it works:

- Dentist diagnoses the patient's problem using advanced virtual care technology.
- Dentist provides e-script for antibiotic and/or non-narcotic pain medication.
- Dentist arranges follow-on care as needed (emergency only).

The TeleDentists service was founded by Maria Kunstadter, DDS. It offers dentists a HIPAA-compliant teledentistry method to (1) stay connected with their current patients of record and (2) connect with new patients seeking a dentist.

How The TeleDentists Service Works during the Covid19 Crisis:

Patients do not want to visit their dentists as most offices have closed or are only seeing emergency patients. Patients can no longer go to the Emergency Room for dental pain as they are standing in long lines or getting turned away. Yet, patients are still getting toothaches. Many are finding The TeleDentists at www.theteledentists.com where they can see a dentist, usually within 10 minutes, who can remediate the problem, get a prescription sent to a local pharmacy, and get information about local dentists whose offices are open for emergencies.



Many dentists had to close their offices in compliance with the American Dental Association recommendations. In response, The TeleDentists is offering use of their system for dental offices to stay in touch with their patients. The My TeleDentist Program employs virtual technology in dental offices to provide teledental services to existing and new patients. Dentists nation-wide have found The TeleDentists to be able to remotely provide service to their own patients, or patients of The TeleDentists.

The number one reason patients like teledentistry is because it lets them know if their current dental problem is serious. Many teledentistry calls are about toothaches, pain, swelling, cracked teeth, chipped teeth, loose teeth, abscesses, cold sores, filling fell out, temporary crown came off, broken denture, etc. Parents often use teledentistry to ask questions about their children's teeth and whether something is normal. Current patients of record who use clear aligners like teledentistry because the general dentist or orthodontist can determine whether the patient is ready for his or her next set of aligners and simply mail them out.

Teledentistry eliminates the need for unnecessary exposure during this coronavirus outbreak, while still providing dental expertise. And it gives dentists a way to stay in touch with their current patients during this challenging time. It also gives the dentist the opportunity to triage dental emergency calls and determine how many members of the dental team will be needed to treat the patient in-office.

The TeleDentists is HIPAA-compliant and includes the protocols needed to gather the patient's data so it can be submitted to insurance companies for reimbursement. "Many of the carriers have relaxed their in-person requirement for the limited evaluation," said Teresa Duncan, author of *Moving Your Patients to Yes: Easy Insurance Conversations*. "This is an unprecedented situation and carriers are being more flexible."

The TeleDentists offers a direct-to-consumer option for \$59, and has recently partnered with Cigna and Anthem insurance companies to provide teledental care to their customers.

The TeleDentists deliver vital services virtually wherever, whenever a dentist is needed.



"At the end of the day, you want to provide dental care," said co-founder Dr. Maria Kunstadter. "By staying in close contact with your patients and helping them when they really need it, you'll be on a good footing when you reopen. You'll be able to schedule those people and say let's get that [problem] fixed now." Furthermore, keeping patients in the dental office and not in the emergency room is vital right now. "Who would

want to go into the emergency room with a toothache and come out with a virus?" asked Dr. Kunstadter. "It's critical that we help them get the care they need. They should be calling a dentist."

Is this the turning point we hoped for which will put teledentistry on the map? **We at The TeleDentists are amazed and humbled by the response from health-care workers and support staff around the country and are hoping to do our part. We pray that readers and their families are healthy and safe. We're all in this together.**

For more information on The TeleDentists, please visit: <https://www.theteledentists.com/>

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Leah Sigler has worked in the field of dentistry for over fifteen years, becoming a Registered Hygienist over five years ago. She transferred to virtual dental care and is now the Director of Operations for The TeleDentists, leading the My TeleDentist Program and Education Center. She is passionate about her patients and continuing to expand access to dental care.

