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Second Opinions
Kerry K. Carney, DDS, CDE

My brother and I were arguing the other day about how a certain book ended. We had both read the story recently and our understanding of how it concluded was very different. When we reviewed the book, we understood what had happened. We had each attached special importance and meaning to different elements leading up to the conclusion. We had both not only emphasized the elements we found important but we had also embroidered on the descriptions in such a way that the conclusions we came to were supported by our memory of the recorded events.

In fiction, ambiguity can be a powerful device that draws one in and facilitates a kind of creative collaboration between the writer and the reader. The book was purposefully ambiguous in its conclusion. My brother and I had each “filled in” the details to support the conclusion that matched our expectations.

What may be a powerful tool in fiction can help us understand how experience and expectations may influence our professional behavior in something as simple as a consultation for a second opinion.

The other day I was asked for a second opinion by a patient of record who had taken a treatment plan I had given him and proceeded to have the work completed in a foreign country. He had participated in dental tourism. He had a vacation in a tropical clime and received dental treatment for a fraction of what it would have cost him here. I was ambivalent because the patient now wanted a critique of another dentist’s work. It felt like he respected my judgment and opinion but did not feel my expertise was worth what I would charge.

I do not know any particulars about the person who provided the care. Some of the care was good and some was not. I led the patient through a detailed explanation of what was visible in the radiographs we had just taken. I was careful not to disparage the provider but described in detail the problems that were evident and the potential harm that may ensue.

This example was pretty straightforward. It was a matter of performance evaluation. According to CDA’s Code of Ethics 1F, a dentist has the obligation to inform patients of their present oral health status. It was a textbook case of communicating the meaning of radiographic evidence of his present oral health status. The provider was miles away, so it was easy to be impersonal and professional.

In accordance with ADA’s Principles of Ethics and Conduct advisory opinion 2.B.1: The dentist rendering the second opinion should not have a vested interest in the ensuing recommendation. This patient was unlikely to contract with me to retreat the affected teeth, so there was no obvious conflict of interest. It was also a chance to try to help the patient understand the impact of good oral health care on his present and future health.

However, in another case, the consultation for a second opinion had more to do with a conflict of interest rather than the quality of the treatment rendered. A patient of record brought in his friend who had just been treatment planned for a porcelain onlay by another dentist in my town. The examination was quick because I agreed with the risks, benefits and treatment options the patient had been given. I concurred that this was an ideal situation for a porcelain onlay.

The patient seeking the second opinion was reassured but then wanted to know how much I would charge for the same procedure. This felt like a conflict of interest. My colleague had done everything correctly as far as I could tell, but I was being tempted to attract this patient to my practice. It is the patient’s choice as to whom he chooses to provide his health care, but this did not feel right. I advised the patient that dental care should not be viewed as buying a commodity. It should be part of a relationship based on trust and respect. I told the patient that his trust and respect for his dentist should be even greater after finding I concurred with his diagnosis and treatment plan.

A third category of second-opinion consultations springs from a treatment plan disagreement. I worked for several years in a clinic with several other dentists. We all respected each other’s motivations and abilities. However, reasonable dentists can disagree on treatment plans.

It is understandable that variables in cases may be assigned greater or lesser importance depending on one’s experience and expectations. I have even found that I can disagree with my own treatment plans. I may not plan the same way at the end of a difficult 10-hour workday than I do at the beginning of a day. I may not treat the same way if I have just experienced a bad outcome for a similarly diagnosed case.
Recognition of a range of acceptable treatment plans based on the changing importance of diagnostic variables and altered confidence in outcome predictions is necessary in our everyday clinical environment.

One dentist may see incipient caries and treatment plan surgical intervention. Another dentist may see the same thing and suggest medical intervention with fluoride, remineralization attempts and behavioral changes. A second opinion in this environment still must advise the patient of his oral condition but should also elaborate on treatment philosophies and potential outcomes.

Second opinions are easy and second opinions are hard. They can be like interpreting the ending of an ambiguous novel. We see diagnostic variables through the lens of our experience. We have expectations based on what we have learned or experienced. However, our code of ethics provides a navigational tool to help us across a sea of controversy. We have to clearly communicate what we see, explain the risks, benefits and range of acceptable treatment options, remain professional in our evaluation of other members of our profession and disallow any financial influence on our opinion. It is a shared code of ethics and professional integrity that define and self-regulate professional behavior.

The Journal welcomes letters

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Research, Diagnosis of Burning Mouth Syndrome Need More Rigorous Standards

A new study that reviewed and analyzed disease definitions and diagnostic criteria used in randomized controlled trials (RCTs) involving burning mouth syndrome (BMS) found that not all burning mouths are the result of BMS and that physicians and researchers need better standards for making an appropriate diagnosis.

The research, led by Milda Chmieliauskaite, DMD, co-author of the study and an assistant professor of oral and maxillofacial medicine at the School of Dental Medicine at Case Western Reserve University, was published in the journal *Oral Diseases*.

For the study, Dr. Chmieliauskaite and her research team conducted a systematic review of RCTs that were published between 1994 and 2017. Their objectives were to summarize and assess disease definitions used in BMS RCTs and to assess the diagnostic (inclusion and exclusion) criteria used to enroll study participants who were designated to have BMS in RCTs.

Results of the review found that the considerable variability in disease definitions and diagnostic criteria that were used in the trials created substantial heterogeneity in the selection of participants and weakened the rigor of the 36 RCTs identified. The analyzed RCTs routinely underreported the methods used to rule in or out study participants as well as the number of individuals excluded from BMS RCTs, according to the study.

As a result, Dr. Chmieliauskaite and her team concluded that BMS clinical trials need more rigorous standards.

“Outcomes of therapeutic interventions from these BMS RCTs should be interpreted with caution due to heterogeneous disease definitions and diagnostic criteria,” Dr. Chmieliauskaite said. “In order to improve the quality of clinical trials, future research should focus on establishing consensus for a single definition of BMS that includes specific inclusion and exclusion criteria that should be used to select study participants for clinical trials.”

Best estimates are that between 0.1% and 4% of the population are affected by BMS and the condition affects more females after the age of 50 than it does males, according to the study. And while the specific cause of BMS is uncertain, some evidence shows that it may be related to nerve dysfunction.

Dr. Chmieliauskaite said because dentists and clinicians aren’t trained well on the topic, and because other conditions have similar symptoms, diagnosing and treating BMS should be approached with caution.

“The issues with misdiagnosis depend to some extent on the context, but include resources, money and patient discomfort,” she said. “The current method for making a diagnosis is ruling out other disorders. A lot of the other things that cause burning in the mouth (such as diabetes, anemia and dry mouth) can be easily treated.”

Learn more about this study in *Oral Diseases* (2019); doi.org/10.1111/odi.13067.
Supply of Pediatric Dentists Could Outgrow Demand in the U.S.

The number of U.S. pediatric dentists is expected to grow by more than 60% through 2030, according to new research commissioned by the American Academy of Pediatric Dentistry.

A study published in the July issue of the *Journal of the American Dental Association* (JADA) that explored how these trends may affect pediatric dentistry suggests that the supply of pediatric dentists is growing more rapidly than demand for services.

“Growth in demand could increase if pediatric dentists captured a larger share of pediatric dental services or if children who are underserved had oral health care use patterns similar to those of the population with fewer access barriers,” said Simona Surdu, MD, PhD, of the University at Albany School of Public Health in Albany, New York.

In 2016, there were approximately 6,530 active pediatric dentists in the U.S., according to the study. If current supply trends hold steady, there will be 10,560 pediatric dentists by 2030, an increase of 62%.

In contrast, demand for pediatric dentists is only expected to grow by 2% under the status quo scenario. This translates to a need of only 140 more pediatric dentists — thousands fewer than the projected supply.

While the supply of pediatric dentists dwarfs demand in the status quo scenario, that could change with sweeping policy reforms. For instance, if children who are currently underserved increase their rate of oral health care to that of their peers, demand would increase to 8,630 pediatric dentists by 2030, according to the study.

Learn more about this study in *JADA* (2019); doi.org/10.1016/j.adaj.2019.02.025.

Root Canal Treatments May Improve Quality of Life

A new study by researchers at the University of Adelaide Dental School in Australia is debunking the popular belief that root canal work is the most unpleasant dental treatment.

In 2009, researchers used questionnaires, dental records and treatment receipts to collect information about 1,100 randomly selected patients aged 30 to 61. The patients’ self-rated dental health score was checked when they had their dental work and then two years later. In comparing those scores, researchers found that the effect of root canal work on patients’ oral health-related quality of life was similar to other kinds of dental work such as tooth extraction, restoration of teeth, repairs to the teeth or gum treatment, preventive treatment and cleaning.

More than 22 million root canal treatments are performed in the U.S. each year, with millions more performed around the world. According to the researchers, these procedures may have a profound positive effect on the quality of life of these patients.

“There is growing interest in the dental profession to better understand the effect and impact oral diseases and their associated treatment, such as root canal work, have on patients’ quality of life,” said Giampiero Rossi-Fedele, DDS, PhD, head of endodontics at the University of Adelaide Dental School and co-author of the study.

Researchers believe patient-treatment outcomes are now the principle driving force behind treatment needs, as opposed to clinician-based treatment outcomes. With this change in emphasis, the perspectives of patients and their relatives are important factors in identifying the need for treatment, treatment planning and determining outcomes from any health care intervention as part of shared decision-making, according to the study.

“Treatment outcomes need to be reexamined from a patient-based perspective using self-reported measures as this more accurately reflects the patients’ perception of treatment outcomes and the effect it has on their overall well-being,” said Dr. Rossi-Fedele.

Read more on this study in the *Journal of Endodontics* (2019); doi.org/10.1016/j.joen.2019.05.002.
Resin Infiltrations Added to Dental School Curriculum

A minimally invasive dental procedure designed to stop cavities without drills could make a big difference for patients with dental anxiety. The procedure, resin infiltrations, is now part of the curriculum at the Herman Ostrow School of Dentistry of USC. Instead of drilling and filling the cavity, the early caries lesions are infused with resin.

“Patients tend to associate dentists with drilling, and they don’t like that,” said Jin-Ho Phark, DDS, an associate professor of clinical dentistry. “So we have been trying for a while to reduce the amount of drilling while still taking care of the disease.”

Because caries and tooth decay can take a long time to develop, the trick to minimally invasive dentistry is to catch the decay before it becomes a big problem and to stop it in the early stages, Dr. Phark said. With resin infiltrations, a dentist can use a special liquid resin to infuse into the porous lesions, much like the sealants used to cover grooves on chewing surfaces. The resin acts like a sealant and becomes a preventive measure.

“In the past, the standard was to wait until the lesion was big enough to be worthy to be drilled into,” Dr. Phark said. “With the new technique, we can stop the cavity early on and prevent it from breaking down and needing a filling at a later time.

Resin infiltrations join silver diamine fluoride as another minimally invasive dentistry technique that dentists can use in situations where the caries lesion has already turned into a visible cavity. USC is the first school to teach minimally invasive dental techniques on a large scale, already starting on the preclinical level.

So far, these techniques have been offered only to patients in special clinics or advanced programs, such as advanced operative and adhesive dentistry. However, last fall Dr. Phark started teaching them to the first-year class in a new module called Cariology and Microdentistry. Once this class enters the clinic, students will be performing this kind of treatment on a regular basis.

Read more about this procedure and minimally invasive dentistry at news.usc.edu.

Autofluorescence Finds Bacterial Contamination in Root Fracture

Researchers in the department of preventive dentistry and public oral health at the Yonsei University College of Dentistry in Seoul, South Korea, were successful in identifying the depth of root fractures and the presence of bacterial contamination using a fluorescence camera instead of conventional scanning methods. The study was published in the Journal of Dentistry in July.

The conventional method for diagnosing root fractures is to obtain magnified images using an operating microscope after staining with methylene blue dye. However, this method may have a low sensitivity for identifying dentine cracks, according to the study.

The researchers conducted an in vitro study using 33 previously extracted mandibular second molars with periapical lesions. These molars had been extracted after root fractures were discovered during intentional replantation or diagnostic surgery. They scanned the root fractures using a fluorescence camera and found 33 root fractures in the teeth, which were confirmed with a microcomputed tomography (micro-CT).

Under illumination by blue-violet light, the root fractures appeared darker than the surrounding sound surface, and a gradual increase in the quantitative fluorescence parameter indicated the deepest point in the fractures. The red autofluorescence associated with bacteria was found in 57% of the root fractures. Bacteria were detected with fractures in more than 94% of the 19 teeth exhibiting red fluorescence.

“This fluorescence technique could be applied in clinical practice for crack detection during surgical procedures such as diagnostic surgery or apical surgery,” said Hye-min Ku, PhD, lead author of the study.

Learn more about this study in the Journal of Dentistry (2019); doi.org/10.1016/j.jdent.2019.05.024.
Sugar Industry Used Dietitians To Influence Dental Professionals

Research presented at the 2019 International Association for Dental Research conference reported that the sugar industry in the 1970s used dietitians to help spread positive messages connecting sugar with good health.

The study by Ifunanya Okeke, DDS, of the University of California, San Francisco, discusses the U.S. Sugar Association’s creation of the Regional Nutritional Information Program in 1975 and its impact on dental professionals by way of dietitians who spread the pro-sugar messages.

Dr. Okeke researched internal documents of the U.S. Sugar Association that were related to operations, regulatory activities and scientific research from 1974 to 1978 for relevance to the Regional Nutritional Information Program. Of those internal documents, 59 were identified for further review and emerging themes were identified.

The results showed that the Regional Nutritional Information Program was an essential component of the U.S. Sugar Association’s public relations campaign and was designed to portray the safety and benefits of sugar in a balanced diet. The target audiences included universities, public schools, professional associations and the media, according to the study.

U.S. Sugar Association dietitians hosted educational workshops, incorporated U.S. Sugar Association literature into libraries and curricula, monitored professional and consumer attitudes toward sugar and made media appearances. Their dietitians interacted with dental professionals by documenting their attitudes toward sugar, influencing a professional conference to include pro-sugar speakers, developing a media program that minimized sugar’s role in tooth decay, and monitoring and criticizing dentist-researchers examining the high-sugar content of breakfast cereals.

New Composite May Combat Tooth Decay

A new study by Tel Aviv University researchers found potent antibacterial capabilities in novel dental restoratives. The resin-based composites, with the addition of antibacterial nano-assemblies, can hinder bacterial growth and viability on dental restorations, the main cause of recurrent caries, according to the research.

The study was led by Lihi Adler-Abramovich, PhD, and TAU doctoral student Lee Schnaider and colleagues from TAU’s Maurice and Gabriela Goldschleger School of Dental Medicine and George S. Wise Faculty of Life Sciences and was published in the journal ACS Applied Materials & Interfaces.

Dr. Adler-Abramovich and her research team were the first to discover the potent antibacterial activity of the self-assembling building block Fmoc-pentafluoro-L-phenylalanine, which comprises both functional and structural subparts. Once the researchers established the antibacterial capabilities of this building block, they developed methods for incorporating the nano-assemblies within dental composite restoratives. Finally, they evaluated the antibacterial capabilities of composite restoratives incorporated with nanostructures as well as their biocompatibility, mechanical strength and optical properties.

“The minimal nature of the antibacterial building block, along with its high purity, low cost, ease of embedment within resin-based materials and biocompatibility, allows for the easy scale-up of this approach toward the development of clinically available enhanced antibacterial resin composite restoratives,” Dr. Adler-Abramovich said.

The researchers are now evaluating the antibacterial capabilities of additional minimal self-assembling building blocks and developing methods for their incorporation into various biomedical materials, such as wound dressings and tissue scaffolds.

Read more of this study in ACS Applied Materials & Interfaces (2019); doi.org/10.1021/acsami.9b02839.
Researchers at Queen’s University Belfast found a substantial link between poor oral health and hepatobiliary cancer but no significant associations between gastrointestinal cancers and poor oral health. The study was published in the United European Gastroenterology Journal in June.

The research team analyzed a large cohort of people in the U.K. to investigate the association between oral health conditions and the risk of a number of gastrointestinal cancers, including liver, colon, rectum and pancreatic cancer. Models were applied to estimate the relationship between cancer risk and self-reported oral health conditions, such as painful or bleeding gums, mouth ulcers and loose teeth.

Of the 469,628 participants, 4,069 developed gastrointestinal cancer during the (average) six-year follow up. In 13% of these cases, patients reported poor oral health. The association between self-reported poor oral health and hepatobiliary cancer was stronger in subgroups of participants who consumed fewer than five pieces of fruits and vegetables daily, were smokers, were overweight or obese or living in more affluent socioeconomic areas. According to the study, self-reported poor oral health was associated with a 75% increased risk of hepatocellular carcinoma.

The biological mechanisms by which poor oral health may be more strongly associated with liver cancer, rather than other digestive cancers, is uncertain, but one explanation is the potential role of the oral and gut microbiome in disease development, according to the study.

“The liver contributes to the elimination of bacteria from the human body,” said Haydée W.T. Jordão, PhD, lead author of the study. “When the liver is affected by diseases, such as hepatitis, cirrhosis or cancer, its function will decline and bacteria will survive for longer and therefore have the potential to cause more harm. One bacteria, *Fusobacterium nucleatum*, originates in the oral cavity but its role in liver cancer is unclear.”

The researchers say further studies investigating the microbiome and liver cancer are warranted.

Read more of this study in United European Gastroenterology Journal (2019); doi.org/10.1177%2F2050640619858043.

More Patients Opting To Bank Stem Cells From Third Molars

There is a new option for patients who may be thinking of throwing out their third molars after extraction — and it involves stem cells, according to an article published in The Post and Courier newspaper.

“It’s almost like an insurance policy for the future,” said Matthew Barefoot, DDS, MD, an oral and facial surgeon in Mount Pleasant, S.C.

More physicians are giving patients the option to bank the stem cells within their third molars. All cells that have a specialized function in the body come from stem cells, according to the National Institutes of Health. They create what’s called a “daughter” cell, which can go on to become either a specialized cell — including blood, liver and brain cells — or remain a stem cell.

A common misconception is that stem cells only come from embryos, according to Ophir Klein, PhD, MD, a University of California, San Francisco, human genetics professor. But there are also adult cells, which are found in bone marrow, fat and third molars.

To harvest the adult cells, extracted third molars are placed into a solution and shipped to a lab where they are then frozen and stored for potential use. Physicians compare the process to when parents bank their baby’s umbilical cord blood.

“It’s the same thing, except instead of a baby, the parent is likely dealing with a teenager’s third molars,” said Michael Longaker, MD, co-director of the Stanford Institute for Stem Cell Biology and Regenerative Medicine.

With the increased need for donated organs and tissues, experts are hoping that stem cells will one day become a renewable source of replacement cells to treat things such as heart disease, stroke and burns.

Read more of this article at postandcourier.com.
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Winners of the 2019 Table Clinic Competition

Dental, dental hygiene and dental assistant students and military/residents from across the state competed in the California Dental Association’s annual Table Clinic Competition at CDA Presents in Anaheim May 16–18. The Journal is pleased to publish abstracts from the first-place winners in each category. CDA continues to collaborate with the California Dental Hygienists’ Association for the RDH portion of the competition.

Laboratory Model To Evaluate Bleaching Efficacy in Stained vs. Nonstained Human Teeth
Claudie Pascal, Loma Linda University School of Dentistry

Objectives: Establish laboratory model to evaluate tooth-bleaching efficacy, evaluate staining protocols and relate measurements to perceptibility/acceptability thresholds.

Methods: Human molars (N = 160) were distributed to nonstained (N = 80) and stained (N = 80) groups that were further divided into four groups (N = 20 each): water (NC), 1% hydrogen peroxide (HP), 6% HP and 30% HP. A shade guide and spectrophotometer were used for color measurements. Results were recorded at baseline (T1) posttreatment at one day (T2), one week (T3), two weeks (T4) and six weeks (T5). Kruskal-Wallis and Friedman’s tests showed color change difference among groups and color change across different time points. Tests of hypotheses were two-sided, alpha = 0.05.

Results: Higher HP concentrations resulted in higher color changes (ΔSGU and ΔE*ab). Thus, there was a concentration-dependent response. All negative controls exceeded perceptibility threshold of ΔE*ab=1.2 at all time points while 1% HP exceeded acceptability threshold of ΔE*ab=2.7.

Conclusion: The proposed laboratory model is valid for evaluating tooth-bleaching efficacy in vitro.

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Laboratory Model To Evaluate Bleaching Efficacy of an Experimental Bleaching Agent
Ellin Choi and Clayton Tran, Loma Linda University School of Dentistry

Objectives: To use a laboratory model to evaluate bleaching efficacy of a product with the ADA Seal of Acceptance and experimental bleaching agent.

