

# CBCT

CONE BEAM COMPUTED TOMOGRAPHY  
M A G A Z I N E

## DENTAL CERAMIC IMPLANTS

Superior Manufacturing  
Process Revealed

Dr. Saurabh Gupta, BDS, MDS



## ★ INTERVIEW

Mr. Daniel F. Fields  
CEO of Symphony MedDent Solutions



## CAD/CAM

## SUBTRACTIVE & ADDITIVE MANUFACTURING

in Combination for a Better Patient and Laboratory Outcome

Dr. Matthew R. Wimmer, DMD



## INSIGHTS - INTERVIEW

Dr. Jeffrey P. Okeson, DMD  
TM Disorders & Orofacial Pain



## NATURE KNOWS BEST

3D Smile Design of the DSDApp  
is using Smile Donators as a Replica  
of a Beautiful Natural Smile

Ralph Georg, CEO & Co-founder DSDApp



## MEDICAL EBILLING

Dental and CBCT Assessments

Chris Nevarez



GUEST EDITOR IN CHIEF  
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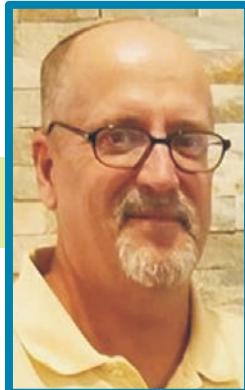
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## EDITOR'S DESK



### GUEST EDITOR IN CHIEF

Dr. Matthew R. Wimmer, DMD

Dear Colleagues,

As I look back about the expansive changes over the years in dental technology it is absolutely mind blowing to see how dental manufacturing has evolved. In 1903 Charles Land developed the porcelain jacket crown. In 1907 William Taggart invented the "lost wax" casting machine. The basic concept of chairside milling was developed by Mormann and Brandestini in the early 1980's with the first CEREC. CEREC and other chairside milling systems are now mainstream and a staple in many dental offices around the world. Dental laboratory milling is also commonplace with a vast array of materials available. Similarly, the first patent for a stereolithography (SLA) 3D printing device (additive manufacturing) was issued to Charles Hull in 1986. 3D printing is becoming more and more mainstream as the cost of units come down and materials and accuracy improve. One can now 3D print a denture, zirconia crown, and even a metal framework from alloy. Desktop printers are becoming more and more common for fabrication of dental models from intraoral scans. Dentists and dental laboratories are beginning to embrace additive manufacturing processes and all the potential it has to offer. These are exciting times we are in and I cannot wait to see what the future will bring to these technologies. I hope that you enjoy this edition of CBCT Magazine dedicated to CAD/CAM and 3D printing/additive manufacturing and that it opens your eyes to the endless possibilities of what lie ahead.

Sincerely,

Matthew R. Wimmer, DMD

EDITOR'S DESK

# WE REMEMBER



**Dr. Subhash Pai**

BDS, MFGDP (RCS England),  
PG Dip Endodontics (UCL London)  
Europe Coordinator

**1981-2019**

Dr. Subnash Pai was and will be remembered as a valued board member, colleague, and influential part of our CBCT Magazine family.

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# surgical kit FOR IMPACTED TEETH REMOVAL

Introducing the VERY FIRST dental surgical kit with ALL dedicated tools for surgical treatment of impacted teeth in ONE kit.

The extractions of the included or semi-included dental elements is one of the most frequently performed clinical procedures by the odontostomatological surgeon. This practice can be relatively simple or extremely difficult in relation to many variables related to the element to be extracted such as localization, anatomy of the dental crown and root, depth and type of inclusion. On the one hand dental avulsion can be considered a routine dental procedure, the extraction of included dental elements requires a considerable technical preparation, an accurate knowledge of all the noble anatomical structures and a matured surgical experience. It is essential to perform a proper treatment plan that, on the one hand, allows to minimize the risk of post-surgical complications (pain, edema, trismus, alveoli's, etc.) and on other to be able to manage the latter in the correct way, always with the lowest biological cost for the patient. In recent years, oral surgery has been strongly affected by technological innovations introduced in this field. In particular, the use of dedicated instruments is essential for a successful surgery. For this reason, I decided to make a dedicated kit divided into two sets where you have all dedicated tools for Surgical Treatment of Impacted teeth. This is absolutely the first one made only for this Surgical Approach.

### Prof. a c Angelo Cardarelli

Specialist in Oral Surgery

Adjunct Professor at San Raffaele University of Milan / Scientific Advisor to the Dental Clinic at the Department of Dentistry at IRCCS / San Raffaele Hospital in Milan (Dean Prof. E.F. Gherlone )  
Private Practice in Isernia at Clinica Cardarelli / [info@clinicacardarelli.it](mailto:info@clinicacardarelli.it)

**SET Prof. CARDARELLI**

CODICE	DESCRIZIONE	Q.
29-179-001	KODER, sterilizzatore, misura 2 40x11	1
29-179-002	KODER, sterilizzatore, misura 3 40x11	1
24-179-003	KODER, sterilizzatore, misura 5,55 x 11	1
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88-280-019	Siringa centrifuga, impiantistica e analisi	1
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83-250-004	Unite-LINE, sferocure radice diritta 5mm	1
87-791-008	USAGI, sferocure stilett 3mm	1
27-722-001	MOLIX, scatola per strumenti, 25,3cm	1
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09-263-030	ADSON, pinza 30cm, bec dritto	1
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01-323-141	FREUDMAN, sclera curettes	1
09-437-130 tu	FDX, forster, rotore 13mm	1
14-100-001	IMPACTOR, impulso 1000	1
12-717-120	SPREUTZ, ergonomico diametrali	1
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AngeleCardarelli

# POWDER INJECTION MOLDING TECHNIQUE

– A Superior Manufacturing Process in Producing Dental Ceramic Implants

## Introduction

The rise of new and different treatment selections in implant dentistry can be attributed to the evolution in the dental trade of zirconia. In comparison to some other ceramic oxides, the material called zirconia displays exceptional biochemical attributes [1-3].

Zirconia has been used as a material appropriate for fixed dental prostheses, ceramic crowns, metal free implant supports and prosthetic frameworks since it was introduced in the field of dental medicine.



Due to zirconia's tooth-like colour, material attributes and organic reaction, zirconia is extremely suitable for dental implants. Furthermore, human studies indicate decreased adhesion of bacteria on zirconia when compared with titanium. Zirconia additionally shows lesser inflammatory cells within the peri-implant soft tissue [4.5]. Most of the dental implant firms that manufacture and market these types of implants make their implants one-piece since the manufacturing process are ablative, making these kinds of implants very costly [6,7].