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THE POWER OF AI TECHNOLOGY IN DENTISTRY

Artificial intelligence (AI) techniques are being incorporated into the dental field to aid dental providers with diagnostic accuracy, treatment planning, and to provide clinical decision support. Machine learning, deep learning, cognitive computing, and natural language processing are subfields of AI that have found their way into dentistry.¹ These techniques work by utilizing data to learn complex processes and simulate human activity, such as analyzing visual images and performing image diagnostics.² These AI processes and associated techniques can detect pathology in dental disease and oral cancer. In addition, AI can provide clinical decision support by identifying anatomical structures and detecting anomalies to provide comprehensive patient care.

Natural Language Processing To Enhance Workflow

An AI technique being used in dentistry is natural language processing (NLP). This type of linguistics applies algorithms to identify the human language in ways that a computer can comprehend. NLP works to assist dental providers by voice prompts. To illustrate, DexVoice uses natural language processing through an Amazon

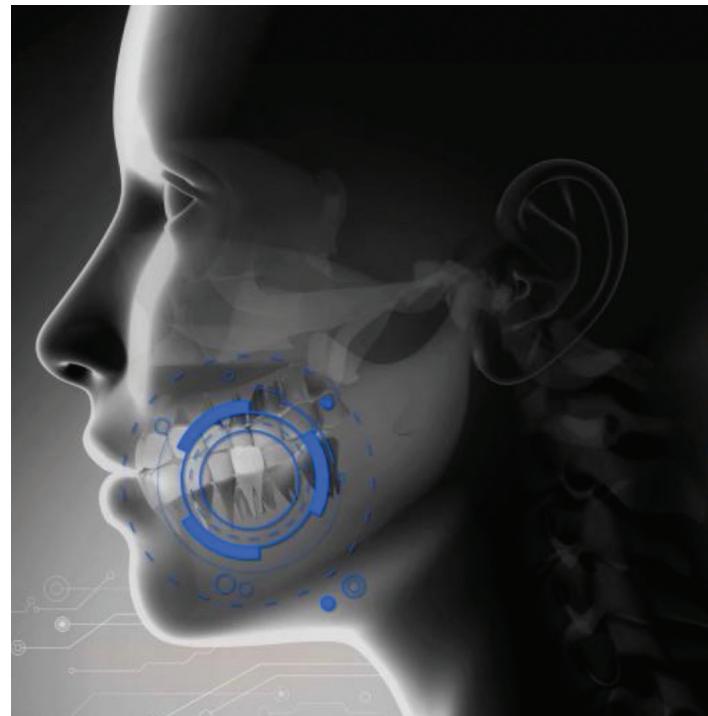


Figure 1. Photo courtesy of Orca-AI.

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Alexa-enabled platform and allows the clinician to use their voice to capture, show, and compare radiographic images; all of which can be accomplished hands-free.³ Currently, DexVoice is an add-on to DEXIS software and is essentially designed to optimize workflows by using only voice cues; therefore, devoting more time to patient treatment and consultation.

Diagnostic Capabilities of AI

While AI is being used to improve workflow processes, deep learning capabilities of AI are also being used to increase diagnostic accuracy as well. AI technology uses algorithms to analyze dental radiographs through image detection, classification, and segmentation. For example, dental decay can be detected based on learning the location and morphology of carious lesions on radiographs, and findings can be identified and annotated immediately with accuracy. ORCA Dental AI offers an innovative caries detection solution that can read multiple image sources, including bitewings, panoramic films, and periapical scans to provide a comprehensive insight of a patient's dental condition.³

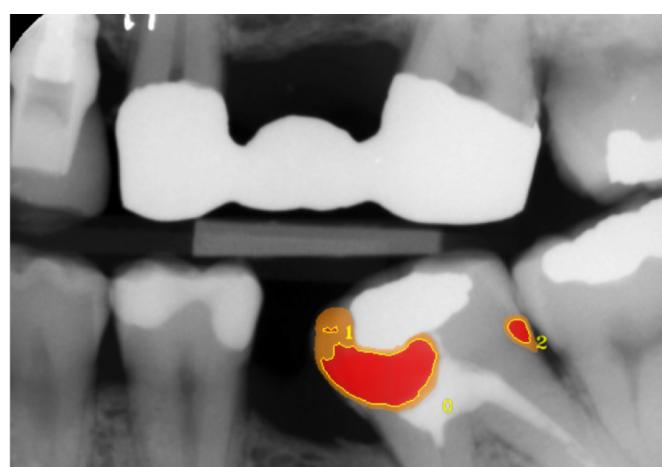


Figure 2. Orca-AI highlighting caries. Photo courtesy of Orca-AI.