Methods: Extracted third molars (N = 50) were distributed into five groups: water (NC), titanium dioxide nanofibers (NFs), ADA Seal of Acceptance product (WS), 1% hydrogen peroxide (1% HP) and 30% hydrogen peroxide (30% HP). Examiners performed visual and instrumental color measurements. Results were recorded at baseline, one-day posttreatment and one-week posttreatment. Kruskal-Wallis’ procedure was used to determine differences in color change among groups. Tests of hypotheses were two-sided with alpha = 0.05.

Results: Overall color change and change in shade guide units were different among groups (P < 0.05). The higher the HP concentration, the higher the color change. Titanium nanofibers showed a decrease in chroma but were not different compared to negative control.

Conclusion: The laboratory model was successful in screening experimental bleaching agents and confirmed high efficacy of a product with the ADA Seal of Acceptance.

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Is it Really Just Snoring? Let’s Find Out!
Diego Ruiz, William S. Hart District

Abstract: In my table clinic titled “Is It Really Just Snoring? Let’s Find Out!” I talk about sleep apnea and dentistry. My hypothesis is that with the help of dentistry and research sleep apnea can be diagnosed, treated and improved. I prove this with the help of research on the internet, diagrams on how air should properly flow and how air flows in a person with sleep apnea. Dental treatments and devices can help improve sleep apnea.

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Flow With Ease
Kelly Nguyen, Chloe Sottosanti and Arianna Yotti, Cypress College

Background: Local anesthesia is the leading source of anxiety for patients in dentistry. Patient discomfort often occurs during the deposition of anesthetic due to a fast and/or irregular rate of solution. A fast rate of anesthetic produces a rapid acidic change to the patient’s pH level, which can cause pain. An irregular rate of injection can be produced when an operator encounters dense tissue resistance, resulting in increased force and volume of anesthetic. This pressure causes tissue to quickly distend, arising in discomfort. Computer-controlled local anesthetic devices (CCLAD) were developed to deliver anesthetic at a consistent rate to reduce patient discomfort and pain.

Methods: Peer-reviewed literature and academic journals were evaluated for this research.

Conclusion: An improved model of CCLAD is now designed to be cordless, lightweight and comfortable for the dental professional while producing more patient comfort, compliance and return to the dental office.

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The Use of Glucometers as a Screening Tool in the Dental Setting

Andrew Galang, Ethan Cook, Sean Halabo, Tom Nguyen and Brian Seo, Loma Linda University School of Dentistry

Acknowledgment: This study was funded by the Loma Linda University School of Dentistry Student Research Program fund.

Objectives: To assess patients’ attitudes and understanding toward utilizing a glucometer in a dental setting.

Methods: A 10-question survey was administered to patients in the hygiene clinic via hard copy. Fifty-four patients participated in the survey. The first seven questions focused on the patients’ opinion and knowledge of the use of a glucometer, while the last three were demographic questions.

Results: The results coincided with findings that were expected based on previous literature. Overall, the Loma Linda University School of Dentistry patients were in favor of the use of a glucometer as a screening tool in the dental clinic. When asking participants if it would be beneficial for dental personnel to screen for diabetes in the office, 35.2% agreed and 37% strongly agreed. Additionally, when asking participants if they would be comfortable having the results of the blood glucose screening released to their medical doctor, 55.6% strongly agreed and 31.5% agreed. Overall, participants tended to agree that using a glucometer as a screening tool in the clinic would be beneficial to their overall health.

Conclusion: The research statistics provided valuable information that can be used for evidence-based practice. This incorporates the best research evidence into the decision-making process for patient care. The results indicated that the majority of patients were in favor of using glucometers as a screening tool in the dental setting. Participants routinely selected “strongly agree” or “agree.”

The data obtained from this study were analyzed with descriptive statistics along with inferential statistics using SPSS.

The corresponding author, Andrew Galang, can be reached at galangandrew@gmail.com.
The Clinical Use of Leukocyte and Platelet-Rich Fibrin (L-PRF) in Socket Preservations
Lt. Sara Storer, DMD, MS, DC, United States Navy

Abstract: Wound healing and tissue regeneration have been popular ongoing research topics. Recently, the autogenous platelet concentrate has proven superior in terms of therapeutic potential. One of the emerging generations of platelet concentrate in wound healing is leukocyte and platelet-rich fibrin (L-PRF). In this series of two cases, we demonstrate the clinical outcome of the use of L-PRF for socket preservation in dental implant site development. Blood samples were collected prior to tooth extraction. After centrifuging, L-PRF exudes were obtained and placed in a compression box. The L-PRF membrane was then used as an allograft activator as well as for site coverage. Patients were followed for two-, four- and 16-week appointments. Clinically, sites where L-PRF was used for socket preservation showed better wound healing and tissue regeneration. The findings show that the use of L-PRF provides clinicians a cost-effective, biocompatible material that is an excellent choice for socket preservation.

The Author: Lt. Sara Storer, DMD, MS, DC, can be reached at sara.a.storer.mil@mail.mil.
It is an honor to welcome you to the second issue of the Journal dedicated to improving all aspects of safety in the dental office. Safety encompasses not only what we do but how we react when there is the potential for an unsafe situation to occur. It involves not only our understanding of the situation but how we empower our staff to intervene when they perceive or observe a problem. Improving safety is not about punishing offenders and offenses, it is about developing a system that tracks problems, incorporates changes and reviews them on a regular basis to eliminate errors in the future. This is the basis of a continuous quality improvement system. It takes a whole team and it involves being honest about our errors and being willing to evaluate them with our staff and outside professional help.

The July issue of the Journal was an introduction to safety, the use of checklists and developing the internal programs necessary for success. The costs of not practicing safely, both administratively and monetarily, were simply laid out. The most basic of safety issues, medical emergencies and the drugs used were discussed.

This month we continue with clinically appropriate discussions by nationally and internationally recognized leaders in their respective fields. Safety issues including employee health, safety and infection control are reviewed by Nancy L. Dewhirst, RDH, BS. An article on radiation safety and the future is authored by Dale A. Miles, DDS, MS, and Juan F. Yepes, DDS, MD, MPH, MS, DrPH, and Roy L. Stevens, DDS, and Daniel S. Sarasin, DDS, discuss medication errors and avoiding them. A unique concept in dentistry is the Dental Patient Safety Foundation, an organization responsible for gathering data on adverse incidents and publishing case reviews and providing real-time data. A discussion about the foundation and how you can get involved is authored by Stuart E. Lieblich, DMD, Robert C. Bosack, DDS, and Michael Rollert, DDS. And concluding the issue, Felix Lee, DMD, and Pam Kawasaki, RDH, MBA, provide an article about a successful dental safety program and its implementation at Kaiser Permanente.

I recently completed a course in safety and error prevention tools at my local hospital. Private practice-based physicians are not required to take or attend courses in patient safety to maintain their hospital privileges; only those who are employed by the organizations must take the courses.
I voluntarily took the course and only a few physicians were there — mainly nurses and other health care providers attended. I learned some interesting and shocking things: Published numbers for harm in a hospital are 250,000 deaths, with 1 out of 10 harmed in some way during their stay. There were 254,000 workforce injuries. The total equates to a 747 airplane crashing each day.1 The goal, therefore, must be error prevention, and it has been identified that significant errors generally occur because of multiple mistakes compounded over time.2

Three components are necessary to develop a safety program in the office and require everyone’s buy-in:

1. Trust: Trust your coworkers when one points out an at-risk behavior.
2. Report: Speak up when you recognize potential unsafe situations.
3. Improve: Make a commitment to improve safety.1

To achieve these goals and implement the program, it is important that the team is trained to effectively communicate. This includes asking questions, speaking up and communicating a concern. A technique utilized for this is closed-loop communication in which an instruction is repeated and numbers clearly spoken, confirmed and acknowledged. Other techniques include timeouts before a procedure, in which the patient, the tooth and the procedure are stated and confirmed by another person in the room or the tooth or oral tissue is marked prior to beginning. This action generates trust between the patient and provider and reduces the chance of harm. The importance of diversity in the workplace is recognized but it may bring with it unique challenges and complications that may arise in nonnative and native speakers. The practice of phonetic and numeric clarification and closed-loop communication is of extreme importance and must be practiced continuously.

One final technique is one we must practice constantly. Called the STAR self-check, it is a technique to prevent skill-based errors that occur when we do the same procedure repeatedly without thinking. STAR stands for:

1. Stop: Take a pause to focus.
2. Think: Consider what you are about to do.
3. Act: Focus and do.
4. Review: Did you do it correctly? What could you have done to do it better? What can you do next time to get the results you want?1

CDA is committed to improving safety in the dental office. Hopefully, these two Journal issues will start you on the pathway to developing a safety program and incorporating it to reduce errors and potential patient and staff harm. The key to developing a culture of safety is to actively include all members of your team in the program. The Hippocratic oath states “primum non nocere,” which translates to first, do no harm. As health care providers, it should be our covenant to follow that dictum.1

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Periklis Proussaefs DDS, MS is a prosthodontist and Associate Professor at Loma Linda University. Dr. Proussaefs has received formal training in all forms of sedation since 1997. He has been providing dental care under I.V. (moderate) or oral (minimal) sedation. His seminars focus on patient safety, airway management, monitoring, and handling emergencies. The course involves lecturing, hands-on training on a manikin, and real patient experience.

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Dental Infection Control — It’s as Simple and Complex as That

Nancy L. Dewhirst, RDH, BS

ABSTRACT Essential components of dental safety include training, compliance, a written safety program, leadership and management, application of standard precautions and preparation for exceptions. This article guides infection control coordinators in creating a written program and addresses aerosol-transmitted diseases, exposure to nitrous oxide and anesthetic gases and altering safety protocol for nonsterile and sterile procedures particularly related to dental waterline safety.

Dental teams should have a culture of safety where infection prevention and control is always a high priority and where they are informed, trained and personally motivated even when unobserved. When dental workers understand fundamental concepts of infection control and work within the context of a complete safety program that includes training, communication, material and physical support and consensus among colleagues, they are more likely to be successful in providing safe dentistry for patients and protecting the dental team. Following is a discussion of six aspects of dental safety:

- Foundational concepts of infection prevention and control.
- The written safety program.
- Leadership in safety.
- Practicing standard precautions while recognizing their limitations.
- Applying transmission-based precautions when needed.
- Updating management of “invisible risks” such as exposure to gases or management of dental waterlines.

Foundational Concepts of Infection Prevention and Control

Training in the basic concepts of disease transmission and infection control practices is required yearly by the California Occupational Safety and Health Administration (Cal-OSHA) and every two years by the Dental Board of California (DBC) for license renewal. Content of this training is stated in the Bloodborne Pathogen Standard and California Minimum Infection Control regulations, and training content is provided by the Centers for Disease Control and Prevention (CDC). Every worker should clearly understand the “chain of infection” or the sequence of events.
necessary to transmit various pathogens and the appropriate interventions to “break the chain of infection.” In most cases, the interventions fall under standard precautions, but occasionally additional precautions are needed or the patient must be referred to a hospital setting to be treated safely. Standard precautions are well-established, expected practices that are often evident to patients, such as hand hygiene and wearing gowns, masks, eyewear and gloves. It is important to remember that hand hygiene remains the single most important infection control protocol and should be emphasized, monitored and supported by provision of supplies and time allotment. Along with techniques, training should include the following fundamental infection control concepts:

- Implement the most effective safety controls first, following the “hierarchy of controls” (FIGURE 1).
- Control infection by preventing exposure or by cleaning, disinfecting and/or sterilizing after exposure has occurred.
- Prevent cross-contamination and pathogen exposure by isolating and separating people and items.
- Clean before disinfection and sterilization to ensure asepsis effectiveness.
- Understand how microbes can be killed or deactivated, including modalities such as heat or chemicals.
- Monitor and assess infection control processes for effectiveness.3,4

The Written Safety Program

A well-written safety program directs safe practices as well as documents compliance with laws and standards. An updated state-d dictated OSHA manual including the Bloodborne Pathogens Standard is an excellent core for a comprehensive written safety program. The California Dental Association provides a basic OSHA Bloodborne Pathogens Standard manual with a complete injury and illness prevention plan and hazard communication plan available at cda.org. The manual should be enhanced by site- and practice-specific information that is detailed enough to train new employees. Every section of the written program that involves tasks and actions should have written standard operating procedures (step-by-step protocols or instructions, TABLE 1; example protocol, TABLE 2). The OSHA manual must be supplemented with additional policies in areas where it is incomplete and if other regulators require documentation. Because OSHA regulates work safety for dental personnel only, OSHA may not regulate policy related to patient protection. The Bloodborne Pathogens Standard addresses worker safety when reprocessing instruments but omits policy for safe and effective instrument cleaning and sterilization, including monitoring, validation, safe storage and cross-contamination prevention; those rules and guidelines are provided by the DBC, the CDC and the Organization for Safety and Prevention (OSAP).4

Written safety regulations or recommendations from various entities may be kept separately or integrated into one written manual. Following are examples of the most important documents/records to have on hand:

- In addition to a complete Cal-OSHA manual, a copy of the DBC’s Minimum Infection Control Regulations should be included in the safety manual and posted in the office.2
- The CDC’s 2003 Dental Infection Control Recommendations and the 2016 updated summary, “CDC Guide to Infection Prevention in Outpatient Settings,” and safe care checklists are important standards to include for reference as well as being useful tools to assess and record ongoing compliance. The 2016 summary includes updates in the following areas:
  - Infection prevention program administrative measures.
  - Infection prevention education and training.
  - Respiratory hygiene and cough etiquette.
  - Updated safe injection practices.
  - Administrative measures for instrument processing.3

![Hierarchy of control.](image-url)
CDC recommendations for health care vaccinations and management of tuberculosis are two important adjuncts to office policy and should be used to manage employee vaccinations and TB monitoring. Although the CDC recommendations for dental settings are not “laws,” these recommendations are based on science and provide the basis for, and are frequently referenced in, the enforceable rules dental practices must follow.

**TABLE 1**

**Suggested Standard Operating Procedures**

1. Hand hygiene
2. Personal protective equipment donning, selection, use, disposal/laundry
   - Gloves
   - Eyewear and face shields
   - Masks
   - Gowns
   - Hair covers if used
   - Shoe covers if used
3. Surface cleaning and disinfection
4. Equipment maintenance
   - Dental waterline treatment, source water, shocking, testing
   - Suction and trap cleaning/changing protocol
   - Cleaning, lubrication, maintenance, replacement of all equipment not covered by instructions for use documentation
5. Instrument transport, cleaning, preparation for sterilization, sterilization, storage
   - Monitoring of cleaning processes [ultrasonic cleaner monitoring, instrument washer monitoring]
6. Sterilization monitoring
   - Class 5 indicator strips or similar technology
   - Biological monitoring
7. Single-use products [never reuse and use as directed]
8. Cleaning contaminated appliances in ultrasonic cleaner
9. Cleaning/disinfection of laboratory cases to and from dental laboratories
10. Laboratory safety and cross-contamination prevention
11. Safety protocol for lasers and other technology

**TABLE 2**

**Example Standard Operating Procedure (based on CDC recommendations and OSHA and Dental Board of California regulations)**

Hand hygiene is the most important infection control strategy. Hand hygiene includes hand-washing, antiseptic hand wash, antiseptic hand rub and surgical hand antisepsis.

Clean hands to remove contamination for one to two minutes at the beginning of the day:

- Apply soap, spread over all hand surfaces.
- Rub hands, lather at least one minute the front and back of hands, targeting calluses, areas with thicker skin, fingernails, cuticles and under fingernails, between fingers, thumbs and webs and wrists.
- Rinse hands thoroughly, rubbing soap off of all surfaces.
- Dry completely with a clean paper towel.
- Avoid touching faucets/surfaces.

Subsequent hand-washing for routine, nonsurgical procedures — clean hands to remove contamination:

- Apply soap, spread over all hand surfaces.
- Rub hands, lather at least 20 seconds; front and back of hands, targeting calluses, areas with thicker skin, fingernails, cuticles and under fingernails, between fingers, thumbs and webs and wrists.
- Rinse hands thoroughly, rubbing soap off of all surfaces.
- Dry completely with a clean paper towel.
- Avoid touching faucets/surfaces.
- Don gloves.

Sanitize hands (reduce microorganisms on visibly clean hands):

- Apply waterless hand rub from dispenser to hands.
- Spread agent over all hand surfaces, focusing on fingertips, nails, creases, between fingers and thumbs and wrists.
- Rub all hand surfaces for at least 15 seconds for antimicrobial effectiveness.
- When hands are dry, don gloves.
- Waterless agents may be repeatedly applied to visibly clean hands approximately 10 times before washing hands.

Avoid conditions and practices that interfere with effective hand hygiene and increase the risk of compromising gloves:

- Long or sharp fingernails are not allowed.
- Fingernail polish, nail gels and false fingernails are not allowed.
- Jewelry is not allowed.
- Do not apply products such as lotions, soaps or hand sanitizers to hands that contain petroleum-based oils before or during working hours.

For oral surgery (to be used for biopsy, periodontal, apical and implant surgery and surgical extraction of teeth):

- Apply antimicrobial or plain [nonantimicrobial] soap.
- Lather for two to six minutes, scrubbing hands.
- Scrub with single-use or sterilizable soft applicator. Avoid rough, stiff or nonsterile brushes that may damage skin or introduce contamination.
- If nonantimicrobial soap was used, apply alcohol hand sanitizer containing a persistent antimicrobial ingredient for the specified effective contact time.

Hand hygiene considerations:

1. Wash hands thoroughly (one to two minutes) before beginning workday, at end of shift and at breaks such as lunch.
2. Use hand hygiene products tested and approved for health care use.1–3
Patient Screening for Aerosol Transmissible Diseases (ATDs)

Name (print first, last) ____________________________________________

Do you have:

A history of tuberculosis?  Yes ☐  No ☐  If yes, explain:______________________________________________________________

Symptoms of tuberculosis?

Productive cough (> three weeks): Yes ☐  No ☐  If yes, explain:______________________________________________________________

Bloody sputum Yes ☐  No ☐  If yes, explain:______________________________________________________________

Night sweats Yes ☐  No ☐

Fatigue Yes ☐  No ☐

Malaise Yes ☐  No ☐

Fever Yes ☐  No ☐

Unexplained weight loss Yes ☐  No ☐

Flu and other aerosol-transmissible diseases, including pertussis, measles, mumps, rubella, chicken pox, meningitis:

Do you have:  How long? Explain:

Fever? Yes ☐  No ☐

Body aches? Yes ☐  No ☐

Runny nose? Yes ☐  No ☐

Sore throat? Yes ☐  No ☐

Headache? Yes ☐  No ☐

Nausea? Yes ☐  No ☐

Vomiting or diarrhea? Yes ☐  No ☐

Fever and respiratory symptoms? Yes ☐  No ☐

Severe coughing spasms? Yes ☐  No ☐

Painful, swollen glands? Yes ☐  No ☐

Skin rash, blisters? Yes ☐  No ☐

Stiff neck, mental changes? Yes ☐  No ☐

In compliance with California OSHA Title 8, Section 5199, dental facilities must prescreen patients for aerosol-transmissible diseases. Dental procedures are not performed on patients suspected or identified as having aerosol-transmissible diseases.

Chronic respiratory diseases (not ATDs and not considered infectious) do not disqualify a patient from treatment under California OSHA Title 8, Section 5199:

Do you have:

Asthma? Yes ☐  No ☐

Allergies? Yes ☐  No ☐

Chronic upper airway cough syndrome “postnasal drip”? Yes ☐  No ☐

Gastroesophageal reflux disease (GERD)? Yes ☐  No ☐

Chronic obstructive pulmonary disease (COPD)? Yes ☐  No ☐

Emphysema? Yes ☐  No ☐

Bronchitis? Yes ☐  No ☐

Dry cough from ACE inhibitors? Yes ☐  No ☐

FIGURE 2. Patient screening for aerosol transmissible diseases (ATD).
Leadership and Management: The Infection Control Coordinator

Dentistry is now formalizing the role of the dental infection control coordinator (ICC), following the example of medicine where the role of infection control preventionist was established. The ICC is a key leader of the dental team and should be qualified, trained and empowered to successfully manage dental safety. ICC training is available through a collaboration of OSAP and the Dental Assisting National Board (DANB) and includes in-person training such as OSAP boot camp and online infection control training programs created by the CDC and OSAP, followed by competency assessment and, ultimately, certification. State board and OSHA ICC certification or credentialing specific to dentistry is not yet available, although other training and certification programs are being developed by qualified trainers. ICC competency provides important legal and ethical assurances related to occupational and patient risk management. Dental professionals interested in pursuing the ICC role can do so by contacting OSAP or DANB. Three excellent resources that provide current dental infection control regulations, issues and resources are osap.org, cda.org and cdc.gov.

Safety is most reliable when advance planning is in place, effective equipment and facilities are designed for safety and every step can be monitored. OSHA and CDC safety programs emphasize the use of engineered safety systems and devices to improve safety, such as automatic equipment and monitoring processes. While “safe practices” such as hand hygiene are vital and practiced often, inconsistencies, mistakes and lack of training may reduce the margin of safety due to human errors. Safe practices demand ongoing training, attention and evaluation.