## Powder Injection Molding

The high price linked with the production of ceramic implants, becomes a significant deterrent for the rehabilitation of dental implants, being only accessible to deep-pocketed people who are more financially able. Powder Injection Molding (PIM) is a rising near net shape method, owing to its advantages like advanced geometry, accuracy and extensive assembly of implants with high efficiency, with no need for surface finishing stages [8].

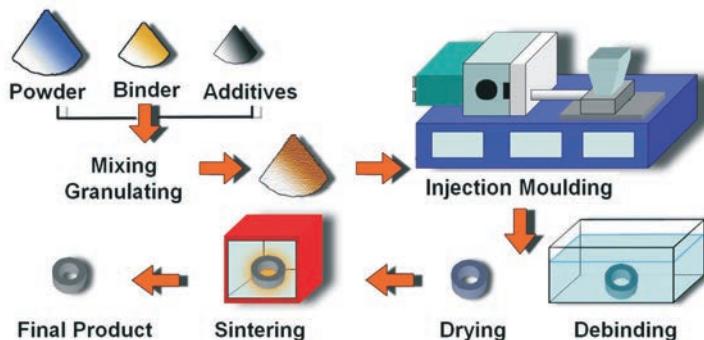


AUTHOR

**Dr. Saurabh Gupta BDS, MDS - India**  
(Oral and Maxillofacial Surgeon & Implantologist)

Dr. Saurabh Gupta is graduated from Manipal University, India and holds a Masters Degree in Oral & Maxillofacial Surgery from RGUHS, Bangalore, India. He is also trained in multiple allied surgical disciplines including Implantology, Laser and Digital dentistry. Currently, he is working as Clinical Director, Digital Dental Design Clinic & DVG's lab (3M Authorized), Bangalore. He is also a visiting senior consultant at Aarogya Dental and Maxillofacial Center, Delhi.

He lectures nationally and internationally, he is the Education Director/ Board Member of the International Academy of Ceramic Implantology, which is the first academy in the USA dedicated to metal free implantology. He is an active member of ZIRG (Zirconia Implant Research Group), whose objectives are to lead and orient research in metal free implantology and support young and established clinicians in clinical and scientific research. He is also serving the "Bioceramic Division" of "The American Ceramic Society", Ohio, US. He is also involved in Research and Development projects at the Indian Institute of Science (IISc), Bangalore. He is also a fellow and ambassador for Cleanimplant foundation, whose mission is to assess production quality and cleanliness of commercially available implant surface. At present, he is involved in a lot of research studies on zirconia implant materials and digital dentistry.



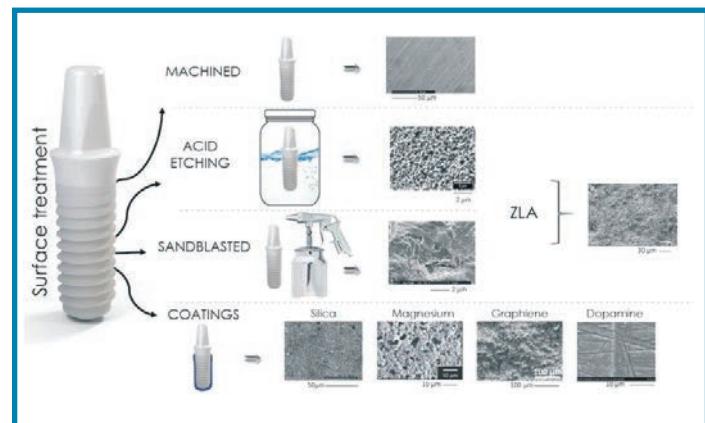
**Fig. 1 Summary of powder injection molding technique**  
Source – Materials World Vol. No. pp. 629-30 Nov. 1996

The process of Powder Injection Molding has five stages: the selection of raw materials, combining the powder with feedstock binder, feedstock injection molding in the mold using preferred form, de-binding to lose the binder and sintering to produce the necessary attributes. It is critical to assess the 4S's (structure, shape, particle size, and particle size distribution) in order to pick out the yttria-stabilized zirconia powder to produce feedstock [9]. It is additionally essential to understand the melting and degradation temperatures of the binder, to outline the processing conditions for mixing and injection, alongside the removal cycle of the binder.

In feedstock, preparation is vital to avoid a critical powder volume concentration (CPVC) so as to attain the most effective mixing force, to produce consistent feedstock and accordingly implants free of defects. After consistent mixing, the feedstock is ready for the injection molding. Lastly, in order to achieve its final form, the green parts (implant and support), are removed from the molds, and then sent to de-binding and sintering. The de-binding and sintering thermal cycles are applied in a high-temperature oven under a well-ordered atmosphere of argon and hydrogen to avoid a stoichiometric alteration of zirconia. The sintering conditions are administered in line with the powder chosen and the de-binding cycle is based on binder thermal analysis (TGA=thermal gravimetric analysis) [10][Figure 1].

## Surface Treatment

It has long been acknowledged that the implant surface is vital for the host reaction to oral implants. Blood will immediately cover the implant surface once the implant is inserted in the body. To boost the speed of the healing process, different surface properties could activate proteins and signaling system. The implant surface can be changed with regard to physics, chemistry, topography and mechanical properties [11].



**Fig. 2**

Existing machined implant surfaces are roughened by numerous physical, mechanical, and chemical modification techniques like acid-etching, coating, sand-blasting, laser and thermal processing [12]. For ceramic injection molded implants, physical vapor deposition, like sputtering, permits the deposition of thin films, with a well-ordered structure, which permits the deposition of nanocrystalline coatings. The implant's surface is extremely vital, being established in literature, that for titanium-based implants the roughness of the surface and nanocrystalline nature might be critical to bone-implant contact and osseointegration, stimulating quick osteoblastic distinction and decreasing the time for patients to recover. The zirconia application coatings ( $ZrO_2$ ) in implants is an approach used for improvement of biocompatibility and osseointegration. On the other hand, there are barely any mentions regarding studies of zirconia with different stoichiometry to be applied in dental medicine [13,14].

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# POSTER PRESENTATION COMPETITION



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Goals, hypothesis & background | Methodology | Results & conclusions

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The Poster Committee will review all abstracts that comply with the above guidelines.