Similarly, AI is being used to analyze images of oral cancer lesions for early detection and diagnosis. Mobile Mouth Screening Anywhere (MeMoSA) is a mobile application that enables early detection of oral cancer for remote diagnosing.¹³ In future developments, MeMoSA will integrate deep learning within the app, where the system will be able to differentiate and classify images of lesions into categories.⁹ With specific input variables and risk factors, predictions can be mapped, and lesions can be classified accordingly.¹⁰

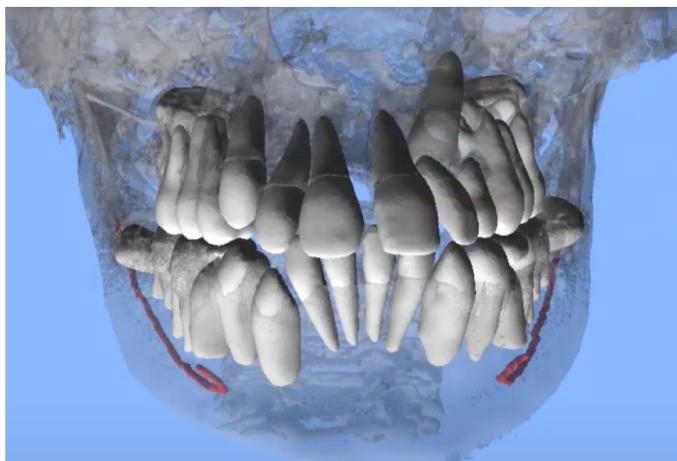


Figure 3. CephX CBCT segmentation. Photo courtesy of Orca-AI.

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AI Analysis, Segmentation, And Automation

AI and related processes in diagnoses regarding oral diseases show a profound impact in increasing the quality of dental care, including its use in other fields of dentistry. Orthodontics is utilizing AI technology for diagnosing and treating malocclusion. For example, CephX is a cloud-based system that provides professional cephalometric analysis within seconds. In addition, CephX provides automated teeth segmentation to validate patient anatomy in 3D from CBCT scans, as well as automated and instant airway volume analysis from 3D volume CBCT data.⁴ In prosthodontics, Orca's nerve canal algorithm can read CBCT images and instantaneously detect and segment the mandibular nerve canal and provide coordinates of the mandibular and maxillary arches, enabling an accurate outline of the arch anatomy.⁴ Complicated problems of uncertainty, non-configuration, nonlinearity, and multiple-factor interactions are removed with the CephX functionality, as it allows for greater efficiency, productivity and in turn, higher quality of care delivery, without having to master complex imaging software tools.⁵

Visualization and Monitoring

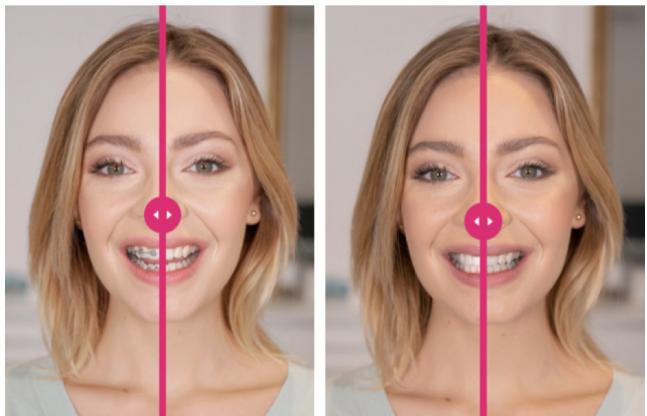


Figure 4 & 5. The patient can see what they would look like with different appliances and what their smile would look like post-treatment. Photo courtesy of Dental Monitoring.