Special Safety Considerations: Practicing Standard Precautions While Recognizing Their Limitations

Standard precautions are the minimum safety procedures that should be practiced when treating any dental patient. They include hand hygiene, personal protective equipment, environmental asepsis, instrument sterilization, sharps safety and, as reemphasized in the CDC update in 2016, injection safety and respiratory hygiene/cough etiquette. Consistency is most reliable when automated and systematic processes such as equipment and checklists are used. Every effort should be made to avoid human habits and errors. Hand hygiene remains the single most important infection prevention practice due to the high number of reported incidences of cross-contamination and infections that have been linked to poor hand hygiene or lack of hand hygiene. Standard precautions are the core of office safety protocol, but it is important to recognize their limits. These practices were originally designed to prevent bloodborne pathogen exposure and later expanded to droplet and contact disease control. However, standard precautions do not adequately protect against the transmission of aerosol-transmitted diseases such as influenza, tuberculosis, pertussis, measles or meningitis. Dental masks are not adequate to reliably filter these pathogens during dental procedures due to mask construction and fit limitations. Additionally, most dental buildings do not have adequate room isolation and air exchange rates to safely treat these patients. It is therefore required in California to screen for active aerosol-transmitted diseases and defer treatment or move patients to a special setting designed for this purpose, such as hospitals. Cal OSHA Title 8, Section 4, § 5199 Aerosol Transmissible Diseases (ATDs) states that dental procedures must not be performed on patients identified to them as ATD cases or suspected ATD cases unless a licensed physician determines that the patient does not currently have an ATD. The injury and illness prevention program must include a written procedure for screening patients for ATDs that is consistent with current guidelines issued by the CDC for infection control in dental settings, and this procedure must...
### TABLE 3

<table>
<thead>
<tr>
<th></th>
<th>Standard precautions</th>
<th>Contact precautions</th>
<th>Droplet precautions</th>
<th>Airborne precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General instructions</strong></td>
<td>Follow OSHA and CDC infection control guidelines for all procedures.</td>
<td>Follow standard precautions and additional steps (below). Additional precautions are necessary to prevent spread of vancomycin-resistant pathogens.</td>
<td>Follow standard precautions and additional steps (below). Post and practice hygiene/cough etiquette.</td>
<td>Follow standard precautions and additional steps (below).</td>
</tr>
<tr>
<td><strong>Applies to</strong></td>
<td>All patients, including those needing extra precautions.</td>
<td>People known or suspected to be infected or colonized with a serious pathogen that might be transmitted by direct or indirect contact.</td>
<td>People known or suspected to be infected with a serious pathogen that can be transmitted by large particle droplets.</td>
<td>People known or suspected to be infected with a serious pathogen that can be transmitted by small droplet nuclei or dust particles.</td>
</tr>
<tr>
<td><strong>Perform hand hygiene</strong></td>
<td>Immediately after touching blood, body fluids, contaminated items even if gloves are worn. Routine: plain soap and water. Specific circumstances: Waterless hand rubs/antimicrobial soaps.</td>
<td>Wash hands with antimicrobial agent or use alcohol hand rub immediately after removing gloves.</td>
<td>Perform hand hygiene immediately after contact with contaminated respiratory secretions or contaminated items.</td>
<td>Follow standard precautions.</td>
</tr>
<tr>
<td><strong>Gloves</strong></td>
<td>Clean, nonsterile gloves to touch contaminated materials/items. Don just prior to touching mucous membrane or non-intact skin. Change between patients or tasks (same patient) if gloves might transmit pathogens from contaminated area to clean area. Remove gloves promptly after use, perform hand hygiene. Avoid recontamination of hands.</td>
<td>Don gloves to enter room. During procedure, change gloves after contact with infective material. Remove gloves before leaving room, perform hand hygiene immediately.</td>
<td>Follow standard precautions.</td>
<td>Follow standard precautions.</td>
</tr>
<tr>
<td><strong>Mask, eye, face protection</strong></td>
<td>Wear mask and eye protection/face shield to protect mucous membranes of eyes, nose, mouth from blood, body fluids, secretions and excretions during splash or spray procedures.</td>
<td>Follow standard precautions.</td>
<td>Wear procedure or surgical mask when working within 3 feet of infected person.</td>
<td>Wear N95 respirators when entering room of person known or suspected to have airborne respiratory illness. Persons immune to measles (rubeola) or varicella need not wear N95 respirator.</td>
</tr>
<tr>
<td><strong>Gowns</strong></td>
<td>Wear clean, nonsterile gown during splash or spray or contact procedures to protect skin and clothes from blood, body fluids, secretions and excretions. Select gown for appropriate fluid resistance. Remove soiled gown as promptly as possible and perform hand hygiene.</td>
<td>Don gown to enter room. Remove gown before leaving room. Isolate used gown and dispose of or route to laundry aseptically.</td>
<td>Follow standard precautions.</td>
<td>Follow standard precautions.</td>
</tr>
<tr>
<td><strong>Patient care equipment</strong></td>
<td>Handle patient care items aseptically. Avoid personal contact, injury and cross-contamination to other patients or environment. Clean and reprocess reusables appropriately. Discard single-use items properly.</td>
<td>If possible, use single-use disposable noncritical patient-care equipment. If not possible, clean and disinfect or sterilize items before next use.</td>
<td>Follow standard precautions.</td>
<td>Follow standard precautions.</td>
</tr>
</tbody>
</table>
be followed before performing any dental procedure on a patient to determine whether the patient may present an ATD exposure risk. Employees must be trained in the screening procedure in accordance with Section 3203 of Cal-OSHA Title 8, and all dental workers with ATDs are restricted from working. Key symptoms to look for are fever and respiratory symptoms. Dental offices should take temperatures on symptomatic patients and dismiss febrile patients.2–4,9

The application of ATD screening exemplifies the strategy of using the most effective control first: Recognize and remove a safety risk instead of relying on PPE that may not be effective (FIGURE 3).

**Respiratory Hygiene/Cough Etiquette**
Each dental setting should have a respiratory hygiene/cough etiquette policy for managing droplet, contact and aerosol spread of infection. Prevention of aerosol and droplet infections requires educating all people about limiting the spread of expelled germs during sneezes and coughs and by contaminated hands after blowing noses or touching nasal secretions. The CDC provides posters and other printed/electronic material that communicates infection control techniques to:

- Cover mouth/nose when sneezing.
- Use and dispose of tissues.
- Perform hand hygiene after hands contact respiratory secretions.

This is a simple program of posting signs and providing supplies. Stations should be located throughout the facility (FIGURE 3) so supplies are readily available when they are needed. The dental team must be trained and should model the way for patients. This basic protocol is commonly expected in public and all health care provider locations.3

Consistent and effective standard precautions will prevent most infections related to patient care but rare exceptions may occur. If patients with infectious diseases must be treated, alterations of the standard precautions can be implemented to increase protection. TABLE 3 compares standard precautions to

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<td><strong>Comparison of Standard, Contact, Droplet and Airborne Precautions (continued)</strong></td>
</tr>
</tbody>
</table>

| Environmental control | Have supplies and procedures for routine care, cleaning, disinfection of surfaces and equipment. Perform procedures consistently. | Follow standard precautions. | Follow standard precautions. | Follow standard precautions. Consider a wide area (entire room) around the patient contaminated. |
| Linen | Handle, transport and launder linens soiled with blood, body fluids, secretions and excretions so as to prevent skin and mucous membrane exposure, contamination of clothing and cross-contamination of surfaces, items or other patients. | Follow standard precautions. | Follow standard precautions. | Follow standard precautions. |
| Bloodborne pathogen protections | Prevent injuries during procedures, clean up and dispose of sharps. Use barrier resuscitation equipment instead of mouth-to-mouth methods. | Follow standard precautions. | Follow standard precautions. | Follow standard precautions. |
| Patient placement | Place those patients who will contaminate the environment or who cannot assist in maintaining asepsis control in a private room. | Place patient in private room. Door may remain open. Maintain spatial separation of at least 3 feet between infected patient and others. | Place patient in private room. Keep door closed. Special facilities with negative pressure treatment rooms and air handling systems are required: 6–12 air exchanges/hour, safe discharge of air to outside and high-efficiency filtration of air going to indoor spaces. |
| Patient transport | Provide a safe passageway for patients in public areas. Guide patients in clinical areas to prevent injury and cross-contamination and preserve clinical asepsis. | Follow standard precautions. | Move/transport patient out of private room only if essential. If transport is necessary, minimize dispersal of droplets by masking patient if possible. | Move/transport patient out of private room only if essential. If transport is necessary, minimize dispersal of droplets by masking patient if possible. |
contact, droplet and airborne precautions. Transmission-based precautions are necessary when people have serious infectious diseases transmitted by contact, droplets or airborne small particles. Dental workers should be trained on making the prescribed changes in protocol for these exceptions.

Anesthetic Gases and Occupational Exposure

Exposure to high levels of waste anesthetic gases, including nitrous oxide, is a recognized harmful occupational exposure. The National Institute for Occupational Safety and Health (NIOSH) has established safe levels of exposure to commonly used gases and OSHA places responsibility for employee safety on employers. In medical environments, significant improvements have been made in the control of anesthetic gas pollution using improved design and scavenging systems, more effective general ventilation systems, improved equipment maintenance and leak detection and careful anesthetic administration. Dental settings may lack building engineering including high air turnover rates, equipment safeguards and careful testing and maintenance programs. Dental workers should be aware of the risk associated with escape gases, use fail-safe equipment and have clear protocol for monitoring equipment safety and gas exposure (California B&P 1680, 16 CCR 1044.5) (OSHA directorate).

Gases may escape from tank valves, high- and low-pressure machine connections, connections in the breathing circuit, defects in tubing, hoses, reservoir bags, ventilator bellows and the Y connector. Gas also escapes through improper practices. Examples of improper practices are leaving gas flow control valves open and vaporizers on when not in use, spillage of liquid-inhaled anesthetics, poorly fitting face and nasal masks and improperly inflated tracheal tubes and laryngeal mask airway cuffs. Scavenging equipment must be designed to effectively remove harmful gases, be used correctly and be routinely assessed.

Dental workers exposed to anesthetic gases and nitrous oxide are at increased risk for lower fertility. Studies link exposure to as little as three hours per week of unscavenged N₂O to the increased risk of spontaneous abortion. Researchers have concluded that scavenging equipment makes a significant difference in N₂O exposure risk. Halogenated agents are linked to reproductive problems in women and developmental defects in their offspring, and studies have shown reproductive risks in wives of exposed males. OSHA- and NIOSH-referenced studies recommend limiting exposure to all anesthetic gases, including nitrous oxide, as much as possible to avoid exceeding established “safe” limits.

Dental offices can demonstrate safety by testing equipment and by testing the air. Only FDA-cleared devices should be used. All gas delivery and waste flow mechanical systems should be tested after installation and when alterations are made. Professional industrial hygienists can provide annual evaluation to confirm the equipment is operating as designed, or built-in gas-flow monitoring devices such as visible gauges may be used to monitor the equipment. Manufacturers’ directions for equipment assessment should be followed. Monitoring levels of anesthetic gases in the air is a reliable way to prove that safe gaseous levels are met. Gas concentrations should be tested near the patient to capture the highest concentrations, including exhaled gases. Personal dosimeters are available to detect N₂O levels and anesthetic gases such as desflurane, enflurane, halothane, isoflurane and sevoflurane. While OSHA does not specifically require that employees wear dosimeters, they are an easy and effective method of documenting that safe levels are being met. Records of all gas testing should be kept including a record of reading installed gauges.

Dental Unit Waterline Safety

Dental treatment and irrigation water that flows through the dental unit is known to harbor and concentrate waterborne pathogens in adhered biofilms within the lumen of the dental unit waterlines. Patterns of use create stagnant water inside small-bore tubing that serves as a constant source of water contamination if not purposefully managed. Nonsurgical procedures must be performed using irrigation fluids that meet potable water standards of ≤ 500 CFU/mL of heterotrophic mesophilic bacteria. Dental equipment can reliably deliver acceptable treatment water if biofilm formation is controlled. The DBC rules state: “Dental unit water lines shall be antiretractive. At the beginning of each workday, dental unit lines and devices shall be purged.
with air or flushed with water for at least two (2) minutes prior to attaching handpieces, scalers, air water syringe tips and/or other devices. The dental unit lines and devices shall be flushed between each patient for a minimum of twenty (20) seconds.” These rules are based on CDC recommendations, which caution that flushing is important to remove stagnant or retracted fluids but is inadequate to remove attached biofilm. Current methods of controlling dental waterline contamination and ensuring potable treatment water include a protocol of consistently adding chemical antimicrobial waterline cleaners to retard the formation of biofilms (daily low levels of antimicrobial products) combined with periodic “shocking” of the lines with a caustic chemical such as commercial hydrogen peroxide-based formulas to remove biofilms. The importance of managing dental water safety is illustrated by one fatality in 2011 linked to exposure to Legionella pneumophila found to be concentrated within dental unit waterlines and at least two clusters of Mycobacterium abscessus infections that were not fatal but caused serious illness and injury to pediatric patients following pulpotomy procedures. These cases have raised public, professional and regulatory awareness about the need to manage and monitor dental waterlines to ensure that biofilm contamination is controlled and water quality meets potable standards.21–25

At this time, no generalized time interval for prescribed waterline testing is available, but customers are directed to follow equipment and waterline product manufacturer instructions for use (IFUs). When manufacturers do not provide such instructions, professional water-testing laboratories can advise each dental site about the appropriate testing strategy to establish and maintain waterline safety. Research suggests that waterline test results are a useful guide for establishing shocking intervals and other maintenance procedures.1–4,19,20

Recent developments and research findings should always be reflected in office safety policy. Following investigation of the recent clusters of infections following pulpotomy procedures linked to contaminated dental water, new guidance documents were drafted. The DBC drafted AB 1277, an “emergency” amendment to Section 1601.6 of the Business and Professions Code of the Dental Practice Act. This ruling requires water or other methods used for irrigation to be sterile or contain recognized disinfecting or antibacterial properties when performing dental procedures that expose dental pulp. A new bill, Senate Bill (SB) 1491, was introduced Feb. 21, 2018, signed by the governor Sept. 22, 2018, and approved by the DBC and Dental Hygiene Committee of California (DHCC), now the Dental Hygiene Board of California (DHBC). Among other things, SB 1491 repeals Assembly Bill 1277, but makes using water or other methods used for irrigation that are not sterile or that do not contain recognized disinfecting or antibacterial properties when performing dental procedures on exposed dental pulp unprofessional conduct by a person licensed pursuant to the Dental Practice Act. This ruling specifically addresses treatment of exposed dental pulp tissue. Examples of the agents with antibacterial properties that the rule references are chlorhexidine and sodium hypochlorite (bleach). Products added daily to dental waterlines to control bacterial and biofilm contamination during nonsurgical dental treatment, such as tablets or cartridges, do not meet the requirements of SB 1491. There is also a proposed addition to Section 1005 stating: “Dental unit water lines shall be monitored following the instructions for use from the manufacturer of the dental unit or the dental unit waterline treatment product.”

California dental waterline laws differ from CDC recommendations in that DBC laws specify protocol and methods for the purpose of meeting safe dental irrigation standards, whereas CDC recommendations set the standard of potable water for nonsurgical procedures and sterile water for surgical procedures without specifically directing methods for achieving those goals.

Surgical Dental Waterline Standards
Sterile water/irrigation liquids are required for all dental surgical procedures. Surgical procedures are defined as those that “involve the incision, excision or reflection of tissue that exposes the normally sterile areas of the oral cavity. Examples include biopsy, periodontal surgery, apical surgery, implant surgery and surgical extractions of teeth (e.g., removal of erupted or nonerupted teeth requiring elevation of mucoperiosteal flap, removal of bone or section of tooth and suturing if needed).”1,2
Sterile water must be used, traveling through a separate sterile delivery system that bypasses the dental unit because dental unit waterlines cannot be rendered sterile (the waterlines contaminate sterile water that is put into them). Peristaltic pumps and syringes are examples of alternative fluid delivery systems used for dental surgery. 1–4, 19, 20

Summary

Dental safety begins with a “culture of safety” where dedicated, educated, well-managed and empowered teams ensure safety for all. An updated written safety program that incorporates regulations, guidelines and references from OSHA, DBC, CDC, OSAP, ADA and other oversight and guidance agencies is required to manage the full scope of dental safety. Successful programs are built upon foundational infection prevention concepts and include systems and equipment that eliminate or reduce errors. A new leadership position in dentistry, the dental infection control coordinator, offers a new career path for the certified workers as well as enhanced safety for patients and workers. In addition to standard precautions, special attention should be given to the management of challenges that require focused attention, including management of dental waterline safety and exposure to anesthetic gases and N₂O, ATDs and other highly infectious diseases. ■

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Dental X-ray Exposure: The Past Has Become the Future

Dale A. Miles, DDS, MS, and Juan F. Yepes, DDS, MD, MPH, MS, DrPH

ABSTRACT Most dental X-ray procedures are delegated to office staff and some recommendations and techniques, such as selection criteria and rectangular collimation for intraoral imaging, have been ignored or forgotten by some dentists. Some of the X-ray exposure recommendations, updated by the American Dental Association’s Science Institute in June 2018, and the need to adopt guidelines proposed by the public campaign Image Gently are discussed to help the reader develop safe X-ray protocols, from intraorals to CBCT.

Effect of Use of Radiation

Intraoral X-Ray Practices

There is no doubt that in our patients’ minds exposure to any dental X-ray radiation can be associated with significant health effects. Catering to that concern, media articles are written that actually feed those fears — sometimes unintentionally but sometimes specifically to raise alarms. The dental profession generally attempts to reduce patient X-ray doses and has been guided to do so by the American Dental Association (ADA) for almost 30 years. We have adopted faster receptors, digital imaging modalities such as intraoral solid-state detectors, digital panoramic machines and even low-dose cone beam computed tomography (CBCT) devices. Most dentists use thyroid collars for child X-ray exposures when intraoral images are taken. However, there are several areas in X-ray exposure techniques that could be dramatically improved for any imaging modality. The purpose of this review is to highlight deficiencies that may be present in offices and suggest protocols for improving X-ray techniques and reducing patient dose, especially for children. Many of the suggestions have been taught for decades in dental schools, but unfortunately, many have been forgotten. Because of increasingly stringent state regulations and now even public campaigns, such as Image Gently, these forgotten techniques, protocols and office standards/practices will have to be revisited by dentists and adopted as the new normal.

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### Types of Collimators

<table>
<thead>
<tr>
<th>Devices</th>
<th>Manufacturers</th>
<th>How it works</th>
<th>Suggested retail price</th>
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<tr>
<td>RINN universal collimator</td>
<td>Dentsply/Sirona</td>
<td>Plastic adapter snaps into end of round cone</td>
<td>$170.99</td>
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<tr>
<td>DEXshield</td>
<td>Dexis</td>
<td>Attaches to a metal rod that holds image receptor (rods sold separately)</td>
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<tr>
<td>Rectangular position</td>
<td>Marggraf</td>
<td>Round cone is replaced by a long rectangular cone with additional alignment rings that must adapt to the long cone</td>
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<tr>
<td>indicating collimator</td>
<td></td>
<td></td>
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<tr>
<td>XDR ALARA collimator</td>
<td>XDR</td>
<td>Attaches to a metal rod that holds image receptor (rods sold separately)</td>
<td>$75</td>
</tr>
<tr>
<td>Tru-Image position</td>
<td>Interactive</td>
<td>Magnetic linkage between receptor and X-ray tube with green LED lights to confirm positioning and linkage</td>
<td>$595</td>
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<tr>
<td>locking device (PLD)</td>
<td>Diagnostic Imaging</td>
<td></td>
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<tr>
<td>Tru-Align</td>
<td>Interactive</td>
<td>The predecessor to Tru-Image; no longer available in the U.S.</td>
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increase office productivity, which are all positive goals. It is recommended that all dental practices should adopt digital intraoral X-ray imaging.2

Solid-state, intraoral imaging detectors reduce patient X-ray dose the most.3 Reusable phosphor plates also reduce the dose somewhat compared to conventional X-ray film. However, they do not reduce patient X-ray dose to the same extent as solid-state detectors. Except for endodontic and pediatric use,2 all dental offices should adopt solid-state detectors over phosphor plates for general dental intraoral imaging.4 There are also panoramic X-ray machines that can take extraoral bite wings for children, eliminating the need for wired, solid-state intraoral detectors at very low dose.2 There are questions as to the diagnostic quality of extraoral digital bitewings for proximal lesions that have yet to be resolved, but studies are underway.2

Unfortunately, because the images from solid-state detectors can be seen immediately, many operators, primarily dental assistants, often take multiple images in order to present the “best one” to the dentist. This practice defeats the intent of reducing dose to the patient. All dentists in all dental practices must reeducate and instruct their dental assistants on proper positioning technique and safe radiographic imaging practices to eliminate retakes and reduce patient X-ray dose. It is a good practice to keep a retake logbook to keep track of the films that are retaken. In 2006, a National Institute of Dental and Craniofacial Research (NIDCR) committee looking for large data sets for research in osteoporosis estimated that approximately 750 million dental X-rays were performed. It is estimated that the number would be well over 1 billion dental X-rays performed annually at present time. It has also been reported that 7% to 13% of all dental X-rays taken are retakes. That means there are more than 100 million unnecessary dental X-rays taken every year in the U.S. This is a conservative estimate that only documents the known retakes.2,8 Many of these retakes could be eliminated by the adoption and use of rectangular collimation products (TABLE) This concept/technique has been taught in dental schools and in dental auxiliary programs for more than 25 years. Images of these products are shown in FIGURES 1. On the other side, the use of intraoral positioning devices must be mandatory when rectangular collimation is in use to avoid cone cuts and unnecessary retakes.6

Possible actions to improve intraoral imaging procedures are:
- Adopt the fastest intraoral imaging receptors possible.
- Eliminate as many retakes as possible.
- Adopt and use rectangular collimation devices.