The final posters will be evaluated on-site according to the above criteria as well as:

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Dr. Rodrigo G. Beltrao

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# An interview with **DANIEL F. FIELDS**

CEO of Symphony MedDent Solutions



“ Many practitioners now accept that **CBCT Mobile Imaging** is the Standard of Care. ”

**Daniel F. Fields** has been a healthcare entrepreneur for over 40 years. From his early days as an EMT/Paramedic and through his college years, he developed a position with an implantable pacemaker company. After college and his time in the USAF, he became a pacemaker technical specialist for the same company, General Electric. GE sold the pacemaker division years later.

- Founded AeroMed International, which provided for air Medivac emergency transportation with helicopters and fixed wing aircraft for accident victims and regional neonatal emergency transport. AeroMed was acquired seven years later by a large corporate hospital group.
- Joined as CEO of Capital Healthcare Associates, a DC based consulting & lobbyist group for health care advocacy and consulted for large organ transplant designated Medical Centers. Provided Mobile Medical Modules for refugee camps in South America with the Agency for International Development (AID), which is a US Government agency.
- Entered the surgical laser market for Dental and general surgical procedures. The company was acquired, and Daniel took over the helm of the new company as President and introduced lasers into other specialties including the Veterinary market.
- Entry into the newly invented CBCT market for Dental 3D imaging as company Senior EVP, introducing CBCT. It became quite clear, that at that time, many practices did not have the additional room to incorporate the CBCT unit nor the large capital investment required. Daniel created the Mobile 3D CBCT system available for all dentists and their patients. The market has grown significantly with close to 90 units currently in operation and growing monthly. While the original idea was to only provide the CBCT units and the highly trained technicians, units are expanding to include intraoral digital scanners, airway analysis equipment and oral cancer screening. The company is pushing forward to increase the value of the Mobile units and offer Dentists additional high-tech equipment under their Mobile DDS program, Dental Diagnostic Solutions.

**CBCT Magazine:**

Daniel, you founded the Mobile CBCT program for dentistry and have over 90 units in operation in the States. Are you looking to expand in other countries as well?

**Daniel:**

We have received many requests for additional information from many areas, we already have units in Canada. We also have had ongoing conversations with Dental concerns in the far East as well as Europe, Central America.

**CBCT Magazine:**

Can you share with our readers how Mobile 3D Imaging came about and what drew your attention to growing this type of business?

**Daniel:**

When the Dental CBCT was invented in Italy it was quite large, (room size), a significant investment for Dental practices and educational programs was just beginning. CBCT opened up a whole new area for Dentists and their patients, viewing 3D has allowed for additional diagnostic opportunities, increased findings of abnormalities and an increased level of confidence for both Dentists and patients.

Subsequently, I made the decision to look deeper into the mobile model of shared use, as most hospitals do not own their high-tech scanners; etc. They lease or rent them.

I have been in the point of care medical market and knew that Dentists and their patients would benefit from the CBCT. The main questions that required research was how to make this a feasible option for the market.

Patients never like to be referred to an outside imaging company or to another Dental office. Continuity of care is a big issue for patients and their providers.

To that end, I designed a program to reach out to Dentists. I asked them a series of questions, and after speaking with well over 100 Dentists, I concluded that the program was in fact viable and beneficial.

The program represented a new option for Dentists as they did not have to make a significant investment in the CBCT. It would not require additions or renovation to their practices, they would not have to be concerned by obsolescence of their equipment. The CBCT Mobile would arrive with a well-trained technician and it would be based on a fee per scan.

**CBCT Magazine:**

How were you able to choose who to trust in growing the company with you? Any advice you can share with hungry entrepreneurs?

**Daniel:**

That was a main question that I gave much thought to. I discussed with my mentors, brought in individuals that I trusted from experience, and met with many Dental friends. I believe that it was paramount to deal with people that were well known, professionals that I have business relationships with, and have proved themselves knowledgeable and valuable over time.

(continued on next page >)



**CBCT Magazine:**

Who would best benefit from your services?

**Daniel:**

Obviously, Dentists and their patients. As I am sure you are aware, there has been significant growth in the Dental community entering the implant field. They are taking programs and attending live procedure classes, they should have a CBCT available. Many practitioners now accept that CBCT Imaging is the Standard of Care.

Large groups with multiple practices along with the DSO market. When you have numerous offices, it becomes cost prohibitive to purchase a CBCT for each office. One mobile could provide scans for 25 or more offices.

Many Dentists have incorporated small FOV CBCT units, these are limited by the image size. If they begin performing multiple implants, sleep studies or major reconstruction cases therefore almost certainly they will require a larger FOV.

**CBCT Magazine:**

For those who have not been exposed to the use of CBCT in their practice, what advise can you provide?

**Daniel:**

Education, education, education, for the Dentists and their staff. We offer educational programs for the Dentists and staff online as well as live programs. The scan is very important, but as Dr. Scott Ganz has always said, "It is not only the scan but the plan!" We highly suggest that all our Mobile users have their scans reviewed by an Oral and Maxillofacial Surgery (OMS) Radiologist. The CBCT unit is fantastic but it is only one part of the solution, the scan, the plan and the Radiologist. We will also arrange for assistance in case planning where requested.

**CBCT Magazine:**

What types of options do you provide to your clients when ordering your services? Do you offer same day, multiple days, or months at a time of service for their location of need?

**Daniel:**

The Mobiles are quite flexible. We will address their needs and provide the 3D imaging, be it one scan or an entire day of patients.



**Units are upgraded to function in a Mobile environment.**

Many Dentists in rural areas may schedule their patients on a day and reach out to the other Dentists in the area to schedule their patients on the same day.

It is not odd for us to provide scans to 10 to 15 patients at one location or even their workplace or homes. We make it convenient for the patient and provide a quick turnaround of the scan for the Dentist to review the case/make a diagnosis /and plan the procedure.

- Scanning performed same day at your office
- Competitive fees to imaging centers
- Effective tool for patient education
- Reconstruction of dental CT data into patient studies
- Conversion of DICOM files into any other 3-D software
- Provide Radiological reports on request
- Provide treatment planning by expert clinicians on request
- Provides high level of risk management

**CBCT Magazine:**

Do you offer various types of CBCT units, if so which ones?

**Daniel:**

In the beginning we had another brand in the Mobiles, but we made the decision to update to the newer Prexion Excelsior and have ordered the new Prexion Explorer Systems for delivery in 2020. These units are upgraded to function in a Mobile environment.

**CBCT Magazine:**

What are some of the differences in quality from one type of CBCT unit from another? Do you have a support team who guides the customers on what would work best for them?