Not only is AI able to analyze cephalometric images and CBCT scans for teeth and bone segmentation, AI is able to provide smile visualization and orthodontic monitoring. Dental Monitoring is a virtual platform that uses AI-powered solutions to offer patients an opportunity to envision their smile in different ways using Smile Simulations.⁷ The Appliance Selection feature uses an assessment tool to envision orthodontics using traditional braces, ceramic braces, or aligners. Similarly, the Smile Prediction feature uses AI technology to transform a patient's smile; providing metaphorical results with pre-treatment and post-treatment outcomes.⁷ In addition to Smile Simulations, DM uses neural networks to monitor orthodontic treatment progress. First, the neural networks are trained on dental pictures, depicting various orthodontic issues such as unseated aligners, dental attrition, debonded brackets, and poor oral hygiene.⁶ The patient captures pictures of their ortho-dontic treatment progress. These pictures are stored, organized, and are accessible to the dental provider within the patient's electronic dental record.⁷ Clearly, DM's application features are beneficial throughout the duration of orthodontic treatment, as its features and functions can accurately detect issues and notify the patient accordingly.⁶



Figure 6. Patient providing scan using Photo monitoring light. Photo courtesy of Dental Monitoring.



Conclusions

Figure 7. Photo courtesy of Orca-AI.



The use of AI technology is advancing dentistry in ways that can increase the accuracy and diagnosis in all areas of the profession. Object identification and classification for teeth, tooth number detection, dental implants, and restorations have been demonstrated and are being offered within dentistry today; from use during routine dental appointments to implementation within other dental specialties.¹¹ Moreover, AI and machine learning techniques have proven to be successful in the design and fabrication of dental crowns and other restorations with the use of dental CAD software. Consequently, AI technology has gained the attention of the FDA, as the FDA already has high expectations for software used in the design and function of medical devices.¹¹ Significant challenges with the verification and validation of traditional software exists and the FDA is currently trying to solve the issue of clearance and compliance obligations for medical device manufacturers.¹² Conversely, it should be noted that recent regulatory updates were published in 2020, which allows a feasible regulatory pathway for dental (CADe) devices.¹² Nevertheless, AI has the ability to analyze data within the patient's electronic dental record. AI discovery and

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deep learning into dental and medical issues can provide the dental practitioner with valuable information to be used in real-time, allowing for a thorough examination and clinical decision support during treatment planning, whether remotely or within an in-office setting.¹⁰ Ultimately, AI technology, techniques, and processes can enhance the quality of care in all dental settings.



Meet the Authors >

Shannon Sommers, MSHI, BTDH, RDH has a Bachelor of Technology in dental hygiene from the State University of New York at Canton and a Master of Science in health informatics from the Medical University of South Carolina. She has over 20 years' experience in dentistry and has been a dental hygienist since 2006. She aims to use her dental background and informatics skills to promote and advance the use of dental informatics.



Alicia Webb, MSHI, BTDH, RDH has been a clinician in dentistry since 2006 and has experience as an educator in a dental hygiene program. As one of the few registered dental hygienists to graduate with a Master of Science in health informatics, she wants to use her informatics knowledge coupled with her dental background to improve population health by developing and analyzing data-driven solutions to improve the delivery of quality dental care.



JOHN CASTANARO, DDS

TELEDENTISTRY

When Virtudent suggested that we would be transitioning to a teledentistry model of care during the Covid-19 pandemic, nobody was more skeptical than me. After all, how can we possibly assess someone without seeing a radiograph or using an explorer. How could a video conference call give anybody with tooth pain relief? To me it seemed like a waste of time and I voiced my concerns to the leadership team. After being overruled I was signed up and ready to take my first teledental consultation call that same day.