**Panoramic X-Ray Practices**

In dental practices as well as dental schools, digital panoramic imaging is replacing a full-mouth series of intraoral dental X-rays. The X-ray dose from a single, digital panoramic image is estimated to be 16 microsieverts (μSv). The X-ray dose from a full-mouth series (14 periapicals and four bitewings) of dental images acquired using a solid-state detector or photostimulable phosphor (PSP) plate is reported to be 171 μSv.5 Thus, the dose to the patient is 100 times less. The patient dose from a full-mouth series of images using conventional D-speed film is 388 μSv.6 Some practices use a digital panoramic image and intraoral solid-state detector bitewing images as their initial radiographic assessment.

Selected panoramic units offer extraoral bitewing programs that allow for an X-ray beam that is parallel to the interproximal contacts of the teeth and that produces bitewing-like images.10 Proposed advantages of this system are simplicity in obtaining images, shorter time requirement, greater patient comfort, comparable diagnostics and lower radiation dose.6 Several studies have confirmed that the highest sensitivity and specificity for detection of interproximal caries is the intraoral bitewing.7 However, diagnostic quality studies have shown that the improved extraoral bitewing and interproximal panoramic radiograph are superior to conventional panoramic radiographs and...
that the sensitivity and specificity of the extraoral bitewing is statistically similar to the intraoral bitewing. Panoramic extraoral bitewing imaging can offer acceptable diagnostic information in certain difficult populations, including pediatrics and the medically compromised, with a relatively low radiation dose (still higher than traditional bitewings) and unfortunately a questionable capacity to assess interproximal caries lesions. FIGURES 2 is an example of a full digital panoramic image as well as the extraoral bitewing image.

Possible actions to improve panoramic imaging procedures are:

- Consider purchasing or leasing a digital panoramic machine that is full-featured and includes the extraoral bitewing capability for reduced exposure to children and ease-of-use by eliminating wires.
- Consider using a digital panoramic image and digital intraoral bitewings as your initial radiographic examination replacing full-mouth series of images.

CBCT

The adoption of CBCT technology in the dental office is much more rapid than the adoption of intraoral digital X-ray technologies. The reasons for this adoption have been explained more thoroughly elsewhere. In terms of exposure to the patient, CBCT is a low-dose imaging modality, especially compared to conventional medical CAT (CT) scanning. Comparing the dose from different CBCT machines is not simple. Many factors such as the field of view (FOV), exposure parameters (kV and especially mA differences) and even machine features can alter the overall patient X-ray exposure dose.

It is now generally accepted that the average dose from typical CBCT machines ranges from approximately 10 to 12 μSv to as high as 132 μSv. By comparison, typical conventional medical CT dose to a patient for a head and neck exam approaches 2,100 μSv. Because of this, there is a concerted effort by the medical and dental professions to reduce true CT dose to children. Image Gently (imagegently.org) is a national awareness campaign for the reduction of radiation exposure in children endorsed by all medical specialties, the ADA, the American Dental Hygiene Association and all dental specialty organizations.

Not every patient who enters your office needs a CBCT examination. Just as we have been teaching in dental schools for more than 40 years, there is the obligation of the dentist to examine the patient clinically, review a complete medical and dental history and then order only those images using the appropriate imaging modalities that are supported by the examination and that are expected to result in positive diagnostic findings. The concept is called selection criteria and has been published multiple times in the Journal of the American Dental Association (JADA).

The adoption of CBCT imaging has been rapidly accepted because of the myriad applications for which this modality is the imaging technique of choice. Once more, the applications for CBCT imaging are discussed completely elsewhere. It should be apparent to the reasonable clinician that more image planning is required than simply ordering a staff member to take a cone beam scan. Considerations for the appropriate scan to be performed include:

- Patient age, especially considerations for exposing children.
- Patient’s size or the selection of appropriate kV and especially mA.
- Patient’s medical conditions.
Dental task to be performed, for example, implant site assessment or surgical planning for an impacted tooth.

Required field of view (FOV).

Voxel size selection, appropriate to the task.

To illustrate these points, let’s examine some case scenarios that all dentists will encounter.

Scenario, case 1. After examination of a healthy 12-year-old male in your operatory, it becomes apparent that the child has missing or unerupted first permanent bicuspids. The patient’s permanent second molars are erupted and in a proper occlusion. Which examination would be more appropriate: a 2D digital panoramic image or a CBCT scan?

Possible clinical decision/solution. Even though the dose is low for a CBCT evaluation/scan, the information about the presence, absence and position of the “missing” premolars could probably be evaluated sufficiently with the 2D digital panoramic image or a CBCT scan?

Scenario, case 2. After examination of a healthy 12-year-old female in your operatory, from the clinical symptoms and history present you determine that there may be maxillary sinus inflammation or even infection. She has several grossly carious first molars. After intraoral imaging of the molars, which would be a more appropriate radiographic evaluation, a conventional medical CT scan or a CBCT scan that captures the maxillary antra and nasal cavity regions (typical 8 cm by 8 cm dentoalveolar volume)?

Possible clinical decision/solution. A CBCT dental scan represents a significantly reduced X-ray dose to this child patient. Even though a conventional CT scan has been the gold standard in the past, a CBCT scan would yield significant information about the maxillary sinuses and nasal cavity as well as begin to rule out any odontogenic causes for the maxillary sinus problems. If your scan failed to capture the remainder of the paranasal sinuses and the maxillary antra and/or nasal cavity are significantly involved, you could take an additional scan to capture the ethmoid air cells, frontal sinuses and sphenoid sinus to evaluate all of the paranasal sinus system. Alternatively, you could refer the patient to their primary care provider and/or an otolaryngologist for clinical, endoscopic and radiographic evaluation of all the paranasal sinuses. More frequently, ENT specialists are now using CBCT with larger FOVs to evaluate their child patients in an attempt to reduce the X-ray dose from conventional CT scans. The low-dose dental CBCT scan will help you evaluate both the maxillary sinuses and the role the infected teeth may be playing. This represents good image management and good radiation hygiene.

Scenario, case 3. A 62-year-old white female has come to your office to discuss implants. She has been missing her mandibular first molars for several years. Your clinical examination and medical history review reveal that she has osteoarthritis (OA) in her neck and left knee. You determine that she needs to have implants to replace the mandibular first molars, removed due to dental caries and subsequent apical periodontitis. You decide to perform an 8 cm by 8 cm dental alveolar CBCT scan to assess the implant sites.

Possible clinical decision/solution. Patients with preexisting osteoarthritic changes in other joints should probably have the TMJ region imaged to determine if there are any concomitant OA changes associated with the condylar heads such as osteophyte or subchondral cyst formation. If you restore the patient’s bite/dentition to proper form and function, you could stir up preexisting OA that may have affected one or both condyles. It is better to assess the
temporomandibular joint complexes before you restore the edentulous spaces and caution the patient that there could be subsequent discomfort due to her preexisting OA. If you do not assess the condyles radiographically using your CBCT device, restore the patient’s occlusion and symptoms ensue, you may be seen as the cause of the patient’s discomfort because you did not educate them about the relationship between their bite and the TMJ complexes. This could represent a bad outcome for both you and the patient.

Possible actions to improve CBCT imaging procedures are:

- Determine which tasks will require and benefit from CBCT imaging and establish the conditions under which CBCT will be performed.
- Develop an office protocol for the use of CBCT for different tasks. This might include:
  - Recording a diagnosis in the chart for which the CBCT examination is required.
  - Recording why a certain sized FOV was used.
  - Evaluating and recording the voxel size selection depending on the task (smaller voxel size for endodontics and implant assessment and larger voxel size for orthodontic assessment and child imaging). Using smaller voxel size inherently increases the dose to the patient.
  - Identifying the individual in the office who is the primary operator for image acquisition.
  - Recording the exposure factors and dose if possible.
  - Developing a methodology for reviewing the scan data.
  - Establishing a formal way of recording unusual findings that need referral.

Risk and Potential Liability of Using CBCT for You and Your Patients

At first, this may seem like a separate issue to “radiation safety.” While extremely unlikely, harm could come to the patient from injudicious use of X-ray modalities. However, there has never been a documented case of dental X-ray exposure from any modality causing serious patient harm or damage. On the other hand, harm to the patient in the form of negligence with resulting injury is documented.16

National Campaigns That Have or Will Impact State Dental Acts

The following is a summary of the national campaign called Image Gently that is endorsed by the ADA (2014), the American Dental Hygiene Association (2014) and most of the dental specialty organizations in the U.S. The campaign began as an appeal to both the medical and dental imaging communities to pledge to reduce the number and frequency of conventional CT exams to minimize radiation burden to children.15,17 It has expanded significantly because of the endorsements of dental organizations to include all types of dental imaging. Although the campaign is aimed at reduction of dose to children, the tenets proposed below could just as easily be adopted for all radiographic exposures performed in the dental office. Following these tenants will allow all of us to take steps in the right direction for minimizing dose to our patients. The six tenets that the Image Gently campaign proposes are:

- Use the fastest image receptor available. When film X-ray is used, select E- or F-speed. Set exposure parameters as low as possible for diagnostic digital imaging.
- Use CBCT only when necessary. CBCT should be restricted in children to cases where it is essential for diagnosis and treatment planning.
- Collimate beam to area of interest. For intraoral X-rays, collimation should be rectangular to match the recording area of detector. For extraoral X-rays, including CBCT, restrict the beam to the area needed for diagnosis.
- Use thyroid shield always. The thyroid gland in children is particularly sensitive to radiation. Use of a properly positioned shield significantly reduces the dose to the thyroid.
- Child-size the exposure time. Less exposure time is needed for children as oral structures are smaller than in adults.

In dentistry, none of this is new, except for perhaps the addition of guidelines on the use of CBCT. All dental team members who trained in any formal dental program were taught the concept of selection criteria;14 that is, to examine the patient, determine the need for the X-ray and the modality and only then order those images necessary based on the exam, history and signs and symptoms. The guidelines for this concept have been published multiple times in JADA. For the most part, they’ve been ignored. Unfortunately for us, it is looking more and more likely that these “guidelines” will be mandated into state dental acts in the future. In our opinion, we have done many of our patients a disservice by not following these guidelines.
One only has to look at how HIPAA and OSHA compliance guidelines have impacted dentistry already. The next targets are X-ray and laser compliance issues, and regulations seem to be following. One only has to look at the most recent report from the Texas Department of State Health Services to see the impact currently. This link, dshs.texas.gov/radiation/enforcement.aspx, leads to a report of the enforcement actions taken in the years 2017–18 to date. Average penalties for noncompliance with state regulations with regard to dental X-rays are between $3,000 and $5,000. There are new companies and services being offered to help dentists stay in compliance in these areas (iradconsult.com). Readers of this article would be wise to check out these or other services in their states to find out if they have incurred any risk due to noncompliance. It is imperative that we understand the radiation guidelines in our state as failure to do so could be costly.

Risk and Liability From Poor Radiation Safety/Office Practices

Direct Risk
In general, and despite the public’s and media’s somewhat inflated concerns over X-radiation, there is very little danger from the judicious use of dental diagnostic X-ray imaging modalities. Just by following the limited guidelines stated from the Image Gently campaign, most patient concerns and probably any harm to the patient would be negligible. Only the developing thyroid of the child needs to be protected from X-radiation because it is a radiosensitive organ. Diagnostic radiographic information is required for many of the tasks we perform in dental offices. The benefits of the value and positive results of the radiographic information need to outweigh the risks of using our intraoral, panoramic and CBCT devices.
Indirect Risk

On the other hand, there are risks associated with not reviewing or interpreting all the data in all the images produced by these devices. Indirectly, because of the size and content of the CBCT image data sets, dentists' risks are significantly increased from missing something in the scan or failing to refer an abnormality or both. Some dentists think, and indeed have been told by some manufacturers and lecturers, that they do not have to diagnose medical conditions in the scan. Indeed, any radiographic image is just a test or tool to help guide a dentist to a final clinical diagnosis. With very few exceptions, one cannot make a diagnosis of medical conditions solely from radiographic information. That's why the exercise is called “radiographic interpretation.” However, this does not abrogate the dentist or dental specialist from their moral and professional obligation to review all of the data set, record any abnormal finding and refer any images made of the finding for a second, often higher-level opinion. This is simply the standard of care. If you identify something different and do not know what it is, there is an obligation to refer the patient and/or the image data for a specialty evaluation — medical or dental.

We take exception to the broad statement that dentists are not responsible for making medical diagnoses. We all take a blood pressure reading prior to an extraction specifically to determine if the patient has high blood pressure, a medical diagnosis that may impact the surgical procedure.

As another example, we may take a patient’s history, evaluate their signs and symptoms and correlate this information with clinical findings and radiographic findings in the patient and form a clinical impression of undiagnosed or uncontrolled Type 2 diabetes mellitus.
There are several of these patients with this endocrine problem in our practices who are as yet undiagnosed. The standard of care would dictate we refer this patient to their primary care provider, an endocrinologist, an internist or even a diabetologist for further serologic evaluation and confirmation of our suspicion. FIGURES 3A–K show the organized, circumferential calcifications seen in uncontrolled or undiagnosed Type 2 diabetes mellitus in segments of the internal carotid arteries. These are not simple plaques seen in the tunica intima, these are changes in the tunica media or medial layer consistent with medial arterial calcification (MAC). These are significant and must be referred.19,20

Almost all dentists in all North American dental programs have been trained to evaluate patient systemic problems and recognize the dental components. If you have a large data set of images from a cone beam evaluation, you have an obligation and responsibility to look at all of the sliced data for radiographic signs of systemic disease. Again, you may not make the final diagnosis but you are reviewing all of the information that you ordered to determine if there is an abnormality. You are responsible for everything in the scan. To reduce this liability, you may decide that because of the time commitment involved to review the scan data or your lack of expertise that you need to have your scans interpreted by an oral maxillofacial radiologist or a medical radiologist specializing in head and neck and/or neuroradiology. Not only will you reduce your risk, you will learn from the reports that you receive from the specialists. This makes you a better clinician, reduces your risk and guarantees that your patient gets the best care possible.

Summary

All X-ray exposures, including those from dental modalities, carry risk. When the diagnostic information from these modalities is expected to benefit the patient, by providing information that leads to a better clinical decision and subsequent better care, there is no reason not to order the appropriate images. The benefit will almost always outweigh any direct harm. If we all adopt faster receptors, prescribe only those radiographs that are necessary, perform those X-ray procedures precisely, use thyroid collars on children for all intraoral procedures, use rectilinear collimation for intraoral images and spend more time to interpret the radiographic data we collect, we will serve the patient better and reduce their direct and indirect risk. By adopting all the suggestions in this article, we will most likely be in compliance with any state or federal regulation or recommendation including those contained within our dental acts. If we don’t make a better effort to practice radiation safety, it harms us all — our patients and ourselves.

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Medication Safety: Reducing Medication Errors and Adverse Drug Events in Dentistry

Roy L. Stevens, DDS, and Daniel S. Sarasin, DDS

ABSTRACT

In the writings of Hippocrates, physicians are admonished to abstain from doing harm, a concept known today as nonmaleficence. All medical and dental therapies contain risk and the prudent practitioner must evaluate and seek to minimize that risk whenever possible. This paper reviews the concept of medication safety and offers simple remedies to enhance patient safety when medication administration and prescribing are part of the patient’s care.

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Administering and prescribing pharmaceutical agents are integral parts of dentistry. Analgesics, anesthetics, anti-inflammatory agents and antimicrobials are utilized on a daily basis in our profession to treat a variety of maladies and conditions within the purview of dentistry. However, many dental patients are more medically complex today than in the past. As the population ages, more seniors and many others who would not have survived their disease in years past are seeking dental care. These patients have complex medical conditions managed with a cornucopia of pharmacological agents. In addition, as the number of new drugs introduced to the medical marketplace increases each year, the risk of harm from improper administration and prescribing of drugs used to treat dental maladies continues to increase. This paper explores two of the most common contributing factors to patient harm involving pharmaceutical agents, medication errors (MEs) and adverse drug events (ADEs), the factors contributing to these problems and recommendations on establishing systems to prevent their occurrence.

Defining the Problem

Medication errors are the failure of a planned pharmacological action to be completed as intended or the use of the wrong plan to achieve an aim. It involves an error in medication prescribing, dispensing or administration or in monitoring the effects of the medication.1 An adverse drug event is an injury arising from medical intervention related to a drug.2 These events can be caused by medication errors, adverse drug reactions, allergic reactions and drug overdose. Not all adverse drug reactions are caused by medication errors and not all medication errors result in adverse drug events.
Medication errors and adverse drug events are key global health concerns, which have been studied extensively over the past 25 years across a variety of health care settings. Unfortunately, nearly all of those studies have been in medicine and are rarely discussed in the dental literature. Consequently, dentistry can only extrapolate from the medical research findings.

Studies using data resulting from self-reporting, chart reviews and direct observation indicate that adverse drug events are among the largest contributors to inpatient hospital-related complications. Adverse drug events comprise approximately one-third of hospital adverse events, affect approximately 2 million hospital stays annually and prolong hospital lengths of stay by up to 4.6 days. Because of the lack of similar systematic reporting in dentistry, the comparative numbers are unknown. Despite this fact, however, regulatory agency action and media reports indicate that medication errors and adverse drug events do indeed occur in dentistry.

Medication Errors and Adverse Drug Events in Dentistry

Most medication errors and subsequent adverse drug event occurrence in dentistry are related to administration and/or prescribing of medication. Oftentimes, these errors are associated with the dentist failing to have a thorough understanding of the patient’s medical history and the medications used to treat them. In addition, there is often a failure to understand the pharmacokinetic and pharmacodynamic principles associated with the agents administered or prescribed and their interaction with medication that the patient may already be using. Unfortunately, the resulting interactions can lead to patient harm.

An example of this phenomena can be seen in the patient taking a noncardioselective beta adrenergic antagonist (propranolol, pindolol, etc.) for hypertension, who receives a local anesthetic injection containing epinephrine. When too much epinephrine is given and proper intraoperative blood pressure monitoring is not applied, the patient is likely to experience a hypertensive episode due to the pharmacodynamic’s interaction between the nonselective beta antagonist and epinephrine.

Oftentimes, these errors are associated with the dentist failing to have a thorough understanding of the patient’s medical history and the medications used to treat them.

Dentists providing general anesthesia and sedation have a greater risk of medication errors due to the larger number of drugs being administered and the increased complexity in rendering that level of care. The numerous steps involved in obtaining, preparing, delivering and monitoring the drug’s effect on the patient can increase the risk of medication errors and result in adverse drug reactions.

Drug shortages can play a role in medication errors as well. Dental offices providing general anesthesia and sedation may have to occasionally settle for alternative agents or have to settle for their standard drug in different packaging and/or concentration. Reports from the Institute for Safe Medication Practices (ismp.org) reveal an increasing number of medication errors in hospitals and ambulatory surgery centers linked to substitution of a facility’s typical drugs with second-choice agents or agents in different concentrations or packaging due to shortages.

Solutions

An exhaustive list of remedies and solutions to the problem of medication errors and adverse drug reactions is beyond the scope of this article. Many medication errors and subsequent adverse drug events can be prevented by practicing problem-oriented prescribing and avoiding excessive medication use or prescribing that is not indicated by the patient’s condition. The practice of consistently administering the same regimen to all patients regardless of need should be discouraged and reevaluated.