**Daniel:**

Yes, we do, basically all the CBCT systems for our purpose require multiple FOV's we have units that the FOV will adjust to smaller FOV for Endo, and pedo and larger FOV for full mouth cases. We offer 5 FOV in each system as well as a Ceph and dedicated 2D Pano. Our technicians control the size of the image in consultation with the Dentists. [\(continued on next page >\)](#)

**CBCT Magazine:**

What important lessons have you learned throughout your journey?

**Daniel:**

- Create a good plan but always update it as one listens to their mentors and the Dentists. Listen more than I speak!
- It was not a simple chore to place a CBCT unit in a mobile unit and design the power requirements. I brought in three engineers to design the unit for functionality and safety. Mercedes has certified all our units. We offer a turnkey program on the Mobile units; we control it from purchase to building and converting the Mercedes as well as the operation of the Mobile and onsite training of the Dentist and staff along with our own team.
- Stay close to your market, keep asking questions as to what the Dentists would like to have in their vans and update upon request additional equipment. We have added intraoral scanning, airway diagnostics, oral cancer screening and in some units' digital printers.

We are also considering the implementation of the Robotic Implant Placement units. This is evolving and we will stay ahead of this market.

**CBCT Magazine:**

How do you enjoy spending your leisure time?

**Daniel:**

I am involved in all the activities of the company daily and always available. Fortunately, with the technology of computers and cell phones it allows me some freedom. I enjoy my time in the mountains and the beach and have been traveling all of my life.



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# CAD/CAM

## SUBTRACTIVE & ADDITIVE MANUFACTURING

Using CAD/CAM Subtractive and Additive Manufacturing in Combination for a Better Patient and Laboratory Outcome

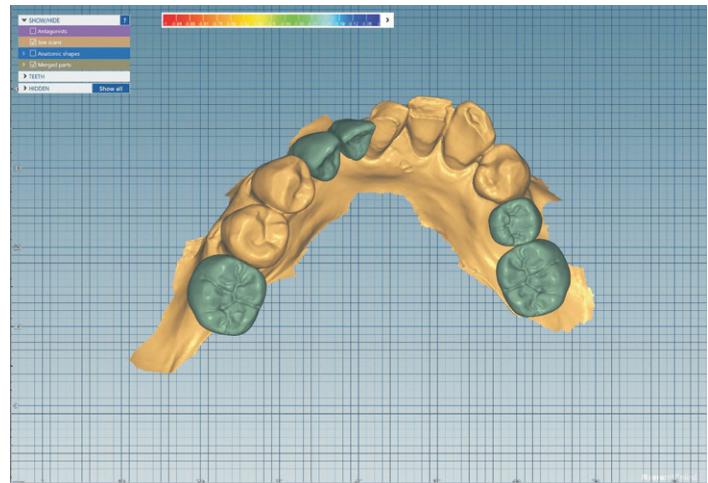


**Dr. Matthew R. Wimmer - USA**

Dr. Matthew R. Wimmer Graduated from Tufts University School of Dental Medicine with a DMD degree in 2009. Dr. Wimmer has invested heavily in technology and uses it to its full potential everyday in practice. He has in office CAD/CAM Milling making use of the Amann Girrbach Ceramill Motion 2 and Additive manufacturing the Form labs Form 2 3D printer. He also makes use of CBCT technology and the latest in laser dentistry using the Convergent Dental Solea 9.3uM all tissue laser.

Contact Information:  
Matthew.Wimmer@gmail.com or on  
**Instagram** @matthewwimmermd

**CAD/CAM subtractive (milling) and additive (3D printing) manufacturing** has come a long way in the last few years. This case report shows how both technologies were used in combination to provide a better fitting prosthesis and high patient satisfaction with less manual working time.



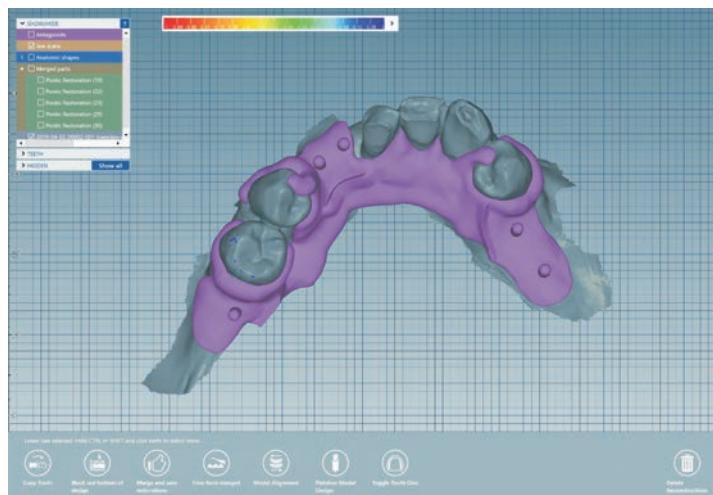
**Figure 1. Teeth Set up on digital cast**

The patient was an 88 year old female with a chief complaint of "My partial is worn out, does not fit, and I would like a new one." The patients existing removable partial denture was a traditional metal framework with acrylic and denture teeth. The prosthesis had a broken clasp and severely worn denture teeth that were limiting her function. Replacement options that were discussed with the patient included a conventional metal framework, a Valplast type prosthesis, or a digitally designed restoration using a high-performance polymer. Dental implants were not an option for financial reasons. We chose to use Solvay Dental 360's Dentivera milling disc for the framework. The Dentivera milling disc is made from Ultaire AKP, a high-performance aryl ketone polymer. This polymer is fully biocompatible and non-allergenic. One exceptional feature of this material is an improved fatigue life over CoCr frameworks. Solvay's research has shown the clasps undergo -0.06 N change in retention force of 15,000 cycles with no measurable macroscopic deformation in clasp fatigue tests over 15,000 cycles vs. CoCr which shows a -2.44 N change and a ~300 micron deformation of the active clasp arm over 15,000 cycles (1). Additionally there is, on average, a 90 minute decrease in manual labor time using the digital design and manufacturing of these frameworks by eliminating the need for waxing and casting (1). It was decided to use additive manufacturing (3D printing) to create strong monolithic composite resin teeth and denture base sections for the new prosthesis. ([continued on next page >](#))

(continued >)

Conventional impressions and records were taken to ensure adequate capture of the vestibules. The impressions were poured in dental stone and digitized into STL format. (Standard Tessellation Language) using a desktop scanner (Amann Girrbach, Ceramill MAP 400). Alternatively, the impressions could be scanned and converted into digital models. The files were then imported into the Ceramill Mind Dental CAD software from Amann Girrbach, an Exocad based design program. Within the software the teeth were digitally set on the models in an ideal position and the occlusion was adjusted using the digital articulator. The teeth set up was then exported as an STL file to use later as digital wax-up.