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Patient X joined me and my assistant on a virtual conference call. He had sent two self-taken digital photos of the area bothering him (lower right quadrant) that I was able to view prior to our conversation. After the normal initial introduction, I started to ask the standard questions; "How long have you had the pain?" "Was there any recent trauma to the area?" "Had the tooth been previously treated?" The patient was in his early 30s, in good health but due to a lack of dental insurance had not had routine care in over 5 years. The patient had noticed some mobility in the tooth for a couple of months and the onset of pain occurred after eating almonds. From the digital photos taken by the patient, the tooth looked intact, but I could observe

generalized periodontitis-the furcation was exposed. Over video, the patient was able to show me that the tooth could be moved in a buccal-lingual direction. It had at least a class II mobility. I diagnosed it as either a vertical root fracture or general loss of bone around the tooth due to a poor periodontal status. Either way it did not seem it could be restored. Unfortunately, the patient lived outside my referral network. After efforts of contacting oral surgeons in his area, we were able to connect the patient with a provider that was accepting emergency patients. We booked a same day appointment for him and the oral surgeon confirmed the tooth needed to be extracted. Treatment was immediately rendered. A follow up phone call by a Virtudent hygienist 48 hours later revealed a happy, pain free patient.

This experience made me realize that I was being short sighted and that a virtual consultation helped this patient with his problem and saved him and our medical colleagues from having to be seen in an emergency room. It is eye opening as to what we can diagnose as clinicians just by getting some information and asking the

Figure 1. Performing Teledentistry in the comfort of your pajamas.
Figure 2. Patient sent image to show area of complaint with Dr. Castanaro.
Figure 3. Tele shot of Dr. Castanaro explaining gum disease.



1



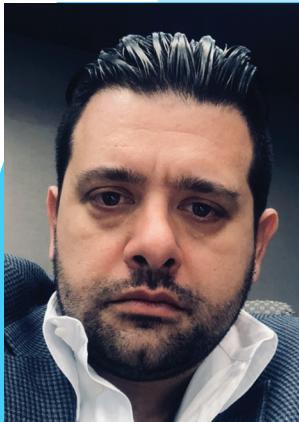
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3

appropriate questions. Teledentistry is a powerful tool now more than ever. If we can triage patients, prescribe antibiotics if appropriate, and refer when needed then we helped keep the patient isolated, out of overcrowded ER's and hopefully away from exposure to the Coronavirus.

Through virtual consultations our Virtudent team has treated patients with a variety of concerns ranging from pericoronitis, sensitive teeth, swollen gums to fractured tooth cusps and displaced crowns. Many of these problems were easily addressed which helped ease the anxiety patients were experiencing. Now more than ever there is a need to stay home and to stay isolated in order to stay safe, if teledentistry can accomplish this, then it is a practice we should be advocating.



Meet the Author

John Castanaro, DDS

> John Castanaro has a private practice in Yonkers, NY. He recently joined the Virtudent team at the beginning of 2020 as the Greater New York Dental Director. He brings a strong clinical background. He graduated cum laude from the University at Buffalo School of Dental Medicine in 2007 and was the Chief Resident at Montefiore Medical Center in 2008. He is a member of the Spear Study Club and serves as trustee on the Board of Education He has won the TopDoc award 3 consecutive years.

JULIANA NO-CORTES, DDS, MS

DIGITAL ORTHODONTICS and Teledentistry

Advances in the digital technology have changed our lifestyles and are now increasingly moving dentistry to a next step. In the last decades, digital revolution brought not only several different devices, software systems and clinical applications, but also faster digital workflows and data transferring among professionals. In this context, computer-Aided Design and Computer-Aided Manufacturing (CAD-CAM), have led to several methodologies in dentistry resulting in efficiency, accuracy and predictability of the treatments. One of the areas that are changing due to development of digital workflows is the field of orthodontics. Digital orthodontic methods such as the use of CAD-CAM aligners lead to reduced chairside time and the possibility to practice teledentistry.

Teledentistry is considered every form of using digital technology, such as telecommunication methods, to provide dental care, treatment, diagnosis and education to the patients. Digital data of patients such as images, radiographs e clinical history, can be used for consultations or even treatment planning, allowing to offer healthcare assistance when distances separate doctors and their patients.¹ Articles demonstrate that teledentistry could have comparable efficiency to face-to-face appointments for oral screening, especially in rural areas, school-based programs, and other areas with limited access to care. Diagnosis of oral diseases, referrals, and teleconsultations are feasible and valid providing easier, cheaper and less intimidating contact with dentistry.