Prevention begins with a thorough medical history questionnaire and a follow-up inquiry of positive responses either with the patient, caregiver or the treating physician. A complete list of medications the patient is using, including over-the-counter, herbal and supplement agents, should be obtained. Patients taking multiple medications or patients with cognitive impairment should be encouraged to bring their medications to the consultation appointment for inspection by the dentist. The patient’s use of illicit drugs should be investigated as well. It must be appreciated that some medications may be delivered by routes other than by mouth (transdermal patches, inhalation, injection) and may be forgotten to be listed by the patient. Some medications (e.g., medical marijuana, erectile dysfunction medications) may also have social stigma associated with them and may be embarrassing for the patient to reveal. Positive responses from the medical history questionnaire should be matched up against the list of medications. Medical conditions listed without a pharmacological agent to treat them (or vice versa) should be investigated further.
The dentist should understand the pharmacology of all agents the patient may be using and potential interactions with the drugs to be delivered during the dental procedure. It may be helpful for the dentist to make up a list of common important drug interactions with the medications they commonly prescribe. There are many electronic aids available for review of pharmaceutical agents and drug interactions (e.g., articaine) have been associated with neurotoxicity. Many sources are available for review of pharmacological agents and drug interactions (Epocrates, Lexicomp). Many practice management software programs also have integrated features for reviewing patient medications and drug interactions.

All dentists should have a thorough understanding of appropriate local anesthetic and vasoconstrictor maximum doses. They should also be aware that some local anesthetic solutions (e.g., articaine) have been associated with neurotoxicity. Many sources are available for this information including the aforementioned electronic programs and the new ADSA Ten Minutes Saves a Life! medical emergency application for iOS and Android systems. It must be appreciated that local anesthetic maximum doses are based on lean body weight that must be obtained prior to drug administration. With more than 30% of the American population now overweight, obese or morbidly obese, medication errors and overdosing can occur when administering strictly with a weight-based regimen.

Prescription of medication, particularly pain medicine, for dental patients has become more complex with the recent concern with opioid prescribing. The universal substitution of nonsteroidal anti-inflammatory drugs (NSAIDs) for opioids for postoperative pain following dental procedures is not without risk, particularly in the elderly and in patients who are medically compromised. Recent evidence suggests even short-term administration of NSAIDs (one to seven days) can increase the risk of myocardial infarction in patients with risk factors for coronary artery disease. The risk of kidney injury in patients receiving NSAIDs is also increased in the elderly and any patient taking angiotensin-converting enzyme inhibitors (ACE inhibitors), angiotensin II receptor blockers (ARBs) and possibly beta adrenergic antagonists (beta blockers).

A drug allergy should be considered as a source of medication error potentially leading to an adverse drug event. It should be appreciated that what many patients label as a drug “allergy” may indeed be a side effect associated with that drug. An example of this is the patient who claims an allergy to local anesthetic following transient tachycardia from a previous local anesthetic injection containing epinephrine. Any mention of a drug allergy should be investigated further to determine if a true allergy exists and the nature of the allergic reaction.

Patients should be monitored for signs of adverse reactions to medications. This monitoring will vary depending on the nature of the medication being delivered or prescribed, the nature of the patient being treated and the training of the provider. General anesthesia and sedation providers should be well-versed in patient vital-sign monitoring. Dentists providing long-term medications (e.g., orofacial pain specialists) may require laboratory or other advanced monitoring.

The lack of data related to medication errors and adverse drug events in dentistry is troubling particularly with the incidence seen among our medical colleagues. The Dental Patient Safety Foundation (DPSF, dentalpatientsafety.org) exists to track and report on patient safety-related issues, including medication errors and adverse drug events, and is the only patient safety organization in dentistry that is listed with the federal government. Confidential reports by dentists to the DPSF are federally protected from legal discovery and will contribute to a database within dentistry of these and other dental patient-safety events.

Conclusion

Medication errors and adverse drug events are an unfortunate risk of drug administration and prescribing. Only through diligent preoperative preparation and careful administration and prescribing can these problems be avoided. All dentists should be encouraged to confidentially report incidents of medication errors and adverse drug events to the DPSF and/or the FDA postmarket drug safety monitoring program so that a database specific for dentistry can be established and additional solutions developed.

REFERENCES

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There is no question that error during the provision of health care is a critical issue and is associated with patient harm, disability and even mortality. In the practice of medicine, patient safety is regularly scrutinized. As a result, metrics, such as indwelling catheter infections, decubitus ulcerations, patient falls and other events recognized as complications, are measured in an effort to minimize mistakes and improve outcomes. Such metrics in medicine are often easier to track and measure because medical practices often have oversight of the doctor’s skills through hospital credentialing and internal peer review. In the hospital setting, outcomes are monitored (e.g., infection rates) and complications recorded and outcomes discussed (peer review). Continuous quality improvement identifies rare or “never” events and the staff are trained at reducing these complications through checklists, peer review and morbidity/mortality conferences. The culture of “the doctor is always right” has been replaced by a recognition that anyone on a patient’s care team can voice concern if they feel there is a potential for an adverse outcome. Even family medical practices often have a team approach with physicians and nurse practitioners interfacing on patient care that can improve collaboration and patient outcomes.

The clinical practice of dentistry, however, is most often performed in the independent setting of a private practice. While many practices may have more than one dentist, the practice relies on the individual dentist’s strengths and potential weaknesses. Less than optimal outcomes are often not identified, measured or tracked. Instead, the dentist “fixes” the issue without necessarily learning from the experience, thereby allowing for future degradation of outcomes. Because many patient safety concerns are “near misses,” when the opportunity to learn from them is also missed then complications with significant patient harm are more likely to occur. In addition, oftentimes staff such as dental hygienists or dental assistants are not encouraged to point out issues or events that may lead to less than desirable outcomes. In fact, reports of staff being admonished, even in front of patients, for questioning the dentist’s decision are the norm. Until recently, shared reports of negative outcomes have not been supported or encouraged in the dental practice setting, which leads to further isolation and a failure of the profession to take advantage of the opportunity to learn collectively.
Adverse Event Reporting

Responding to the issues of preventable patient injuries and poor outcomes, the United States government set up the Agency for Healthcare Research and Quality (AHRQ) under the Department of Health and Human Services. Its genesis was the Institute of Medicine's 1999 report “To err is human: Building a safer healthcare system,” which noted how human error in health care delivery led to adverse outcomes. The thought process was that by reporting errors that occur during the provision of health care all practitioners can learn to recognize the events that led to the error happening, ideally breaking a link in its progression to patient harm.

In health care settings, there has been a tendency to avoid reporting safety events, as practitioners have sought to reduce the risk of adverse medicolegal or licensing issues. However, it is well recognized that disseminating information about medical errors, especially involving low-frequency/high-impact events, could benefit all providers by creating shared learning and allowing others to avoid similar mistakes. The Patient Safety and Quality Improvement Act of 2005 authorized the creation of Patient Safety Organizations (PSOs). The AHRQ then went on to develop the format for the listing of PSOs (credentialing) and providing a mechanism for the unified reporting of patient safety events.

A listed PSO collects information from licensed health professionals for dissemination to others in the field. A case that is reported to a listed PSO is de-identified based on strict guidelines to protect patient, facility and practitioner identity. Information gathered by a PSO is not accessible for medicolegal or licensing board adverse actions. This is protected information, as determined by U.S. government regulations. The AHRQ reports estimate that, through its programs, 1.3 million errors were prevented, 50,000 lives were saved and $12 billion in wasted medical spending was avoided in the years 2010–2013.

Cases that are entered online by practitioners are known as patient safety work products (PSWP). The specific information is then de-identified by the PSO board, according to federal guidelines, so that a case report or other promulgation of information can be made to the profession. Through this collection of case reports, shared learning, without the threat of blame or other consequences, can occur with the goal of improving patient safety.

Following are the eight patient safety activities that are performed by a PSO:

- Efforts to improve patient safety and the quality of care delivery.
- Collection and analysis of PSWP.
- Development and dissemination of information regarding patient safety (protocols, best practices, etc.).
- Use of PSWP to encourage a culture of safety and assistance to minimize patient risk.
- Maintenance of procedures to ensure confidentiality of reports.
- Provision of security measures to maintain confidentiality.
- Utilization of qualified staff.
- A patient safety evaluation system maintained.

An example of the potential benefit of a PSO is the formation of the Anesthesia Incident Reporting System (AIRS) that represents medical anesthesiologists. It was formed through the American Society of Anesthesiologists in 2008. Through the reports of various adverse events, colleagues learn from each other in a shared environment. The AIRS system collects information about adverse responses to anesthetic medications, unusual manifestations of systemic diseases and novel or unexpected system failures, to name only a few.

Dentistry’s Role in Patient Safety

Previously, 82 PSOs were listed on the AHRQ’s website, but none were related to specific issues surrounding dental practice. In the summer of 2017, the Dental Patient Safety Foundation (DPSF) began discussions about going through the credentialing process to form a PSO with a primary focus on dentistry. Initially, DPSF was motivated by the issue of patient harm during dental anesthesia. Quickly, however, many other safety issues in dentistry were encountered. Could the use of a PSO in dentistry improve outcomes, as was seen so often in medicine? Were there commonalities that could be communicated in a shared learning environment to improve patient outcomes?

Discussions directly with the AHRQ were initially quite positive and the agency was quite receptive to include dentistry in the group of listed PSOs. Following a rigorous credentialing process in October 2017, the DPSF was officially listed as a PSO (P0198) and now is active in receiving...
reports, providing shared learning and improving safety in all aspects of dentistry. The DPSF’s mission is to support a culture of safety in dentistry.

What Can Dental Providers Do?

Colleagues are encouraged to learn from each other by self-reporting using a confidential online tool. The DPSF is interested in collecting case information regarding patient safety events. These include:

- **Incidents**: patient safety events that reach a patient, whether or not harm occurs.
- **Near misses (close calls)**: patient safety events that do not reach the patient.
- **Unsafe conditions**: circumstances that increase the possibility of the occurrence of an incident or a near miss.

Case reports are presented as “shared learning safety reports” and provide a brief discussion of the event, the outcome and a section on “what we learned” so that the safety event doesn’t occur again. Examples of case reports are presented at dentalpatientsafety.org/reports. Any licensed practitioner can report through the DPSF website, dentalpatientsafety.org, either anonymously or confidentially. If reported confidentially, the directors can obtain further details about an incident as well as provide confidential feedback to the reporting practitioner directly. It is important to reiterate that all submissions remain confidential and de-identified. This confidentiality is protected by federal law from discovery by a licensing agency or other medicolegal requests for information.

It is also important to note that reporting to the DPSF does not absolve the practitioner from reporting to any state departments of dentistry or other agencies depending on individual state laws. For example, many states require the dentist to report the hospitalization or death of a patient that occurred within 24 hours of treatment. A DPSF report is still encouraged to be made in these cases, but state law needs to be followed as well.

The DPSF is totally independent of all other professional organizations and is funded by donations. The foundation hopes that all of organized dentistry will appreciate the value of the mission to improve patient safety and offer tangible support. There are no costs for practitioners to subscribe to the site so that they can be alerted when new cases are posted.

**REFERENCES**


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Incorporating Safe Practices Into the Dental Office: Lessons From the Kaiser Permanente Dental Program

Felix Lee, DMD, and Pam Kawasaki, RDH, MBA

ABSTRACT The Kaiser Permanente Dental program for quality and safety is multifaceted and comprehensive. This program is made up of all stakeholders including clinicians, employees and program leaders. Having a robust oversight structure, a just culture with safety reporting, policies that address safety, and culture-building programs are all elements that are in place to elevate the standards of quality and safety in the dental care setting.

Kaiser Permanente Dental (KPD) provides general dentistry and specialty services and includes services provided by periodontists, endodontists, pediatric dentists, prosthodontists, orthodontists and oral surgeons. Because of its ties to the Kaiser Permanente Medical Group and Kaiser Hospitals, it must maintain the same standards for safety and quality assurance that the medical departments must maintain. In this article, we discuss the program and how it works to improve patient safety.

KPD is comprised of the Kaiser Foundation Health Plan of the Northwest (KFHP-NW) and Permanente Dental Associates (PDA). KFHP-NW is a nonprofit corporation and a group model HMO that enrolls members, collects membership dues and contracts with PDA for the provision of dental services to its dental enrollees. In addition, the Kaiser Permanente Dental Choice PPO plan gives members access to a nationwide network of more than 380,000 dentists including 55,000 specialists.

KPD has 20 dental offices located in southwest Washington and in Portland, Salem and Eugene, Oregon, as well as a dental laboratory. It is also supported by a regional call center.

Most services are provided in dental offices operated by KPD. Under certain circumstances, however, care may be provided on a day-surgery, outpatient basis to members in an operating room setting under general anesthesia. In these cases, care is provided at Kaiser Foundation Hospital’s ambulatory surgery centers.
KPD has received more than 28 years of continuous accreditation by the Accreditation Association for Ambulatory Health Care (AAAHC). Being accredited means that KPD is measured against nationally recognized standards of care, demonstrates a strong commitment to maintaining patient safety, is dedicated to protecting patient privacy and meets all federal, state and local laws.

**KPD Quality Structure and Oversight**

The program for quality and safety is multifaceted and comprehensive and utilizes personnel from multiple disciplines. Recognizing that expertise doesn’t necessarily reside in a few, this system involves all stakeholders, including the input of employees and leaders in the process. Engaging a diverse number of stakeholders helps create broad acceptance and ownership for the quality and safety culture that resides within KPD.

**KFHP-NW — Dental Oversight Committee**

This committee is dedicated to the governance of KPD. It is comprised of two members of the Kaiser Foundation Hospitals and KFHP-NW board of directors (the governing board), the president of Kaiser Foundation Hospitals and KFHP-NW and the vice president of the Center for Health Research.

**PDA Board of Directors**

PDA elects a board of directors that is chaired by the executive dental director, which is also an elected position. The board’s role includes:

- Setting corporate policy.
- Selecting and reviewing the performance of the CEO as the executive dental director.
- Confirming appointments of and evaluating the PDA leadership team.

- Reviewing the fiscal management of the corporation and KPD.
- Approving the selection and evaluation of dentists.
- Developing and monitoring treatment protocols and practice philosophy.
- Overseeing credentialing, peer review, clinical effectiveness, safety and quality.

**Executives Responsible for Quality Improvement Program**

The PDA executive dental director and the KFHP-NW vice president, dental care services, are jointly responsible and accountable for the direction, implementation and success of KPD’s quality improvement effort. The vice president, dental care services, is the senior leader assigned this accountability by the region’s president.

**Dental Quality Assurance/Improvement Committee**

The committee structure of KPD’s quality improvement program begins with the quality assurance/improvement committee (QAIC) that reports directly to the executive dental director and the vice president, dental care services.

The QAIC collects and analyzes data of detailed activities across numerous areas to monitor and track progress on achieving identified goals and to identify additional areas where improvement may be needed or risk mitigated. An example is patient satisfaction trending, where KPD uses Press Ganey survey data that include data from other dental organizations across the country. Another example of dental benchmarking is the preventive sealant placement on children with data available from the state of Oregon as a comparison.

The QAIC meets bimonthly. Minutes are developed that identify the issues and next steps and whether items are needed or risk mitigated. An example is patient satisfaction trending, where KPD uses Press Ganey survey data that include data from other dental organizations across the country. Another example of dental benchmarking is the preventive sealant placement on children with data available from the state of Oregon as a comparison.

**TABLE 1**

<table>
<thead>
<tr>
<th>Quality Assurance/Improvement Committee Members</th>
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<tbody>
<tr>
<td>Dental Director, Quality of Care, co-chair (PDA)</td>
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<tr>
<td>Director, Dental Quality, co-chair (KFHP)</td>
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<tr>
<td>Senior Director, Dental Care Delivery (KFHP)</td>
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<tr>
<td>Director, Dental Operations (KFHP)</td>
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<tr>
<td>Peer Review Committee Chair (PDA)</td>
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<tr>
<td>Dental Director, Evidence-Based Care and Oral Health Research (PDA)</td>
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<td>Dental Director, Care Delivery (PDA)</td>
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<tr>
<td>Dental Director, Strategy and Business Development (PDA)</td>
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<tr>
<td>Dental Quality Program Manager (KFHP)</td>
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<tr>
<td>Quality Information Analyst (KFHP)</td>
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<tr>
<td>Executive Dental Manager (PDA), ad hoc</td>
</tr>
<tr>
<td>Vice President, Dental Care Services (KFHP), ad hoc</td>
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<tr>
<td>Hygienist representative (KFHP), ad hoc</td>
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</table>

**Safety Committee**

The KPD program is committed to health and safety at the program and office level. At the program level, KPD has had a long-standing dental health and safety committee comprised of representatives from PDA, management and clinic staff. The committee was established to provide support and resources necessary for establishing and maintaining a safe work environment.
for employees and patients. The committee ensures compliance with safety regulatory requirements and regional, national and dental safety policies and procedures. Monthly meetings are held to discuss safety initiative implementation throughout the dental program as well as safety policy creation and oversight. Topics may include, but are not limited to, infection control, environmental health and safety, purchasing of equipment and supplies related to safety issues and the review of incident reports. Minutes are recorded at each meeting and distributed to dental offices throughout the program. A summary report that highlights recommendations and action items is posted at each office.

The dental health and safety committee uses a co-chair model that includes a representative from management and clinical staff. Committee decisions are made by consensus and must include one representative from each area. Agenda items for the dental health and safety committee are often initiated by updates and policy changes at the institutional, state and federal level, by incident report review and by safety conversations. Safety conversations provide an opportunity for employees to identify an area of concern and make suggestions for improvement. Concerns brought forward to the dental health and safety committee are evaluated, reviewed and assessed. A corrective action plan is discussed and noted in the distributed meeting minutes. KPD strives to create a culture of safety by empowering employees to bring forward concerns in a supportive environment.

The dental health and safety committee schedules time throughout the year to focus on ergonomic agenda items, and additional stakeholders are invited to attend the meeting. Ergonomic concerns and equipment evaluations are reviewed to identify areas needing intervention or modification. Employees are encouraged to self-identify and initiate ergonomic evaluations upon request to prevent repetitive stress disorders. Once an ergonomic need is identified, early corrective intervention is initiated and corrective actions are established to eliminate or minimize the risk.

All safety committee minutes and quarterly inspections for past years are kept on-site and accessible for staff to reference and review.

At the office level, the KPD program incorporates monthly safety meetings and quarterly environmental roundings. Representatives from staff, management and PDA sit on the committee and review accident investigation forms, safety actions and other related agenda items. In addition, committee members participate in quarterly safety roundings to assess if staff have the workplace safety training required for their area of responsibility and the resources needed. Based on these findings, the health and safety committee may put forward recommendations for compliance and improvement to ensure the office is meeting standards. All safety committee minutes and quarterly inspections for past years are kept on-site and accessible for staff to reference and review.

Patient Safety Reporting and Just Culture

KPD encourages patient safety and just culture reporting of health care errors (adverse events and/or close calls) to assess and improve processes and provide a safe environment for patient care. The definition of an adverse event is as follows: An event, situation or condition that resulted in a patient injury, accident or illness. Examples include wrong patient, wrong side/site, wrong procedure, oversedating a patient, death or serious complication arising from dental treatment, etc. The definition of a close call is the following: An event, situation or condition that could have resulted in an injury, accident or illness, but did not, either by chance or through timely intervention. Examples include a patient fall without injury, the wrong radiograph exposed, etc. The following is the definition of a health care error: An unintended act, either of omission or commission, that causes potential for harm or actual harm. The purpose of reporting health care adverse events, close calls and incidents is to learn about their causes and enhance systems to reduce errors that may result in patient harm in a just or blameless environment.

All staff members are encouraged to participate in the detection and reporting of close calls/health care errors. Reported information is utilized in the identification of system-based causes of errors and the facilitation of system enhancements to reduce the likelihood of errors that could cause patient harm. The focus of the patient safety and just culture reporting process is quality improvement, not punishment. In essence, a just culture environment is one in which
TABLE 2

Systemic Changes Resulting From Root Cause Analysis

<table>
<thead>
<tr>
<th>Issue where RCA was completed</th>
<th>Changes initiated</th>
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<tbody>
<tr>
<td>Similar names.</td>
<td>Two patient identifiers must be used.</td>
</tr>
<tr>
<td>Similar age and same gender.</td>
<td></td>
</tr>
<tr>
<td>Similar landmarks on radiographs.</td>
<td></td>
</tr>
<tr>
<td>Wrong teeth/surfaces restored.</td>
<td>Procedural pause must be used.</td>
</tr>
<tr>
<td>Instrument packs loaded into sterilizer for the night but not run.</td>
<td>Use of “clean/dirty” sign on sterilizer. Limited number of staff allowed to process instruments.</td>
</tr>
<tr>
<td>Risk of unsterilized packs being unpacked the next morning assumed sterile.</td>
<td></td>
</tr>
<tr>
<td>Endodontic therapy initiated on wrong tooth.</td>
<td>One of the following must be done:</td>
</tr>
<tr>
<td></td>
<td>■ Quadrant RD isolation.</td>
</tr>
<tr>
<td></td>
<td>■ Single tooth RD isolation only after open into chamber.</td>
</tr>
<tr>
<td></td>
<td>■ Mark tooth prior to single tooth RD isolation.</td>
</tr>
<tr>
<td></td>
<td>■ Clamp tooth independent of RD.</td>
</tr>
</tbody>
</table>

frontline staff and others are not punished for actions or inactions taken by them that are commensurate with their training and experience, but only in cases of gross negligence or willful destructive acts. KPD assumes that employees are doing their very best and that adverse events and close calls are not the result of incompetence or misconduct. Therefore, per the Kaiser Permanente Northwest (KPNW) patient safety policy statement and the labor management partnership agreements, information regarding errors will not be used as the basis for corrective action except in rare cases such as the employee meeting any of the following criteria:

- Was under the influence of drugs or alcohol.
- Deliberately violated rules, regulations, policies or procedures.
- Specifically intended to cause harm.
- Engaged in particularly egregious negligence.