Next, the models were imported into the partial denture framework module to design the framework. This module digitally surveys and blocks out undercuts on the digital models. With the framework design completed, direct visualization of where the teeth were set was used to determine optimal positioning for tooth retention posts. Upon completion of the framework design the STL file was saved. The STL file of the newly designed framework combined with the digital model was then exported to be used as a new working model in a separate CAD work order to design the teeth and gingiva sections.

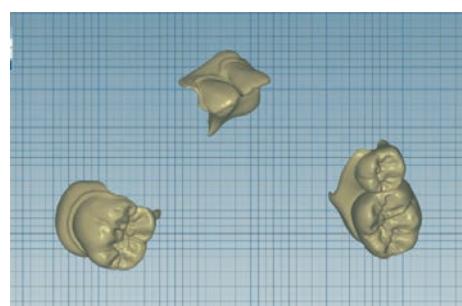


**Figure 2. Partial Denture framework on the digital cast**

A new CAD workorder was opened and the previous antagonist file and the previously saved working model with the framework were then imported. The previous teeth set up file was then imported as a wax-up scan, which would allow for the use of the previous set up, without re-design. Gingiva sections were designed and merged with the teeth set up. This new merged file was adapted to the framework to create slots for the retention posts in the teeth/gingiva parts to allow a secure connection to the framework. The new teeth and gingiva sections were then exported as STL files to be produced using additive manufacturing.

**Figure 3.  
Teeth and gingiva  
sections designed**

**Figure 5. Milled partial  
denture framework with  
3D printed teeth and  
gingiva sections**



The framework was sent to the CAM software and milled with the Amann Girrbach, Ceramill Motion 2 - 5 Axis milling machine. Milling time was approximately 90 minutes. The teeth and gingiva parts were imported into the Form Labs Preform software to prepare for additive manufacturing. Supports were added to the parts, and the parts were printed from NextDent Crown and Bridge MFH resin at a resolution of 50 microns in the open mode on the Form 2 printer. Printing time was approximately two hours. The 3D printed parts were post processed with isopropyl alcohol and light cured according to NextDent's recommendations. The supports were removed from the post-processed parts.

When the milling of the framework was completed, it was removed from the puck and the support sprues were removed and smoothed off. All parts were air abraded with 50µM aluminum oxide particles at 2 Bar pressure and then steam cleaned. The 3D printed teeth and gingiva parts were tried on to the framework and found to have an excellent fit and snapped into place with little effort. The parts were then separated and bonded together per Solvay dentals recommendations.



**Figure 4. 3D printed Teeth and gingiva in NextDent MFH Resin**

Excess bonding resin was removed, and gingival composite (Anaxdent Anaxgum composite) was added to finish the gingival portions of the RPD. The new partial denture was refined by hand and polished. At the delivery appointment, only the slightest adjustments to the framework and minimal occlusal adjustments were required.



(continued >)

Incorporating CAD/CAM digital technology such has additive and subtractive techniques offers some significant advantages over conventional techniques.



**Figure 6 & 7. Assembled Partial denture**

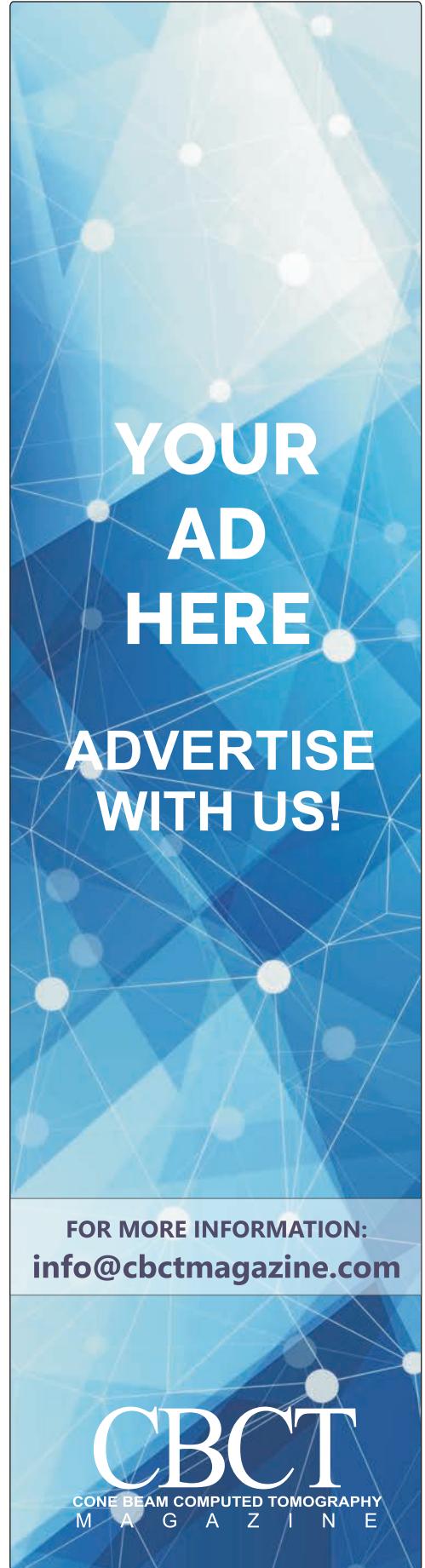
Utilization of these techniques allows for a significant decrease in valuable manual time spent manufacturing prosthetics as well as a decrease in time for the clinician in patient visits and time spent with adjustments.



**Figure 8. Final partial denture seated in the mouth.**

#### References

"Redefining RPDs With Ultaire® AKP." Solvay® Dental 360  
[www.solvaydental360.com](http://www.solvaydental360.com)



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# INSIGHTS

INTERVIEW

## with Jeffrey P. Okeson, DMD TM Disorders and Orofacial Pain

**“ The needs of my patients have required me to learn more about the complex field of pain.”**

**CBCT Magazine:** What was the reason for you getting into the academic field of the TMJ and Orofacial pain specialty?

**Dr. Okeson:** I began my teaching at the University of Kentucky in 1974. At that time, I was asked to teach in the area of occlusion. The predominant concept in dentistry at that time was that if a patient had facial pain, it was related to poor occlusion. Therefore, treatment needed to be directed towards improving the occlusion and once this was accomplished, the pain would resolve. I began to realize that in some patients improving the occlusion was helpful and in others, it was not. It became obvious to me that developing a sound occlusal condition is essential to promote healthy masticatory function. However, occlusion is not the only etiologic factor that may lead to facial pain. In a response to this, I started the University of Kentucky Orofacial Pain Clinic in 1977 to serve the needs of many patients who were not getting better with occlusal changes. This was one of the first clinics developed in the United States to better understand the role of dentistry in the complex field of orofacial pain. Over the years, our clinic has evolved into a major multi professional center for complex orofacial pain conditions.