Teledentistry allows for the following types of teleconsultation with patients:

1. "Real-Time Consultation", which involves a virtual consultation (interactive audio and video) between dental professionals and their patients through a videoconference, same time but different locations.
2. "Store-and-Forward Method", which enables exchange of clinical information and static images collected by the clinician, storing and forwarding the data for consultation and planning.
3. "Remote Monitoring Method" in which patients are supervised at a distance, geographically far away from each other.

Thus, the aim of this article is to show a case report where all three types of teledentistry activities were performed in order to treat the patient's condition.



Meet the Author
**Juliana No-Cortes,
DDS, MS**



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Juliana No Cortes, DDS is an orthodontist who has more than 10 years of experience in orthodontic treatments and restorative dentistry. She has also more than 3 years of experience with digital orthodontic treatment modalities, as well as digital workflows for oral rehabilitation. She has taught orthodontics in different institutions in Brazil and Canada. She performed an internship in orthodontics in Harvard University in Boston, MA, USA. Lately she has been acting as a Clinical Tutor and PhD candidate in the Faculty of Dental Surgery, University of Malta, while she still participates in digital orthodontic treatments at her private practice in São Paulo, Brazil.

Clinical Report

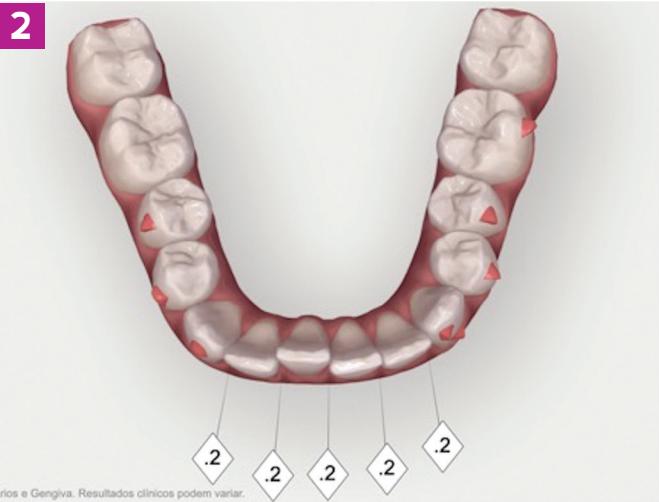
A 27-year-old female patient presented to our clinic (Private Practice, São Paulo, Brazil) with the chief complaint that her teeth positions had been altered since she finished a conventional orthodontic treatment. At that time, the orthodontist of the clinic (i.e. the author of this article) was abroad as a clinical tutor (University of Malta, Msida, Malta), for which reason a teleconsultation by video conference was offered to the patient. In such appointment, the patient emphasized that her major complaint was an anterior mandibular crowding, which did not exist when the patient had finished her previous orthodontic treatment. Such situation was noted diagnosed by the present orthodontist during teleconsultation, along with an excessive lingual displacement of the right lower central incisor (Fig 1).

After clarifying the acceptable treatment option, the patient chose for the use of orthodontic aligners, and signed an informed consent accepting the treatment and to confirm her will to participate in this report.

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Initially, the patient was referred to a radiological center, where she underwent radiographic examinations (i.e. digital panoramic radiography and lateral projection), clinical intra and extraoral photographs, digital impressions with intraoral scanner (iTero; Align Technologies, San Jose, Calif), and relevant orthodontic documentation. Such data was uploaded to an online platform to perform interactive digital treatment planning by using the Invisalign Clincheck® software (Align Technologies).



For this case, a total of seven aligners (Fig 2) were required to accomplish the treatment. An appointment was scheduled at the clinic to deliver the aligners to the patient. For this purpose, a clinician installed the required attachments for the aligners, following instructions given by the present orthodontist. The patient was informed to use each aligner for 22 hours per day, and to change to the next aligner in 10 days, provided that 22 hours per day of use were completed. During the treatment, the patient sent a picture with her cellphone, for the orthodontist to follow-up the treatment progress (Fig 3). Total expected treatment duration informed to the patient was 70 days, which was achieved and considered reasonable to correct the lower anterior crowding. At the end of the treatment, patient was scheduled at the clinic to remove the attachments and to initiate orthodontic retention (contention) phase.