When any dental staff or provider suspects an adverse event or close call has taken place, the first priority is responding to the care of the patient. After that has occurred, a factual description of what happened and any follow-up care are documented in the patient record. After these top two priorities have taken place, the adverse event or close call would need to be reported using the safety event reporting system (SERS), which is KPNW’s electronic event reporting system. The dental office manager or professional director (i.e., the managing dentist of that site) will document all follow-up action in SERS. The dental administration will review all patient safety events/close calls and notify the regional quality resource management department of all sentinel events as defined in the KPNW sentinel event management policy. The dental administration will also facilitate root cause analyses (RCAs) when necessary and determine, recommend and implement improvement strategies (TABLE 2). It will also evaluate the effectiveness of interventions and report the findings, interventions and improvement evaluations quarterly to the quality resource management and the dental quality assurance/improvement committee.

RCAs are a confidential and nonpunitive part of the process whenever a significant dental event has been reported. They are designed to confidentially gather all parties involved in the event to describe a timeline of the events and to explore what an ideal situation would have looked like. The gaps between the ideal situation and the actual transpiring of events are explored to identify any system issues that may have either contributed to or were the root cause of the event. Examples of gaps in the dental office that this process has identified through the years include: Wrong patients being seen due to two patients having the same or similar names; dentists working on the wrong teeth due to the multiple-chair nature of the practice; communication gaps between dentist and assistant when the pair is unfamiliar with each other; and handoff gaps in the sterilization process that result in an unsterilized handpiece being used on a patient. Some of the systemic changes initiated as a result of RCAs include the following (TABLE 2):

- Use of two patient identifiers prior to seating the patient for their appointment; implementing a procedural pause policy to identify the proper site to be worked on for that day; and including the use of a “clean/dirty” indicator on the sterilizer as well as limiting the number of staff allowed to process instruments in the dental office. The findings of the RCAs are communicated to all staff and clinicians in KPD via a dental ASPIRE communication. ASPIRE is an acronym for analyze, share, prevent, intra-regionally. These communications are typically modified to protect patient confidentiality, the clinicians and staff involved and the exact dental office location. The communication is segmented into four parts:

- Situation: This is typically a very high-level, one-sentence description of the event.
- Background: This is a narrative description of the event, including as much applicable detail as possible.
- Assessment: Contributing factors are typically listed in bulleted list
Recommendation: Methods

Restate their name and another personal staff member then asks the patient to reception using first and last names. The dental hygienist calls the patient from clinical staff member (dental assistant, photo ID for identity verification. The KP health plan membership card and desk) asks the patient to provide their policy and how it looks in practice.2

Operative Side/Site

Verification of Patient, Procedure and Operative Side/Site

The purpose of this policy is to ensure the patient, procedure and operative side/site will be verified correctly prior to initiation of dental treatment. Below are the elements of this policy and how it looks in practice:3

The dentist conducts a procedural pause or time out just prior to initiation of any irreversible invasive procedure as a fail-safe step. Additionally, the dentist conducts a procedural pause or time out just prior to initiation of any irreversible invasive procedure as a fail-safe step to ensure that the entire dental team is in agreement on the procedure being performed as well as the location of the treatment (side/site). If the dentist is interrupted during a procedure (such as to do a hygiene exam), the dentist completes a new site-specific procedural pause or time out (this is referred to as the mini procedural pause) and the assistant verifies by confirming aloud. The dentist documents in the treatment record that the side/site verification and procedural pause/time out occurred, and the dentist/assistant teams sign, on an annual basis, the program’s procedural pause attestation form that confirms their individual understanding of the process and sends it to PDA’s HR department.

Infection Control Policy

KPD has a comprehensive infection control policy that covers every aspect of infection control and prevention in the dental setting. Below are some areas that are notable to highlight:3

Hand hygiene: Must be performed for at least 15 seconds. Hand-washing (including waterless rub if no visible debris is present) must occur at the beginning of the day, before glove placement and after glove removal. Other indications for performing hand hygiene include after touching objects likely to be contaminated by blood or saliva, before leaving the operatory, before eating, drinking or putting on makeup, after using the restroom and when hands are visibly soiled.

Personal protective equipment: The policy describes expectations regarding gloves, masks, eye protection and protective clothing.

KPD Policies in Support of Safety

Verification of Patient, Procedure and Operative Side/Site

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The purpose of this policy is to ensure the patient, procedure and operative side/site will be verified correctly prior to initiation of dental treatment. Below are the elements of this policy and how it looks in practice:3

The dentist conducts a procedural pause or time out just prior to initiation of any irreversible invasive procedure as a fail-safe step.
Employee health service: The policy covers employee tuberculin testing, hepatitis B screening/vaccination program, blood/body fluid exposure protocol and the infectious disease program (employee/provider diagnosed with infectious disease).

Disinfection/sterilization: Specifically describes the process for instrument cleaning, instrument sterilization, chemical and biological indicators and storage of sterile supplies. The policy also includes a detailed description of waterline testing and operator preparation and cleaning/disinfecting. The policy is consistent with best practices outlined by the Centers for Disease Control and Prevention (CDC) and the Organization for Safety, Asepsis and Prevention (OSAP).

In addition to the policy, KPD provides advanced training for subject matter experts (SME) and identifies an infection-control lead dentist at each office. The advanced SME training includes instruction on how to perform biological and water testing, maintenance of sterilizers and instrument washers and management of instrument processing areas. The infection-control lead dentist serves as an infection control resource within their office. This role requires an ongoing interest in keeping up to date with the ever-changing landscape of infection control regulations and practices and upholding high standards of infection control for patients, staff and dentists.

KP Programs in Support of Safety

Patient Safety University
The KPNW region incorporates a training session named Patient Safety University whenever a new building is put into service. This is seen as a good way to reset cultural expectations as they relate to safety, and inserting this programming as part of the orientation activities when relocating to a new building helps to support that. KPD has leveraged this practice in the past few years, as we have opened new dental facilities recently. The curriculum has been modified to better fit the viewpoint of dental care delivery. The following represent some of the areas covered in this half-day session:

- Human factors and systems conditions — group pressure from the perspective of accountability for good/safe practices.
- Teams and team culture — the evolution of a safety culture and information exchange.
- Mutual support and other leadership tools.

Patient Safety Roadshow
The Patient Safety Roadshow is a rotating presentation made by the top safety leaders in KPD. This is incorporated as part of a routine clinic staff meeting and utilizes a more focused version of the Patient Safety University noted above. Given the size of our program, the rotating roadshow covers the entire dental program over a one- to two-year period. The Safety Roadshow includes transparency regarding the current safety experience in the dental program (wrong site procedures, etc.).

Disaster and Medical Emergency Drills
KPD has a robust medical emergency response program (MERP) as well as a disaster scenario drilling program. A medical emergency exists when an individual demonstrates symptoms that may indicate a serious or potential threat to the individual’s life or continued well-being. In addition, specific dental office emergency protocols defined for fainting, chest pain, respiratory depression, acute asthma, stroke, seizure, mild and moderate allergy, anaphylactic shock, insulin shock, diabetic coma and accidental ingestion or aspiration of a foreign object describe the appropriate sequence of actions for each emergency. In the event of a medical emergency occurring in a dental office or facility, the medical emergency response program will be initiated, activities and outcomes will be documented on the medical emergency report form and copies will be distributed to the patient’s dental record (scanned into the electronic record) and to dental administration. The dental office manager or their designee will complete the form, including the 24-hour follow-up, and forward it to dental administration within 48 hours of the occurrence. Dental administration will submit any necessary reports to the Washington or Oregon state boards of dentistry as required by law (Washington WAC 246-817-780; Oregon OAR 818-012-0015).

All providers of care and clinical support personnel obtain and then maintain a health care provider basic life support (BLS) card from an American Heart Association-approved program for health professionals as required by the board of dentistry in the state in which they practice or as required by dental program policy. Following are some specifics to the KP medical emergency response program policy:

- It is the responsibility of each dental office manager to periodically make available an opportunity for the respective provider and support staff to obtain or reestablish their BLS certification.
- It is the responsibility of dental administration to organize the availability of requisite BLS training/recertification resources — either inside or outside of Kaiser Permanente — and to communicate that...
All dental offices will maintain a standard medical emergency response cart in a constant state of readiness. Teams will be assigned weekly. The cart will be inspected four times per month, as assigned by the dental office manager, and documented as complete and current with all items tested for proper pressure and/or working condition. The completed checklists will be kept on file by the dental office manager. The contents of the medical emergency response cart are listed on the medical emergency equipment checklist and are not to be altered without approval from the dental administration and the PDA. A dentist SME who has line of sight on the contents of the emergency response cart will inform on any recommended changes to the contents of the carts.

A dentist will be present in the dental office or immediately available by telephone whenever patients are physically present in the dental office.

Environmental Auditing

Environmental Rounds Checklist

- Environmental workplace safety rounds are conducted quarterly at each KP dental office. Rounding provides an opportunity to connect with people in meaningful ways and develop positive working relationships. During rounding, employees are engaged in a two-way dialogue and listen respectfully to each other’s responses. The following questions are asked during safety rounding:
  - Do you know how to report a safety conversation/unsafe condition?
  - Do you know what a workplace safety stop is?
  - Have you taken or participated in workplace safety training, either regarding your department hazards or in KPLearn around safety conversations, safety stops or how to report an incident or a hazard?
  - Do you have access to safe patient mobility equipment?
  - If you have utilized safe patient mobility equipment, can you provide an example of how it was used?

Environmental rounding is conducted by the office safety committee and may include managers, dentists and staff as available. The goal is to initiate conversation with at least three different employees each quarter. After the conversation, the committee member should come away from the interaction with either a recognition or an issue they can help to resolve and provide guidance on additional resources or support as needed. After the quarterly environmental rounding is completed, findings are brought forward to the office safety committee for discussion. Once a year, environmental rounding is initiated by a manager from another KPD facility to provide insight from an external perspective.

Clinic Site Infection Control and Safety Audit

Internal infection control and safety audits are conducted yearly at each KPD office to assess and evaluate if the clinic site is complying with regulations and meeting standards. The evaluative criteria are based on 35 survey items that directly align with OSHA policy, CDC guidelines and KPD infection availability to all dental office managers. A centralized log is sent out to all dental office managers on a regular basis regarding the expiration of BLS certification, informing them of when their staff are approaching deadlines for recertification.

All staff will receive instruction in the MERP program during orientation within 30 days of their hire date. All staff will receive, at a minimum, two hours of KPD MERP training provided at the dental office annually. Licensed staff must meet their appropriate requirements for licensure.

KPD will provide four hours of emergency training per year (two hours every six months) to include two hours of disaster training and two hours of MERP training in which one hour includes hands-on CPR.

Dental office staff will be accountable for being knowledgeable and competent in the following areas: the MERP procedure including CPR for providers and clinical support staff; use of the automated external defibrillator (AED); utilization of the emergency protocols; accessing and operating the emergency equipment; and completing the medical emergency report form and the medical emergency equipment checklist. The orientation and training program (including periodic review) will utilize the latest medical emergency information provided by the designated dentist, the MERP trainer in each dental office and the dental quality and safety consultant for emergency practice sessions.
TABLE 3

Multiyear Trend Line for Root Cause Analysis and Never Events at KP Dental

<table>
<thead>
<tr>
<th>Year</th>
<th>RCAs completed</th>
<th>Never events</th>
<th>Patient visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>3</td>
<td>2</td>
<td>364,486</td>
</tr>
<tr>
<td>2013</td>
<td>5</td>
<td>2</td>
<td>385,811</td>
</tr>
<tr>
<td>2014</td>
<td>4</td>
<td>2</td>
<td>420,687</td>
</tr>
<tr>
<td>2015</td>
<td>7</td>
<td>6</td>
<td>442,775</td>
</tr>
<tr>
<td>2016</td>
<td>3</td>
<td>0</td>
<td>436,548</td>
</tr>
<tr>
<td>2017</td>
<td>2</td>
<td>0</td>
<td>459,148</td>
</tr>
</tbody>
</table>

AAAHC Preparedness Audit

KPD has received continuous accreditation from the Accreditation Association for Ambulatory Health Care Inc. (AAAHC) for the past 28 years. As part of the process, KPD commits to a thorough, on-site survey by AAAHC surveyors at least every three years. Organizations must meet AAAHC standards in several different chapters (up to 18) outlined in the AAAHC handbook, including chapters covering infection prevention and control, facilities and environment and quality of care. As part of the preparation process, KPD conducts twice-yearly preparedness audits at each office. The 110-point audit worksheet includes areas such as following the various infection control, medical emergencies and procedural pause policies, among other items.7

Miscellaneous Learnings

Look-Alike Medications

KPD has instituted a system to mitigate the unintentional use of look-alike medicaments used in dental procedures. The best example of this is with local anesthetic carpules. Because the carpules are the same size and lettering on the label is very small and not easily readable at a glance, manufacturers have used a color-coded stripe around the carpule to quickly identify the specific anesthetic solution inside. Unfortunately, the colored stripe is very similar (gold versus tan) when comparing a solution of 4% articaine with 1:100k epinephrine with a 3% mepivacaine solution with no vasoconstrictor. This can be problematic for patients in the event the wrong carpule is identified and then subsequently injected when the intention is to not use a vasoconstrictor. There is the expectation that the look-alike anesthetics not be stored next to each other or kept next to each other in the dental operatory assistant cart. Additionally, the storage area should have a label in red all-capital lettering indicating “look-alike medication,” so that anyone looking will be reminded to double check to make sure they are taking the intended anesthetic.

Summary and Conclusions

The KPD program has established a culture of safety through daily, monthly, quarterly and annual assessment. The processes have been formalized and allow employees the opportunity to bring safety discussions into the workplace. The commitment from the organization is evident in the time, resources and support provided in maintaining a safe workplace and patient care environment.

KPD has realized a favorable trend line with respect to never events realized. Although the number of never events is very small to begin with, the previous six years’ worth of data show an impressive track record of success (TABLE 3).

It is also notable that this is realized in the context of a dental program that has grown by nearly one-third in the past six years in terms of dental visits. A similar growth trend was seen in KPD membership (patient) population growth and provider growth (general dentists, specialists, hygienists, auxiliary staff).8 The fact that the number of never events remained in the single digits despite the scaling up of the program speaks well for the overall culture of KPD as it relates to quality of care and safety.

KPD engages staff with an annual people-pulse survey, which measures employee engagement. One of the questions that is surveyed is about the safety reporting and just culture. The "encourage/easy to speak up about..."
errors and mistakes” people-pulse survey question has a five-year average of 81.2%.

Tracking this measure has informed KPD leaders on how much traction the safety reporting and just culture has gotten and has led to efforts to intensify focus on this at times when the score has slipped.

KPD developed a program for quality assurance and safety modeled after the program for medical and hospital-based programs. Through customization, the program would be easy to incorporate into both the private practice and the corporate dental practice models. Elements that small group practices or academic dental practices can begin to implement right away are formalizing an infection control policy, safety auditing, verification of patient, procedure and operative side/site and root cause analysis when there is a never event. The key to its success is that all team members are included and all input is respected. Nonpunitive action is required for quality and safety improvement.

Regular staff meetings, multiple streams of communicating learnings and best practices and retraining have been shown to be beneficial to the program’s success.

REFERENCES

THE CORRESPONDING AUTHOR, Felix Lee, DMD, can be reached at felix.w.lee@kp.org.
**LOSA VEGAS COUNTY**


**CERRITOS** — Located in a busy strip mall, this GP has almost 50 yrs of goodwill. Consists of 6 eq ops. Property ID #5286.

**CULVER CITY** — GP w/ 60 yrs of goodwill to offers is located in 2 story free standing bldg. Averaging 30 new patient/mo. Grossed $365K in 2018. NET $71K. Property ID #5283.


**LONG BEACH** — GP w/ 35 yrs goodwill. Has 3 eq ops in a 1,698 sq ft suite. Grossed $336K in 2018. NET $229K. Property #5258.


**ROWLAND HEIGHTS** — Estab. in 2009, this GP is located in a 1 story free standing bldg. Grossed $772K in 2018. NET $225K. Property ID 5278.

**TorrANCE** — Located right off the PCH, this GP is Collecting $43K in monthly revenues. Net of $123K. Property ID #5281.

**ANAHEIM** — GP located in 2 story building w/ heavy traffic flow. Has 8 eq ops. Grossed $754K in 2018. NET $229K. Property ID #5255. Real Estate for Sale!!!

**ORANGE COUNTY**

**ANAHEIM** — GP located in 2 story building w/ heavy traffic flow. Has 8 eq ops. Grossed $754K in 2018. NET $229K. Property ID #5255. Real Estate for Sale!!

**CARLSBAD** — This beautiful practice has over 22 yrs of goodwill. Has 4 eq ops in a 1,800 sq ft suite. Fee for service office. Grossed approx. $440K for 2018. Property ID #5256.

**CHULA VISTA** (Turn-Key) — Well laid out practice in a 2 story med/dent building. Has 3 eq operatories and 1 plumbed not eq in 3 story med building. Grossed approx. $588K in 2018. Great potential for a full time dentist. Property ID #5273.


**SAN DIEGO COUNTY**

**CARLSBAD** — This well established GP with walking distance to the ocean. Consists of 3 eq ops. Grossed $898K in 2018. Net $214K. Property ID #5285.

**LADERA RANCH** — Beautiful GP in premier shopping center. Has 11 eq ops. Grossed $1.9M in 2018. NET $400K. Property ID #5262.

**ORANGE** — Price Reduced! Turn-Key GP in small shopping center on a major heavy traffic street. Has 3 eq ops in a 1,800 sq ft suite. Grossed approx. $164K for 2018. ID #5253.


**SANTA ANA** — GP w/ 3 eq ops and 1 plumb not eq in 4 story med building. Grossed approx $658K in 2018. Property #5258.

**ESCONDIDO** — Estab. in 2009, this GP has almost 50 yrs of goodwill. Has 4 eq ops in 1,150 sq ft suite. Fee for service only. Property ID #5243.

**RIVERSIDE COUNTY**


**LA QUINTA** — Price Reduced!! Well established GP with over 8 years of goodwill. This modern designed practice has 8 eq ops. On a the busiest major intersection. Grossed approx. $1.6M for 2018. NET $568K. Property ID #5130.


**SAN DIEGO** — Price Reduced! Turn key practice with 3 eq ops and 1 plumbed not eq on an approx. 1,815 sq ft suite. PPO and Cash only. Grossed approx. $325K in 2018. ID #5274.

**Sorrento Valley** — Located in premier shopping place with convenient freeway access. Established in 1992. Has 3 eq ops and 3 plumbed not eq ops room for expansion on an approximate 2,400 sq ft suites (2). Grossed approx. $486K in 2018. Property ID #5272.

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The day-to-day running of a practice can be hectic at times, so many dental professionals use set systems and procedures to streamline their work. After all, less time on the backend means more time on patient care. But occasionally, cutting corners can lead to unwanted risk. This is especially true when it comes to patient records. Taking shortcuts on charting, such as using preestablished templates, may seem like a convenient timesaver, but it can cause more headaches down the road. At best, it can leave patients unhappy. At worst, it can lead to potential liability claims.

In one case reported to The Dentists Insurance Company’s Risk Management Advice Line, a patient came in for a routine cleaning. She called the office the next day to say she felt cheated because she did not receive a polish at the end of the cleaning. The office staff assured her that the polish is part of the cleaning and they would look into the matter. They reviewed the notes and found documentation that polishing did, in fact, take place. As a goodwill gesture, the dentist allowed the patient to return to the office for another polish. The patient was pleased.

Three weeks later, another patient called and reported there was no polish at the end of the cleaning. Again, the chart note indicated the polish took place. This time, the dentist looked into the matter more critically and found that the polish was part of the treatment template and was automatically populated. He discovered that at times, the hygienist did not do the polish due to time constraints.

While digital templates can keep notations clear and consistent, said Senior TDIC Risk Management Analyst Taiba Solaiman, they should be used with caution, especially if fields are auto-populated, can lead to errors and omissions. “Inconsistent notes can reduce the credibility of the dentist, and the onus is on the dentist to make sure that chart notes are an accurate depiction of what transpired at each appointment,” Solaiman said. “It’s best to refrain from prepopulating notations whenever possible.”