**CBCT Magazine:** Can you share your early experiences in the field of TMJ and orofacial pain with respect to patients and your learning experience through these patients?

**Dr. Okeson:** Over the years the needs of my patients have required me to learn more about the complex field of pain. Early on we dentists provided the treatments we knew best, which were those related to occlusion and jaw function. For some patients, this was very appropriate and effective. However, for others, it had very little effect on their symptoms. These results forced us to think outside the training we received as dentists. As evidenced-based dentistry became more appreciated we had to move from the anecdotal concepts based on clinical beliefs and move into the research evidence associated with our patient's complaints. This move has been difficult in dentistry because it

(continued on next page >)



Jeffrey P. Okeson, DMD

Dr. Okeson is Professor, Division Chief and Director of the Orofacial Pain Program, which he established in 1977. Dr. Okeson has more than 240 publications in the area of occlusion, TM disorders and orofacial pain in various national and international journals. He has authored two textbooks on TM disorders and orofacial pain, which have been translated into twelve different languages. Dr. Okeson is a very sought after lecturer on the subject of TMD and orofacial pain and has presented more than 1300 invited lectures on the subject of TMD and orofacial pain in all 50 states and in 59 different countries. He has received the campus wide University of Kentucky "Great Teacher Award", the Provost's Distinguished Service Professorship, the American Academy of Orofacial Pain's Service Award, the Acorn Award for the outstanding professor in the state of Kentucky and the first ever "Distinguished Alumni Award" from the College of Dentistry. Dr. Okeson has also received "The International Dentist of the Year Award" from the Academy of Dentistry International. This is the highest award recognized by this Academy and was given to him in recognition of his worldwide efforts in providing education in the area of temporomandibular disorders and orofacial pain.

Jeffrey P. Okeson, DMD  
Interim Dean, College of Dentistry  
Provost's Distinguished Service Professor  
D-138, College of Dentistry, University of Kentucky

(continued >)

forced us to move away from the mechanical concepts that are so important in dentistry to the more basic concepts of pain mechanisms and brain function. This by no means suggests that proper dentistry is not important; it is fundamental to successful masticatory function and health. However, to effectively help all our facial pain patients we need to not only appreciate the mechanics of jaw function, but also appreciate how pain mechanisms and biopsychosocial factors may also play an important role in orofacial pain. These concepts can be very challenging.

**CBCT Magazine:** How do you see the TMJ specialty growing across the globe in the current era?

**Dr. Okeson:** I believe there is a very significant need for dentists to appreciate and understand the complex field of orofacial pain. Non dental pains are extremely common in the general population. The second most common pain complaint we dentists face in a practice is musculoskeletal pain (TMD); second only to toothache. Yet, dental schools generally do a poor job training dentists about TMD. In order to help more patients, we need to improve our educational efforts. In the United States, the Commission on Dental Accreditation (CODA) has established criteria for two-year fulltime graduate training programs in orofacial pain. In 2011 our program became one of the first programs to be fully accredited. There are now 10 accredited programs in the United States. It is my hope that graduates of these programs will go out into their communities and serve patients with complex orofacial pain problems. I strongly believe that every dentist should have basic knowledge of TMD so they can help the routine TMD patient. However, when these problems become more complex and chronic, they often become more difficult to resolve. I believe the dentist who has completed an orofacial pain training program will serve as a resource for these chronic and complex patients. Several countries in the world have established orofacial pain specialties and this process is being formalized in the United States. I believe this is needed to best serve our patients.

**CBCT Magazine:** What advice would you like to give young professionals who wish to pursue TMJ and orofacial pain?

**Dr. Okeson:** I encourage all dentists to understand their role in the management of musculoskeletal pain of the masticatory system. I believe temporomandibular disorders (TMD) is a problem for dentists, but it is not always a dental problem. We need to understand that we are the only healthcare providers that manage TMD. However, TMD does not always require performing dentistry. We need to understand where dental changes are important for TMD and when they may not be important. I believe there is a strong need for dentists to understand the role they play, not only in TMD, but how they can affect other orofacial pain conditions. Appreciating their role often requires them to reach outside of traditional dental education. This can be very rewarding for both the patient and the dentist.

**CBCT Magazine:** Can you share some details about your personal life and family?

**Dr. Okeson:** My wife and I have been married for 49 years. We have two adult sons and one granddaughter. I grew up with three brothers and with my own two sons, so there were no girls in my family. Therefore, it is very special for me to have a little girl around. I share a lot of my time with my 7-year-old granddaughter. She and I enjoy doing many things together.

**CBCT Magazine:** With advent of AI and digital dentistry, will it be useful in TMJ disorders? What is your view, and what do you foresee happening in the near future?

**Dr. Okeson:** The growth of technology is rapidly changing many parts of our lives, including dentistry. Certainly, digital dentistry has changed how we accomplish prosthetic, orthodontic and surgical procedures. In the future we will likely have software that can precisely simulate joint and mandibular movements. With this technology, occlusal appliances may be fabricated that will require little to no adjustments. This technology may assist us with patients who have an occlusal component to their TMD. However, in my opinion, the most difficult task for the clinician is not fabricating an appliance, it is making the proper diagnosis. Knowing which patient will benefit from an appliance from those that will not is a diagnostic issue. At this time technology cannot override the clinician's judgement when it comes to making the proper diagnosis. I often say that treating pain is a "thinking sport", not a "doing sport". Most of dentistry is doing things. To be successful we must use our brains first, and then, in some instances, provide dental changes. In many TMD patients, dental changes may not be indicated.

**CBCT Magazine:** Which TMJ and orofacial pain course do you recommend for students who are interested in pursuing TMJ as their specialty?

**Dr. Okeson:** This is a difficult question. There are many courses available for TMD and orofacial pain. Some are based on sound scientific principles while others have very little science foundation. My recommendation would be to pursue a course that is associated with a reputable program or university and even they may not be evidenced based. The interested student should always be asking the question "show me the evidence". Ask for the documentation and do not quickly believe all you hear is factual. My mentor Dr. Weldon Bell, told me early on to think for yourself, the teacher may be wrong. That is great advice. He also said, "follow the man who is seeking the truth, not the man who has found it". Keep looking for the evidence and you will be the best clinician for your patients. When in doubt, always make sure your initial therapies are conservative and reversible.