At the end of the treatment, the patient was scheduled at the clinic to remove the attachments and to initiate orthodontic retention (contention) phase. (Fig 4)



Discussion

In this report, all three teledentistry modalities were used to connect the patient to her orthodontist, allowing for accomplishment of digital orthodontic treatment with aligners, emphasizing the usefulness of teledentistry, as described recently in the literature.¹ The benefits of digital dentistry are also beneficial considering the current pandemic, since faster treatments and shorter chairside times can be offered to the patient, as compared to conventional modalities. However, considering the existing literature and that this is a case report, further clinical prospective studies would be recommended to address long-term results of the above mentioned approaches using teledentistry modalities.

In conclusion, within the limitations of this report, the present findings suggest that teledentistry is useful for treating patients with digital orthodontics.

Reference:

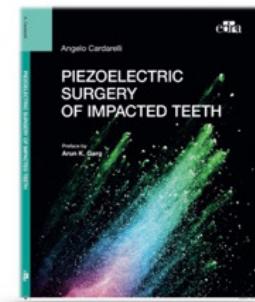
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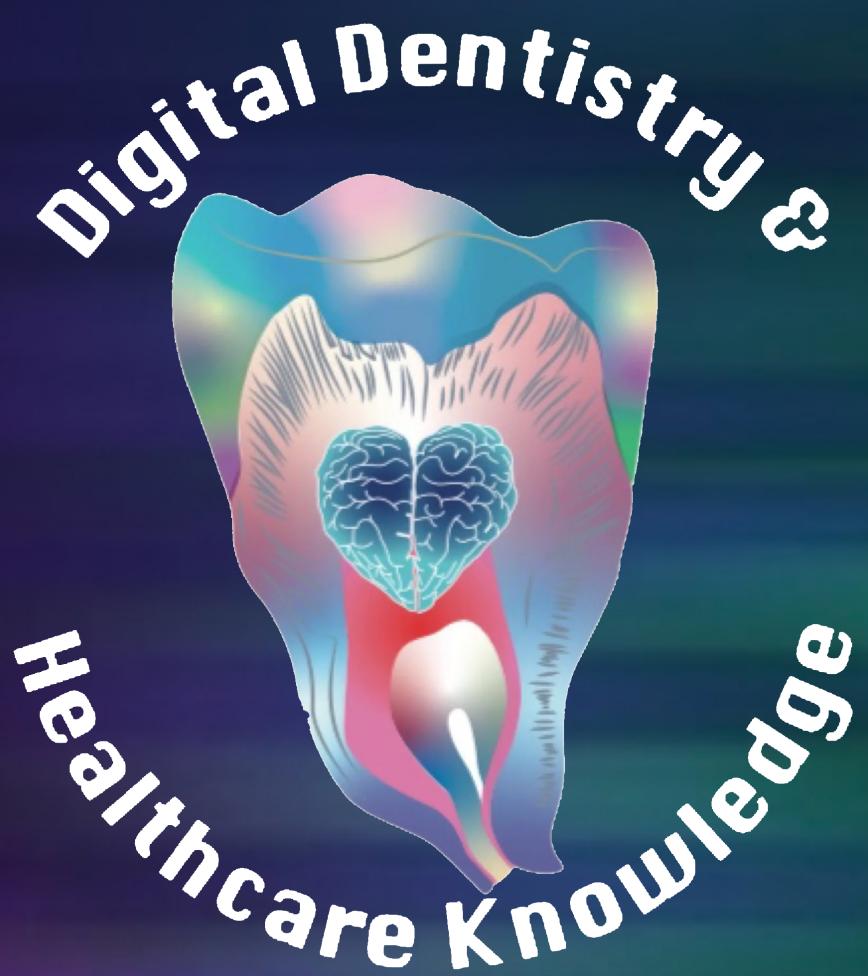
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