Although no great harm came from the case above, the use of templates can have more serious effects. In another case...
reported to TDIC, a 4-year-old patient presented for restorative treatment due to rampant decay on multiple teeth. The procedure was performed under conscious sedation. Vital signs were obtained and noted on the patient’s sedation record. At the end of the procedure, the patient was breathing and her eyes were open, but the dentist could not arouse her. She was immediately placed on oxygen. The patient wasn’t responding to verbal or physical stimuli. Her blood pressure and oxygen saturation levels were dropping, so office staff called 911. The paramedics arrived and transported the patient to a local hospital.

Upon reviewing the patient’s chart entries the following day, the dentist noticed that there was no mention of the patient’s drop in blood pressure or oxygen saturation levels. Even more concerning was a note that the patient was discharged “awake, alert and ambulatory.” The dentist then contacted TDIC Risk Management for advice.

One of the concerns in the above case is that some of the recordings of vital signs on the sedation record were precharted in the interest of time. The dentist quickly recognized that this method carries with it the potential for inaccuracies. The dentist was concerned that the parents would view the timesaving approach as reflective of an overall approach to patient care, which may lead them to wonder what other “shortcuts” could have led to this incident. While no liability has been established in this case, it brings to question the safety and accuracy of the record-keeping method used. The analyst advised the dentist against precharting and cautioned the dentist about editing entries after the fact.

“When digital or written, comprehensive and accurate patient records are the best defense in liability claims. They should include (among other information) diagnoses, treatment plans, progress notes, vital and diagnostic signs, exam and treatment notes, informed consent discussions and forms and all interactions with patients, such as conversations, phone calls and emails. Records serve as credible evidence of discussions between you and your patient as well as the actual treatment provided,” Solaiman said. “Accurate and complete records are critical for demonstrating sound clinical judgement.”

“Records serve as credible evidence of discussions between you and your patient as well as the actual treatment provided,” Solaiman said. “Accurate and complete records are critical for demonstrating sound clinical judgement.”

Dentists and their staff should be extremely careful in not only what they document, but how they document. Chart notes should be written during, or soon after, the appointment. The more time that passes, the greater the likelihood of details being forgotten or inaccurate. Although entries can be edited, after-the-fact edits increase scrutiny and can appear suspicious in a liability case. Practice owners should also review all chart notes completed by their staff. Legally, the dentist is responsible for all errors that occur within his or her practice.

“We also recommend that the dentist check over every provider note to make sure that the entry is correct and that the dentist feels confident speaking to the notes,” Solaiman said. Faulty records can strengthen a professional liability case against a dentist in litigation. Many plaintiff attorneys are becoming increasingly sophisticated in reviewing treatment charts. Audits can be run on electronic records that show the history of all entries made by whom and when. Records come under intense scrutiny, and the slightest mistake or omission can make an otherwise defensible case indefensible.

Accurate, thorough and up-to-date treatment records are a dentist’s best defense in a liability claim. They are considered legal documents and, as such, must be created and maintained with the utmost care. Preestablished treatment templates may save time, but what’s saved in minutes can, and often will, create more problems down the road. These measures can also appear careless and insensitive to patients, eroding confidence and leading them to believe that the practice values production more than patient care. Ultimately, patient safety should supersede convenience.

TDIC’s Risk Management Advice Line is a benefit of CDA membership. If you need to schedule a confidential consultation with an experienced risk management analyst, visit tdicinsurance.com/RMconsult or call 800.733.0633.
4359 SANTA CRUZ GP offering 30+ years of goodwill within walking distance to the beach! Located in a well-established, attractive, single story professional building complex with ample parking, good visibility and easy access. 2 doctor days/week, 2 hygiene days/week, 380 active patients with approx. 10 new patients/mo. 3 fully equipped ops in 850 sq. ft. Average GR $250K with Average adj net of $135K. Asking price $150K.

4351 SONOMA COUNTY GP & BUILDING Offering 70+ years of goodwill. Beautiful modern facility with 3 fully-equipped ops and digital x-ray. Equipment is in pristine condition, most purchased in 2016-2018. Dental suite has lots of natural light with views looking into a courtyard and garden. 2018 Gross Receipts $600K+ with 4 doctor days/week and 4 hygiene days/week. 700+ active patients, all fee-for-service. Seller owns the building, it is available for purchase. Asking $305K for practice, $425K for building. Owner/doctor willing to help for smooth transition.

4338 PENINSULA PROSTHODONTIC PRACTICE Preeminent 45 year Prosthodontic practice located in mid peninsula neighborhood. State-of-the-art 1,242 square foot facility with 5 operatories. Seller willing to help in the transition. Outstanding referral sources. Average Gross Receipts $1.3M with 4 doctor-days per week. Asking $884K.

4256 SANTA CRUZ COUNTY GP Seller moving out-of-state and offering 33 years of goodwill. Wonderful location on major thoroughfare in a charming beach community close to wineries and the water. Tranquil and modern, beautifully appointed, 5 op facility. Approx. 1,300 active patients (all fee-for-service). Seller will help for smooth transition. Asking $180K.

4343 CAPITOLA GP Ample 3,000 sq.ft. facility w/5 fully-equipped operatories,. Tennic opportunity to own the facility and well-established community practice with quality and seasoned staff. Average Gross Receipts $870K+. Asking $643K.

4261 CAPITOLA GP Retiring doctor offering an established practice in professional office complex built around a garden setting. Beautiful and modern 1,463 square foot facility with 4 fully-equipped operatories. Average gross $743K+ with 3 doctor days and 6 hygiene days per week. Approximately 1,800 active patients. Asking $562K.

4355 SAN FRANCISCO ENDO Endodontic practice in signature building with wealth of referral sources. State-of-the-Art, modern, 1,027 square foot office with 2 fully equipped ops. Well established, seller with sterling reputation willing to help for smooth transition.

4233 SAN FRANCISCO GP Seller offering 26+ year general practice in SF Financial district. Ground floor office with high volume foot traffic. Approx. 1,200 sq. ft. facility with 4 fully-equipped ops. $930K+ avg. annual GR. Seller willing to help for a smooth transition.

4311 SAN FRANCISCO GP Downtown SF practice in gorgeous, remodeled 1,300 office with panoramic views. Suite includes 4 fully equipped ops, reception area, business office, private office, staff lounge, lab area, and sterilization area. Beautiful, modern cabinetry and equipment. 1,600 active patients with 15-20 new patients/mo. Owner/doctor works 3 days/wk with 5 hygiene days/wk. Average gross receipts $738K with average adj. net of $305K. Asking $495K.

4358 SAN MATEO GP Unique opportunity to own a downtown San Mateo GP surrounded by a variety of retail, restaurant, service and specialty shops generating significant foot traffic and daily business draw. 1,498 square foot facility with 4 ops, reception area, business office, private office, staff lounge, lab area, sterilization area, bathroom, storage & dedicated parking spaces. Family oriented practice with an emphasis on Restorative care. Average annual Gross Receipts $400K+

4336 SAN BRUNO GP Legacy practice centrally located in a combined commercial & residential neighborhood, convenient to highways 101, 280, and 380 and close to the BART station. Elegant, remodeled 1,463 sq ft. office with 5 fully-equipped ops, & digital radiography. 5 year average Gross Receipts $922K+. 1,000 active patients with an average of 10 new patients per month. Asking $661K.

4216 SIERRA NEVADA FOOTHILLS 23 year practice located in the heart of the Sierra Nevada foothills in modern building close to downtown area. 1,024 square foot office with 4 fully-equipped ops., upgraded major equipment and digital radiography. Average Gross Receipts $890K+ with 56% average overhead. Asking price for practice $604K. Seller is offering real estate for sale to the buyer of his practice.

4262 MOUNTAIN VIEW GP Desirable 1,700 square foot Mountain View location. 5 fully equipped operatories. Average Gross Receipts $886K+ with 4 doctor days and 6 hygiene days. Practice with an emphasis on Restorative and Preventative care. Seller retiring. Great opportunity for a skilled dentist to take over a 35 year practice with seasoned staff and loyal patient base. Asking $619K.

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New/Not New: Takeaways From the OSAP Annual Conference

CDA Practice Support

The Organization for Safety, Asepsis and Prevention (OSAP) is a community of individuals and organizations that strive to improve safety at dental facilities through education, compliance tools and building a network of experts. The OSAP annual conference regularly brings together dental professionals from around the world to hear from the Centers for Disease Control and Prevention, the U.S. Food and Drug Administration (FDA) and infection control and safety experts and to share their challenges and learn from each other.

This year’s conference featured presentations and panel discussions on dental unit waterlines, instrument reprocessing, medication errors, radiation safety and more. Attendees represented private practices, Indian Health Service clinics, dental schools and dental service organizations. Although no new guidelines or regulations were announced, it was apparent that attendees were learning new information from speakers and each other. Here are two takeaways from the conference.

FDA Guidance and Manufacturer Instructions for Use

In 2015, the FDA finalized guidance for medical device manufacturers on the subject of reprocessing.¹ The guidance established an expectation that manufacturers will include validated reprocessing instructions for their reusable devices. Devices without validated reprocessing instructions are considered single-use devices. Such devices in a dental office include diamond coated burs and scaler tips. Non-diamond coated burs and endodontic files should be managed as single-use devices until complete and validated reprocessing instructions are produced by the manufacturer. If manufacturer instructions are incomplete or incorrect, a dentist can contact the FDA Office of Compliance.

Reprocessing instructions in some cases may be limited to a certain type of sterilizer, for example, one that utilizes a prevacuum cycle in addition to a gravity cycle. A dentist cannot assume that a manufacturer’s reprocessing instructions apply to any steam sterilizer. When contemplating the purchase of a reusable semicritical or critical device, a dentist should review the manufacturer’s instructions for use (IFU) to verify that the device can be properly sterilized at the dentist’s facility. If the IFU are not readily available, contact the manufacturer’s technical assistance department, rather than the sales department, to obtain that information.

The FDA recommends reprocessing instructions be comprehensive and include all of the following elements:²

- Necessary special accessories, for example, plugs, sizes and types of brushes and type of sterilization wrap.
- Point-of-use processing, that is, steps that can be taken to prevent the drying of contaminants or microbial growth on the device.
- Disassembly and reassembly instruction.
- Method of cleaning, such as by mechanical or manual methods or by both.
- Cleaning agents, for example, quaternary ammonium compounds and enzymatic detergents and instructions on their preparation and use.
- Rinsing, including the type and quality of water, duration and temperature.
- Lubricating agents, if any can be used.
- Visual inspection, for example, identifying what is unacceptable deterioration.
- Method of disinfection or sterilization with details such as cycle specifications, packaging and load characteristics.
- Reduction of sterilant residuals.
- Drying.
- Reuse life, such as either the number of times it can be reused or a description of how a user can determine whether the device has exceeded its use life.
- Additional labeling recommendations.
- Patient or layperson use.
- Reference to guidelines or accessory labeling.
- Manufacturer’s contact information.

Reprocessing instructions should be current, understandable and without ambiguity. For example, an instruction to “disassemble if applicable” leaves it to the discretion of the user to determine if disassembly is necessary to properly reprocess a device. If a manufacturer provides ambiguous instructions, dental staff should request better instructions.

Leadership and Safety

Speakers highlighted incidences of infection control breaches, medication errors and radiation overexposure in dental practices. In many cases, it appeared individuals failed to follow or implement known safety standards or to check or double check whether a procedure was completed or that correct medication was used.
In the case of medication, speaker Steve Yun, MD, urged dental professionals to use generic names instead of the brand names of drugs because brand names can be similar, for example, Celebrex (NSAID), Cerebryx (seizures) and Celexa (antidepressant). Dr. Yun, who has worked on Dental Board of California investigations, urged a dental medication safety paradigm that includes:

1. Improving medication safety education.
2. Knowing the patient.
3. Knowing the drugs.
4. Proper management of emergency medication.
5. Proper management of sedative agents.
6. Creating a just culture.3

OSAP attendees were reminded that radiographic prescriptions should be based on patient need and not made to be routine at preset intervals. Radiographs should be prescribed only after clinical evaluation and radiation exposure be kept “as low as reasonably achievable” — to follow the ALARA principle. Speaker Juan F. Yepes, DDS, MD, MPH, MS, DrPH, promoted the Image Gently campaign, which promotes safe pediatric imaging, and he discussed studies on the use of CBCT, panoramic radiographs and dental radiographs in children. He concluded that dentists can do better in protecting children from unnecessary radiation exposure.

Infection control breaches in dental settings are not uncommon. Speakers discussed actual incidents and reviewed postbreach steps that include identifying incident details, conducting a risk assessment, communicating with stakeholders and notifying patients. When determining whether patient notification is warranted, a dentist should consult with the local public health department.4

The need for leadership at dental practices and clinics to cultivate and maintain a safe environment for both staff and patients was the common theme of the conference. OSAP attendees were urged to know, understand and follow the standards, to convey them and to encourage colleagues to do the same.

### REFERENCES

3. According to HealthLeaders Media, “Just culture refers to a values-supportive model of shared accountability. It’s a culture that holds organizations accountable for the systems they design and for how they respond to staff behaviors fairly and justly. In turn, staff members are accountable for the quality of their choices and for reporting both their errors and system vulnerabilities (Griffith, 2009).” www.healthleadersmedia.com/nursing/developing-just-culture. Accessed June 26, 2019.
6168 SACRAMENTO STATE  “Bread & butter” Delta PPO practice averages $480,000 in collections per year. Everything referred. Well liked Dentist. 10+ weeks off a year. 4-days of Hygiene. 4-ops and digital Pan. Perfect for Skilled Dentist who seeks strong patient relationships. 2019 trending $800,000+ with profits of $300,000. 5-days of Hygiene. Entire office from leaseholds, delivery systems and technology have all been upgraded.

6166 EAST BAY’S TRIVALLY  2019 trending $850,000+ in collections. Averages 20 new patients per month. Attractive 4-op office. Digital Pan and Fabrication Center.

6165 ROSEVILLE ORTHO – “OUT-OF-NETWORK” Stanford Ranch. Great satellite office. $455,000 invested in build-out, furnishings, computers and equipment. 3-chair Bay. Digital Pan with Ceph. 51 active patients and averages 3 New Patients per month. Full Price $150,000.

6164 SAN FRANCISCO BAY AREA – “OUT-OF-NETWORK” Highly regarded practice as evidenced by 25+ new patients per month. Collections have topped $2 Million in each of the last 3-years with Available Profits averaging $1 Million per year. Paperless. Great location. Seller shall work-back to affect an orderly transition.

6163 LAKEPORT  Extremely attractive alternative to practicing in ultra-competitive settings and living in expensive housing markets. Appeal of practicing in Lakeport is ability to step back in time when life was less hectic. Decompress and have more time for yourself. Beautiful 6-op facility with high-end technology and completely networked. 2018 collected $956,000 with Profits of $360,000. 2019 trending $1.1+ Million in collections. Building is optional purchase. Full Price $295,000.

6162 REDDING  Great alternative to practicing in uber-competitive markets in ultra-expensive housing communities. Strong foundation as evidenced by 1,500+ patients and 8-day Hygiene Schedule. Charges in 2018 totaled $709,800 - down from 2017 which realized $779,000 as Owner chooses to work less and takes 9-weeks off. Simple “bread & butter” practice with all specialty work referred. Roll-up your sleeves and do $1+ Million if you choose. The patients are here. Seller previously owned a very busy Group Practice in high-end Orange County beach community. Comparing the two, he prefers his Redding practice. 2,000 sq.ft. suite leases for $2,296/month and enjoys river views. Full Price $175,000.

6159 WOODLAND - “SOLD” 3-day practice perfect for first practice, or acquisition by nearby DDS as can be relocated. Collections in 2018 totaled $518,000. 3-days of Hygiene. 4-ops in well-designed office. Quality patients.

6158 FORTUNA  Relaxed lifestyle in Humboldt County’s Banana Belt. Adjacent to Ferndale. Perfect for Dentist seeking small town living. 2018 Collected $395,000 with $156,000 in Profits. 2019 trending $400,000+ 6-weeks off. Lots of work referred. Full Price $75,000.

6157 SACRAMENTO’S ELK GROVE AREA – “SOLD” 2018 collected $909,000 on Owner’s 3-week day. Successor can increase to 4-days as practice is rich in patients. 25+ new patients per month. 5-ops, digital Pan, strong Recall, great staff. 6152 SAN RAFAEL - “SOLD” Across from Marin Academy. 2018 collected $520,000. Stand-alone building optional purchase. Nearby DDS who desires their own building should vertically integrate their practice here and have instant $1+ Million practice in superior location.

6150 HAYWARD - “SOLD” Strong Dental DNA. Well-designed 5-op office. Digital radiography and computers. 2018 trending $850,000+ 5-days of hygiene. Seller available to provide long-term transition assistance.

6147 SAN FRANCISCO BAY AREA - “OUT-OF-NETWORK” - “SOLD” 2018 collected $2.2 Million. Hygiene produced $1+ Million. $700,000+ in profits. Seller available for long transition.

4000 SOUTH ORANGE COUNTY - FEE FOR SERVICE  High profile Shopping Plaza. Can do $2 Million with energized Buyer and Associate. Grosses $1.45 Million.

4001 PALM SPRINGS / LA QUINTA  Location, location, location! Grossing $1.5 Million. Well equipped. High Identity. $2 Million achievable.

4003 PEDO CHINESE / HISPANIC  3,000 Charts. Established 35 years. Move into your nearby practice. Full Price $150,000.

4004 INLAND EMPIRE – UNION PRACTICE  Can do over $1 Million. 5 ops.

4005 REDLANDS HISTORIC COLLEGE CITY  Long established, moved into new condo in 2015. Beautiful 6-ops. New equipment & cone beam. Seller will transition 2 days/week at $500 per day for 2 years. Grosses $961,000 on 2.5 day week. 3.5 hygiene days. $5,000/month in HMO. Nets $400,000. Can grow to $2 Million. Full Price Practice $961,000. Condo $1,100,000.

4006 ALTA LOMA  High identity shopping center. Grosses $700,000 with Absentee Owner. Hands-on Successor will do $1 Million. 5 ops, 3 equipped.

4007 WEST COVINA  Grosses $650,000. 2 days Hygiene. Absentee owned.

4009 IRVINE  Lady DDS grossing $1 Million. 5 Ops.

4011 DIAMOND BAR  Dream Million Dollar location. 5 ops equipped. Several restaurants bring in droves of customers daily. Full Price $150,000.

4013 ORANGE COUNTY BEACH CITY  Grossed $700,000 last month. 4 ops in 1,800 sq.ft., room for more. Seller will transition. Full Price $800,000.

4014 VENTURA CITY  Grossing $1.6 Million, HMO $10,000 month.

4015 HEMET  Easy way to gross $500,000. Grossing $180,000 on 1-day. Seller must sell. Building & Practice. Full Price $110,000.

4018 SOUTH ORANGE COUNTY  Two separate practices doing approximately $800,000 each. Owned by same DDS.

4019 $1 MILLION NET PROFIT  Opportunity of a lifetime. Phone Tom at 714-345-9659.

4022 VENTURA  Cash and PPO. 4 days Hygiene, 4 ops. Trending $620,000.

4023 ORANGE  Grossing $380,000 on 3-days. 1.5 days of Hygiene. Lease up in 6 months. Three 5-year options. Close to Chapman and Tustin streets.

4021 WEST LOS ANGELES  Prestigious Medical building. 39-years established. 4-ops.

4024 LA HABRA / LA MIRADA  Professionally designed Office. Next to several Fast Food Restaurants. Cash, PPO, some Denti-Cal. HMO $3,000 per month. Grossing $520,000.

4027 IRVINE - NEWPORT BEACH - SO SANTA ANA - COSTA MESA - TUSTIN  Dentist retiring. Lost Lease. Will work back. $800,000 Fee for Service.

BAKERSFIELD AREA  Grossing $40,000 on 2 day week. 1,800 sq. ft. 5 ops. Full Price $330,000 includes Building.

CAPITOSTRAO BEACH  Senior DDS. Grosses $200,000 on 16-hours. Full Price $150,000.

INLAND EMPIRE  Denti-Cal grossing near $300,000. 4 ops Rent $1,350. Full Price $195,000.

INLAND EMPIRE – UNION PRACTICE  Grosses $650,000+. Nets approximately $400,000 on 2.5 days per week.

LAGUNA WOODS  Absentee owned. Grossing close to $800,000. High end area. Hi identity shopping center.


ORANGE COUNTY BEACH CITY  Absentee owned. Grossed $934,000 in 2018. Working owner shall do $1 Million first year.

REDLANDS  5 ops. Grossing $500,000. Low overhead. Long established.

RIVERSIDE  Female grossing $300,000. 3 ops. Full Price $250,000.

SANTA CLARITA  DDS wants to share & remain 1-day in 2 ops. 8 ops available. 70,000 autos pass daily. This location did almost $2 Million with previous owner.