**CBCT Magazine:** You have authored so many fantastic books on TMJ and orofacial pain. Which books do you recommend and whose books do you read? Who are the other clinicians doing great in TMJ?

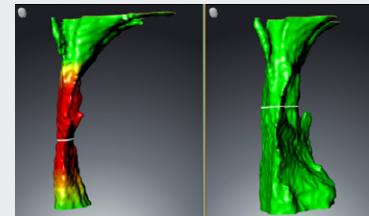
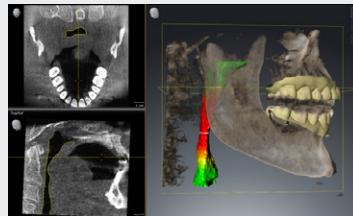
**Dr. Okeson:** I have two popular textbooks that are in multiple editions. My most popular textbook is my TMD and occlusion text which is now in its ninth edition. It has become a standard for teaching TM disorders worldwide. My second book is on orofacial pain. It provides information on all the other disorders that can produce orofacial pain. It is for individuals who want information on how to reach out beyond TMD into the greater areas of pain. My general thought in selecting a textbook is see how well it references the supporting literature. If you see few or no references at the end of the chapter, the textbook is an opinion text which may or may not be evidenced based.



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# NATURE KNOWS BEST

3D Smile Design of the DSDApp is using Smile Donators as a Replica of a Beautiful Natural Smile

Traditionally, false teeth have been known to have an unnatural appearance. Restorative dentistry is losing its connection with natural beauty. Designing teeth with our hands requires decades of practice, training, constant personal improvements. Which is hard, time consuming and very limited regarding the numbers of smiles that we can provide. And sometimes we start to believe that what we do is more beautiful than what nature does.



The majority of smiles that we deliver are not copying nature, so the problem is that the patients are starting to appreciate more artificial smiles. Maybe it's time to reset and learn from nature again.

The best way to reconnect is through technology and digital workflows and intra-oral scanning. The DSDApp offers you a technology to analyze the facial characteristics, facial flow and to 3D design a facial driven smile that's natural, in harmony with the face and that replicates a natural smile from a donator. With the milling and 3D printing technology - we can test-drive the smile before going into the final restoration. We can learn how to copy nature again, by digitalizing all-natural details, replicate them in our projects and deliver a beautiful natural smile.

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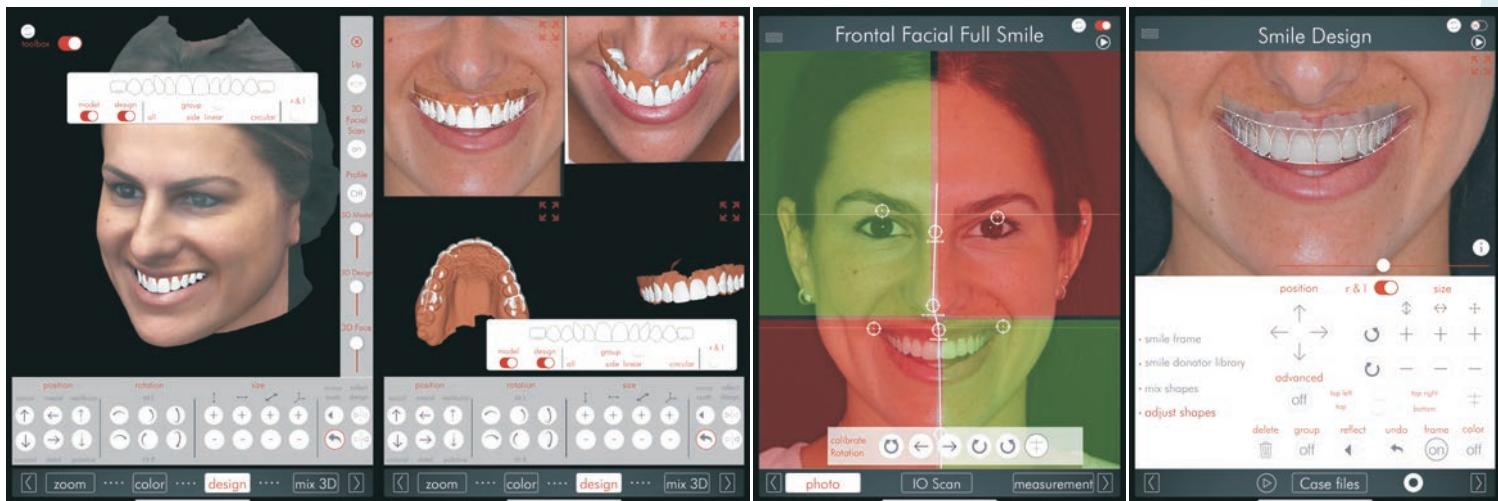


Ralph Georg, CEO &  
Co-founder DSDApp

Mr. Ralph Georg is the CEO and the co-founder of the DSDApp. He completed his Master of Science and Creative Arts at the Middlesex University in London, UK. He dedicates his work developing and integrating technological solutions such as AI and Facial Analysis in DSD workflows to create unique solutions in the area of smile design, patient documentation analysis and communication. Ralph Georg lectures nationally and internationally on innovative smile design workflows and procedures.

"We have the unique opportunity to develop and integrate CI (collective intelligence) and deep machine learning into the DSDApp to take advantage of big data integration. Our goal - to create a live changing patient experience delivering the most beautiful, harmonic, natural smiles possible. We should start the era in which technology works for us - instead of us spending time working with technology!"

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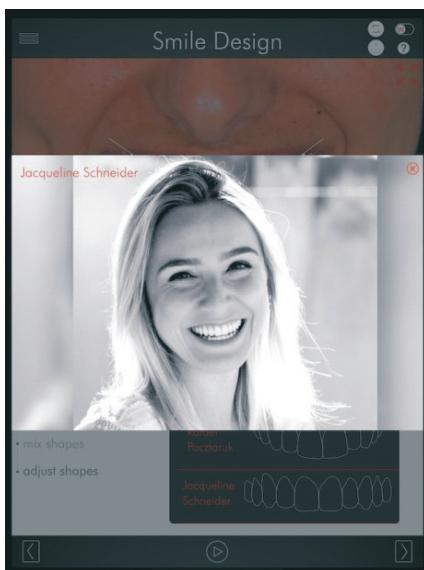
Donator

3D Design

3D Printing Model



The images above demonstrate the patient Marina. She was once designed with the smile from Angelita and once designed with the smile from Jacqueline. Angelita and Jacqueline are smile donators.