VAN NUYS  Starter Practice. Over 2,500 Patients $150,000 or Make Offer.
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Dental Practice Brokers CA DRE #00863149
After a three-year absence, Mrs. Smith, a longtime patient, came in for a checkup. After reviewing the radiographs and performing an oral exam, I began discussing several possible choices of treatment that we could offer her. As I finished the presentation and asked her preference and if she had any questions, she waved her hand and said, “Oh you’re the doctor. I will do whatever you think is best.” How should I handle this?

Establishing a free and fully informed consent is one of the most important practices for any health care professional. Although your knowledge of dentistry is undoubtedly greater than your patient’s, it is of the highest priority that you find a way to allow your patient to understand the condition of her mouth as well as the benefits, risks and costs of all the appropriate treatment options.

While it is flattering for a patient to freely decline her responsibility and grant you that authority, you should firmly reject that honor, as it is much more important for the patient to be fully invested in the treatment planning decision than in making you feel good and powerful.

Historically, the principle of patient autonomy was addressed during the development of the American Dental Association’s Principles of Ethics more than 150 years ago, when the members noted, “It is not to be expected that the patient will possess a very extended or a very accurate knowledge of professional matters.” That statement holds true today and is embodied in the current CDA Code of Ethics, which states, “Patients have the right to determine what should be done with their own bodies. Because patients are moral entities, they are capable of autonomous decision-making. Respect for patient autonomy affirms this dynamic in the doctor-patient relationship and forms the foundation for informed consent, for protecting patient confidentiality and for upholding veracity.”

Your oral examination should be thorough, encompassing all aspects of care that might be indicated. With few exceptions, an ideal, complete treatment plan should be developed and included in your discussion with the patient. Of equal importance, alternative options that may require less time, have a lower cost or offer less comprehensive care should also be developed and presented. This will allow the patient to evaluate what they really want and can afford. This process should not be a sales presentation, but rather a collaborative effort to determine what is best for the patient at that time.

Mrs. Smith may not want to be bothered with decision-making. She may feel as if she is questioning my judgement, or she may truly believe that I am so professional that I will make the best decision for her. Despite those feelings, I have an obligation to educate Mrs. Smith that including her in the decision is not only nice, but truly necessary to assure that we are jointly developing the best possibility of a good outcome for her.

Although we feel that we are honest and ethical, public surveys by Gallup over the years find that, consistently, only three out of five people believe that dentists are above average in those characteristics. Although we are outdoing car salesmen and building contractors in those surveys, we can do better. Focusing our efforts on educating and involving our patients in deciding upon their own care will honor our profession’s ethical foundations and hopefully improve the perception of our value among the public.

**REFERENCES**


Gary Herman, DDS, teaches at the University of California, Los Angeles, School of Dentistry and lectures on ethics, dental law and patient management. He is past chair of the ADA Council on Ethics, Bylaws and Judicial Affairs and is a member of the CDA Judicial Council.
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### Top 10 Issues for Dentists Contemplating Retirement in Ten Years or Less

- **Top 100 Issues for Dentists:**
  - Commuting time
  - Quality of life
  - Cost of living
  - Insurance coverage
  - Retirement age
  - Health care
  - Tax implications
  - Estate planning
  - Family considerations
  - Legal advice

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### Better Exposure, Better Fit, Better Price!

- **Top Ten Issues for Retirement in Ten Years or Less**
- **Top Ten Issues for Better Price!**
- **Top Ten Issues for Better Fit!**
- **Top Ten Issues for Your Life's Work!**

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### Bay Area

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<thead>
<tr>
<th>Facility/Real Estate</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>AC-886 SAN FRANCISCO</strong></td>
<td>Unsurpassed visibility &amp; location! 850 sf w/ 3 ops $135k</td>
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<tr>
<td><strong>AC-989 SAN FRANCISCO</strong></td>
<td>Busy Retail Shopping Plaza w/ major anchor tenants! 3 ops Price Reduced $125k</td>
</tr>
<tr>
<td><strong>AC-1029 BURLINGAME</strong></td>
<td>Perfect “starter” practice to add some Dr days to your work week. 1000 sf w/ 2 ops. Plumb for 1 add’l $70k</td>
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<tr>
<td><strong>AG-871 SAN FRANCISCO</strong></td>
<td>Seller Motivated! ~600 sf w/ 2 ops Price Reduced $65k</td>
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<tr>
<td><strong>AG-944 SAN FRANCISCO</strong></td>
<td>~980 sf w/ 3 ops $595k</td>
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<tr>
<td><strong>AG-945 SOUTH SAN FRANCISCO</strong></td>
<td>~1800 sf w/ 4 ops $495k</td>
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<tr>
<td><strong>AG-990 SAN FRANCISCO</strong></td>
<td>Build the practice of your dreams! ~850 sf w/ 3 ops $228k</td>
</tr>
<tr>
<td><strong>AG-993 WEST PORTAL AREA</strong></td>
<td>Desirable area w/ easy commute to downtown San Francisco. ~1000sf w/ 3 ops Reduced Price: $410k</td>
</tr>
<tr>
<td><strong>AG-994 SAN FRANCISCO</strong></td>
<td>Highly profitable with net profit over $400k! ~850 sf w/ 3 Ops $825k</td>
</tr>
<tr>
<td><strong>BC-741 DANVILLE (FACILITY)</strong></td>
<td>Move in Ready! ~1600 sf w/ 3 ops. PRICED TO SELL! $10k</td>
</tr>
<tr>
<td><strong>BC-926 ANTIQUOCH</strong></td>
<td>Long established, well respected office. 1866 sf w/ 5 ops $495k</td>
</tr>
<tr>
<td><strong>BC-949 ALABANY</strong></td>
<td>Desirable commercial/residential area. Medical Prof Bldg w/ good frontage. 3200sf w/ 4 ops $695k Real Estate: $1.8</td>
</tr>
<tr>
<td><strong>BC-1010 ANTIQUOCH</strong></td>
<td>Health Prof. Complex 2118 sf w/ 2 equipped ops + 3 add’l $250k</td>
</tr>
<tr>
<td><strong>BC-1015 SAN RAMON FACILITY</strong></td>
<td>Fantastic location, beautiful buildouts and well equipped, move in ready office! $200k</td>
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<tr>
<td><strong>BC-1002 OAKLAND</strong></td>
<td>“Pill Hill” Area near hospital! 1064 sf &amp; 2 ops. Plumb for 1 add’l $150k</td>
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<tr>
<td><strong>BG-981 BERKELEY</strong></td>
<td>Long established, family-oriented practice. ~1100 sf w/ 3 Ops $345k/ Real Estate Available $499k</td>
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<tr>
<td><strong>BG-1025 WALNUT CREEK</strong></td>
<td>You won’t find a more outstanding opportunity than this extraordinary practice! ~2138 sf w/ 6 ops. $750k Real Estate: $995k</td>
</tr>
<tr>
<td><strong>BN-952 BERKELEY</strong></td>
<td>Step into this quality practice and you’ll know you belong here! ~835 sf w/ 3 Ops. Reduced Price $375k</td>
</tr>
<tr>
<td><strong>BN-1023 RICHMOND</strong></td>
<td>This is a rich opportunity for the astute dentist! 1450sf w/2 ops + 2 add’l. $50k/ Real Estate $750k</td>
</tr>
<tr>
<td><strong>BN-1028 CONCORD</strong></td>
<td>This Practice grossed more than $1.15 Million in 2018! 2000sf w/ 7 ops. $795k</td>
</tr>
<tr>
<td><strong>BN-1038 BERKELEY</strong></td>
<td>One the Bay Area’s most popular cities! 1000sf w/ 3 ops. $385k</td>
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### Bay Area Continued

<table>
<thead>
<tr>
<th>Facility/Real Estate</th>
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<tbody>
<tr>
<td><strong>BN-1045 CONCORD</strong></td>
<td>Imagine owning a highly successful, family-oriented practice! ~1150sf w/ 3 ops. $165k</td>
</tr>
<tr>
<td><strong>CC-846 SAN RAFAEL</strong></td>
<td>Prof/Retail Building Complex. 3 ops 640 sf Collections $433k in 2017 $275k</td>
</tr>
<tr>
<td><strong>CC-927 SAN RAFAEL</strong></td>
<td>Build the practice of your dreams by increasing this 2-day work week! 800 sf w/ 3 ops $175k</td>
</tr>
<tr>
<td><strong>CC-960 SONOMA</strong></td>
<td>Great location in one-of-a-kind setting! 950 sf w/ 3 ops. $385k/ Real Estate Available $350k</td>
</tr>
<tr>
<td><strong>CC-979 NOVATO</strong></td>
<td>Seller Retiring. ~803 sf w/ 3 ops near downtown and Old Town Novato. $195k (Real Estate $215k)</td>
</tr>
<tr>
<td><strong>CC-1017 VACAVILLE</strong></td>
<td>Maximize your work days and watch your production increase! ~1500 sf w/ 4 ops $130k</td>
</tr>
<tr>
<td><strong>CC-1020 SANTA ROSA</strong></td>
<td>Cash Flow of over $270k. Unique FFS Practice. 1320 sf w/ 4 ops. $450k</td>
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<tr>
<td><strong>CC-1030 SANTA ROSA</strong></td>
<td>Condo office in modern bldg w/ ample parking &amp; adjoining Ortho practice! 1683 sf w 5 ops $325k</td>
</tr>
<tr>
<td><strong>CG-616 NAPA COUNTY</strong></td>
<td>State-of-the-Art office! ~850 sf w/ 2 Ops. Seller Motivated $250k</td>
</tr>
<tr>
<td><strong>CG-995 VALLEJO</strong></td>
<td>Live, play and practice here where your lifestyle can’t be beat! ~2035 sf w/ 7 ops $1.175M</td>
</tr>
<tr>
<td><strong>CG-1037 SONOMA COUNTY</strong></td>
<td>Your lifestyle and practice will indeed be the envy of many dentists! ~1310 sf w/ 4 ops $395k</td>
</tr>
<tr>
<td><strong>CN-911 SANTA ROSA</strong></td>
<td>“Quality Care &amp; Patient well-being FIRST!”.2250 sf w/4 ops + 1add’l. $545k</td>
</tr>
<tr>
<td><strong>DG-862 MID-PENINSULA</strong></td>
<td>Rare gem with up to 7 operators in the Bay Area! ~2274 sf w/ 6ops + 1 add’l. $475k</td>
</tr>
<tr>
<td><strong>DG-936 SUNNYVALE</strong></td>
<td>Opportunity of a lifetime! ~1000 sf w/ 3 ops. $495k</td>
</tr>
<tr>
<td><strong>DG-986 CAMPBELL</strong></td>
<td>The ideal opportunity to practice in this community! 988 sf w/3 ops $288k</td>
</tr>
<tr>
<td><strong>DG-1006 MONTEREY AREA</strong></td>
<td>This practice is one which every dentist aspires to! ~3400 sf w/ 8 ops $1.395M</td>
</tr>
<tr>
<td><strong>DG-1030 SANTA ROSA</strong></td>
<td>Seller willing to consider Associateship for qualified DDS w. intention to Buy In! $350k</td>
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<tr>
<td><strong>DG-1040 SUNNYVALE</strong></td>
<td>Unique FFS Practice. 1320 sf w/ 4 ops. $450k</td>
</tr>
<tr>
<td><strong>EG-1012 EAST SACRAMENTO</strong></td>
<td>Amazing fee-for-service practice w/ no contracts! ~1150 sf w/ 4 ops Price Reduced $625k</td>
</tr>
<tr>
<td><strong>EG-1016 LINCOLN</strong></td>
<td>Don’t miss your opportunity to live and practice in beautiful Monterey! ~1125 sf w/ 4 Ops. $875k</td>
</tr>
<tr>
<td><strong>EG-910 MIDTOWN SACRAMENTO</strong></td>
<td>Call for Info! . $350k</td>
</tr>
<tr>
<td><strong>EG-968 SACRAMENTO</strong></td>
<td>Amning fee-for-service practice w/o contracts! ~1150 sf w/ 4 ops Price Reduced $625k</td>
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<td><strong>EG-965 EL DORADO HILLS VICINITY</strong></td>
<td>This is a rich opportunity for the astute dentist! 1450sf w/2 ops + 2 add’l. $50k/ Real Estate $750k</td>
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For a free copy of Dr Giroux’s book, call or email today.

**Top 10 Issues for Dentists Contemplating Retirement in Ten Years or Less**

- Timothy G. Giroux, DDS

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NORTHERN CALIFORNIA

DG-1005 SUNNYVALE: Highly Successful w/ Great Reputation in the Community! 1239 sf w/ 3 fully equipped ops $720k
DN-910 MIDTOWN SACRAMENTO: A thriving practice does not come along very often! ~1107 sf w/ 2 + 1 add'l. Reduced $210k
EG-965 EL DORADO HILLS VICINITY: Call for Info! 1100 sf w/ 4 Ops, $350k
EG-968 SACRAMENTO: Desirable, mid-town neighborhood, w/ ample parking in garage! ~1527 sf w/ 5 Ops. $550k
EG-1012 EAST SACRAMENTO: A practice like this one does not come available very often! ~2900 sf w/ 8 ops. $2.5M
EG-1016 LINCOLN: Look no further than this growing community to springboard your success! ~1800 sf w/ 4 Ops $595k
EN-976 SACRAMENTO: Philosophy to treat patients like family & listen to their needs. 1750sf w/5ops. $595k
EN-985 ROSEVILLE: Practice offers a full spectrum of the highest quality of dental care! 3120sf w/6ops + 1 add'l. $895k
FC-650 FORT BRAGG: Family-oriented practice. 5 ops in 2000 sf $350k for Practice & $400k for the Real Estate
FC-962 HEALDSBURG: Amazing practice w/ 1200 sf & 3 ops. Beautifully landscaped professional plaza $180k
FG-841 ARCARA: Great demographics w/ very little competition! ~1114 sf w/3 ops Reduced Price: $200k/ Real Estate Available
FN-961 EUREKA: Where the quality of life can’t be beat! 1400sf w/ 4 ops. $395k/ Real Estate Available $395k
FN-855 NO. HUMBOLDT: Seller relocating! Long-established, 100% FFS practice! 1600 sf w/ 3ops + 1 add’l. $190k/ Real Estate Available
GN-953 CHICO: Established for 55 years! 1067sf w/ 3 ops. $275k!
GN-924 TEHAMA COUNTY: Don’t miss this ideal opportunity! 3000 sf w/ 6 ops. Practice $495k / Real Estate $455k
GN-988 YUBA CITY: Excellent Merger Opportunity! Location and Lifestyle! 1600 sf w/ 3 ops. $100k
HG-815 TRUCKEE AREA: Busy, productive practice with 3 days of hygiene! ~1000 sf w/ 3 ops $165k/ Real Estate $437k
HG-851 SO LAKE TAHOE: Projected Revenue on track to do just under $700k this year! ~2100 sf w/ 5 ops $425k
HG-983 GRASS VALLEY: Newly remodeled office in highly desirable neighborhood! ~1250 sf w/ 3 ops. Reduced Price $195k/Real Estate Available

CENTRAL VALLEY & SOUTHERN CALIFORNIA

IC-975 MODESTO: Established 33 years. 1,100 sf w/ 3 ops $225k
IG-881 TURLOCK: Long established has unsurpassed quality care. ~3500 sf w/ 10 Ops (shared). Reduced: $295k
IG-1007 GREATER MODESTO AREA: Combines a quality learning environment with relaxed living. ~3000sf w/ 6 ops. $645k
IG-1009 TRACY: This opportunity is waiting for you to sink your roots down and invest your future here! ~1200sf w/ 4 ops. $745k
IN-764 STOCKTON: 5,000 sf w/10 ops. $220k
IN-917 MERCED AREA: Well established practice with a stable, loyal patient base! 1300 sf w/ 3 Ops, Reduced! $295k
IC-811 FRESNO COUNTY: Seller willing to consider Associateship for qualified DDS w. intention to Buy In! 3,000 sf w/ 6 ops $350k
IC-823 LOS BANOS: Heavy emphasis on hygiene. 1000 sf w/ 3 ops $90k
KL-909 SAN DIEGO: Remarkable Opportunity. Long established in vibrant North Park. 2400 sf w/ 5 ops & 2 Pedo chairs $810k
KG-921 SANTA MARIA: Live and practice in this desirable collegiate coastal community! ~930 sf w/ 3 ops Seller Motivated $285k

SPECIALTY PRACTICES

BC-784 CENTRAL CONTRA COSTA CO Perio: Seasoned Staff. Office runs like well-oiled machine! 3 ops $295k
BG-843 WALNUT CREEK Perio: Priced at 50% of collection! ~1085 sf w/ 4 ops $390k
BG-1024 WALNUT CREEK Prosth: Stellar reputation for providing the highest level of treatment! ~2138 sf w/ 6 ops. $750k Real Estate: $995k
BN-998 WALNUT CREEK/SAN RAMON AREA Ortho: Looking for your dream Orthodontic practice! 1450 sf w/ 5 Open bays/Chairs. $1,150M
DC-835 TRI-VALLEY Perio: Collections over $1.2M. 2,100 sf w/ $800k
GG-940 NORTH OF SACRAMENTO Pedo: Practice is on track to collect more than $1,000,000 in revenues this year! ~4300 sf w/ 5 ops. Reduced $555k
JG-757 VISALIA Perio: Incredible Giveaway at this price! Collections over $800k! ~2000 sf w/ 5 ops Steal at $150k
Wyze Cam ($19.99, Wyze Labs Inc.)

Security camera technology has evolved at a rapid pace, with every iteration having more features, smaller footprints and decreased cost. Wyze Cam is a small, approximately 2-inch cube that has an extendable three-axis adjustable base with a 1080p HD night-vision camera and two-way audio. An included adhesive metal plate can stick to most surfaces and magnetically attaches to the camera’s adjustable base without requiring screws. The camera is powered via a micro-USB cable and power adapter, which are both included. Additionally, it has a micro-SD slot for a card to optionally store recordings locally. Owners download the Wyze mobile app on their iOS or Android devices and create an account to start setting up their cameras. Users plug their camera into a power source and add a “New Device” on the app, which displays a QR code to place in front of the camera. Users press and hold a setup button on the camera, and a voice prompt announces that it is ready to connect. The camera scans the QR code and another voice prompt announces when setup is complete.

A plethora of features exists in the Wyze app for connected Wyze Cams. Owners can watch a livestream of their camera feed, manually record footage, send audio to the camera speaker and take still photos. More customizable features include Motion Tagging, which frames moving objects in recordings, and Time Lapse, which takes a series of photos over a frame of time (requires a micro-SD card). Out of the box, Wyze Cam automatically records 12-second event video clips, which are triggered by motion or sounds and are stored for free for 14 days in the cloud via Amazon Web Services. For continuous recording, owners will need to install a micro-SD card. Playback of event video clips or continuously recorded footage can be performed easily within the app. Owners can integrate Wyze Cam with Amazon Alexa, Google Assistant and IFTTT. Once connected to the smart home, owners can view camera footage through their hub device and create routines around event triggers. Unfortunately, the Wyze mobile app is the only method to access Wyze Cam and its settings as there is no corresponding desktop web browser site available.

— Hubert Chan, DDS

DEPSTECH Wireless Endoscope ($35.99, DEPSTECH)

Filming dental procedures is a challenging and expensive task. Managing lighting, stabilizing the camera and controlling focus all while getting out of the operator’s way are the tip of the iceberg when it comes to filming in the mouth. Loupe cameras, overhead mounts and studio operatories increase expenses to unmanageable levels and make this venture impractical. Is there a low-cost, high-resolution, easy-to-use, unobtrusive, wireless solution for filming dentistry? Maybe, but some lateral thinking and off-label usage are necessary to examine one such option.

China-based DEPSTECH is a company that specializes in manufacturing affordable video and image-capturing devices like dash cameras, microscopes and camcorders. Its initial claim to fame, however, was in the endoscope/borescope field, where it created “snake cameras” used by plumbers, engineers and medical professionals. The company’s IP67 offering is 11.5 feet long, boasting a waterproof 2MP camera capable of recording video and stills at slightly better than 1080p. The endoscope is semirigid, allowing operators to securely wrap it around objects they choose (like an overhead lamp or a chair arm). While the camera has a fixed focus, it can clearly visualize objects from 1.2 inches to 15.7 inches away, even under a bright operatory or loupe lighting. Up to five mobile devices wirelessly stream what the endoscope is seeing via a simple, but primitive app that captures images and videos directly to the devices’ photo albums. The video quality for filming intraorally is minimally acceptable; the endoscope itself is unobtrusive, the ease of use is phenomenal and the price point is palatable to all. The DEPSTECH IP67 should never be considered a replacement for a professional filming setup, but it is an acceptable solution for those moments where utilizing the setup is not feasible or necessary, especially if the alternative is not having any video.

— Alexander Lee, DMD

Would you like to write about technology?
Dentists interested in contributing to this section should contact Andrea LaMattina, CDE, at andrea.lamattina@cda.org.
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