Creating a new smile for the patient is more than just creating teeth or planning where and how to place them. You create confidence. You create happiness. You create a new attitude. A new social life for your patients. Understanding the importance of our work - will make us understand how all the new technologies help us achieving the most important aspect of all - creating an amazing patient experience - and the best outcome possible.

The Facial Flow concept: "An organic orofacial analysis – the vertical component"  
Authors: Bruno Pereira Silva, DDS, Eduardo Mahn, DDS, PhD, Kyle Stanley, DDS, Christian Coachman, DDS, CDT

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# MEDICAL E-BILLING



## IN DENTAL AND CBCT ASSESSMENT\$



**Chris Nevarez**

Chris Nevarez started in Dealer Sales and Service in 2000, currently, Chris is an Independent Prexion CBCT Dealer Representative for Symphony MedDent Solutions, a Prexion Reseller and Mobile Radiology Provider and has consulted Select Equity Group LLC on Dental 3D Futures. In 2014 Chris Started Patient to Patient Dental Consulting specializing in Business of Dentistry Consulting, Associate Buy-In Transitions and 3D Technology Integrations as well as Medical E-Claim Training. PT2Pt offers 5 Basics to Medical E-Claims Dental Implants for Private Practices, Group Workshops and Dental Societies.

[patient2patientdentalimplants@gmail.com](mailto:patient2patientdentalimplants@gmail.com)

If you have been keeping up to date on the changes in our industry, there is a huge shift for Private Dental Practices implementing CBCT and CAD/CAM in an attempt to expand their dental services to include endodontics, sleep appliances, clear ortho aligners and dental implants all under one roof. Many practices are investing in CBCT and are doing all they can to keep pace with all the competitive factors including DSO's, mall kiosks and mega-pharmacies who are now offering dental procedures, all of which are offering in house 3D Technology for the patient wow factor...

What I don't see many practices doing to stay competitive is implementing medical necessity covered oral care, with the exception of DSOs, who amazingly are growing by hundreds of acquisitions a month and are successfully utilizing medical e-claims through their in-house clearinghouse software, all of which start with the medically covered CBCT Diagnosis Exam.

The challenge is, medical e-billing by private practices has been widely overlooked or has been dismissed by many clinicians who have heard from their peers and social media that dental procedures are typically denied, confusing, or just a waste of time. What many don't know is nearly all medical e-billing challenges I've heard of, often trace back to 1 of 5 simple protocols which are a physician's referral, a pre auth, a minimum ICD10 diagnoses, a supporting ICD10 diagnoses note and clearinghouse software for claim submissions.

Unfortunately, by feeding into this rhetoric you are placating the medical insurance industry, much to their chagrin. The simple fact is Medicare, all PPO and HMOs, now cover a wide range of necessity related oral surgical procedures and they all start with 2 diagnostic tools, the CBCT and the fluorescent light or "blue light" assisted cancer screening exam.

It is important to know by allowing your practice to register via CMS and submit e-claims, you are benefitting many insurance providers financially, for example, when a hospital or urgent care facility provides an MRI for a medically necessary covered myofascial exam, it costs insurers typically \$2k-\$3k, when it's done by an out of network, radiologist it's \$1190-\$1800, when an insurer sends a patient out of network, with a pre authorization to an oral specialist the typical FFS is \$1000 and are also providing a valuable oral specialist, risk assessment diagnostic exam.

Other differences to medical e-billing include, there is never a need to send an x-ray attachment with your e-claim, unless requested.

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The medical fee schedules are night and day when compared to dental fee schedules and the best advantages overall is the help it provides the large percentage of the patients who just can't afford implants and other surgical out of pocket fees, which in turn raises case compliance exponentially for private practices.

Also, it's not uncommon for an insurance company to initiate an automatic denial, which simply requires a correction or an appeal requesting an explanation of denial, which will often render the claim paid. Some insurers will request an individual audit of a patient's chart for large dollar cases where a patient's long term prognosis is compromised for health reasons such as cancer patients in remission or patients with a history of smoking, heavy drug or alcohol use; however, it is also important to know where accidental medical trauma, TMJ disorder, cleft lips or palates are clearly present. These procedures are covered with very minimal push back, again with a clearinghouse pre-authorization and or a physician's referral "prior to their appointment", remember once a patient is laid back in the chair it is too late.

In closing, the biggest challenge for dentists who are naturally curious, are the answers to these questions and here are my anecdotal explanations...

- Does Medical E-Billing work and what is the learning curve? Yes, it only works if you register via the CMS PECOS System and use the tools like e-forms and clearinghouse software. Self-teaching does take some time however starting slow with just the CBCT Exam which uses minimal ICD10 and CPT claim codes will shorten this curve.
- What are the differences between medical clearinghouses who will manage all claim submissions and do it in-house as a provider and submitter? Many clearinghouses will use the term "IN-House" so please verify as this is often misinterpreted, some clearinghouses will offer their In-House for services fees to submit, and manage the entire claim process, which in some cases include, \$100 for setting up a patient's profile, \$500 for applying for and setting up a medical provider acct., and typically 8%-10% of the total claim reimbursements. While practices who self-learn, use tools needed like e-forms for pre-qualifying patients, a medical specific medical clearinghouse software for checking claims for errors, e-submitting claims and managing Automated Clearing House (ACH) payments.
- Who are the companies that are providing their training events? A simple Google Search for Medical Coding for Dental Events will give you all the choices you may need as well as examples of paid claims like the one included, and then there are Independent Medical E-Billing for Dental Trainers like myself which can be found on social media outlets and dental society sponsorships.

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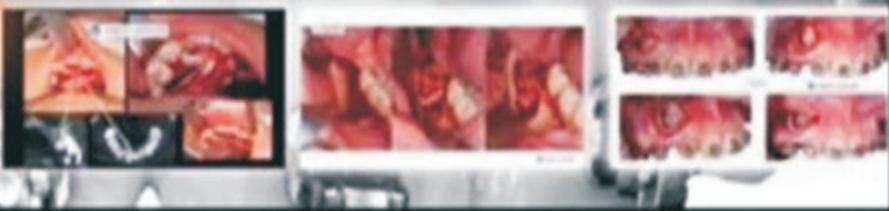
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