

Minimally Invasive Treatment of Proximal Lesions

*The following is a transcription that has been taken verbatim from the presenter's audio.
No Edits have been made.*

Video Transcript

Jeanette MacLean:

Hi. Thank you so much for having me. I really appreciate this opportunity. I've got my webinar mullet on, business on top, pajamas on the bottom. I'm rocking some camo today because, let me tell you, in these past weeks that feel like years, I feel like I'm a general in war and the battle plan is changing minute by minute. I appreciate everyone being here. Thanks so much to P&G and Crest Oral-B for sponsoring this. Thanks so much to CEZoom for putting this together. Major shout-out for the musical interlude in the wait room. That was awesome. I was rocking out. And the message the songs were giving were great too, that we're going to be alright. Because that's right, we are going to be alright. On that note, I'm going to turn off my video, so bye for now, because I want you guys to focus on the slides here. So here we go.

Today we are going to talk about minimally invasive treatment of proximal lesions. You already heard my little intro bio there. I would just like to add that I have been in private practice now for 15 years. I became an owner, or half owner I should say, of my practice in 2007.

For disclosure purposes, I want to make sure it's clear that I do not have any owner interest or stock in any of the products that I'll mention today. I don't receive any sort of sales commissions. I have received speaking honorarium in the past from various dental meetings, conferences, universities, et cetera, and unrestricted educational grants from various companies such as Elevate Oral Care, Oral Science, GC America, DMG America,

NuSmile, DryShield, and P&G. However, they have no input on any of the evidence-based content that I'm going to share with you today.

I'm also a huge supporter and advocate for organized dentistry and think now perhaps more than ever before, we need to show our support and our strength in numbers to advocate for our profession in whatever capacity you can, whether it's from being a member, or if you can participate on their committees at a state or national level.

Right now, gosh, we're getting so many helpful emails from ADHA and ADA, et cetera, with so many resources, so many valuable resources in this COVID-19 pandemic, and surveys, et cetera. So I encourage everyone to read the emails, use the resources, help out when you can, respond to requests to submit emails to your legislators, fill out the data requests. I got one yesterday just asking about the impact on our practice and the volume of patients we're seeing. All of that can help push us forward and help us survive following this when it's finally all over. I can't wait.

I'm also a big advocate for charitable dentistry and giving back our time and talents to those who would otherwise not receive care. Can't wait to do that again too. Very importantly, timing not so great, but Happy Dental Hygienists Week. Woo-hoo. Wish we could be celebrating this in person. I miss my two hygienists so much. So let's hope a year from now it's going to be a very different Dental Hygienists Week.

But no, this is what's going on right now. This is my office the day after we closed. So St. Patrick's Day, not as much of a big celebration this year. It was sad. It's such an eerie feeling to see my office essentially shut down. We are seeing emergencies. We're screening them by phone, however, but to have it just be empty and having to have the sign on the door, it's an eerie feeling. I miss my work family. Most of our team has been there longer than me. This is an old picture. Our office manager there on the bottom center, she's going to celebrate her 30th anniversary with us later this summer. I miss everyone. I miss my patients.

I'm a pediatric dentist so, oh my goodness this is the highlight of the day, having fun with the kids. They're such a crack-up and it's just so nice to see them and watch them grow, and I miss them. I'm sure you all miss your patients too.

More recently I've become known as an advocate for minimally invasive dentistry, which, of course is the topic today. I do get asked why I got so passionate about that. I'm going to share that with you, but just a disclaimer first. I am a clinician. I'm in private practice, and I do consider myself a forever student because science is ever evolving. That's why we need to keep abreast of the literature and make sure that we are on top of the science. That way, we can do the very best for our patients. So thank you for using your time constructively during social distancing and quarantine and taking this awesome CE opportunity that we've been given.

There are key life events that changed the way I practice. To be more specifically, my daughter had surgery under general anesthesia as an infant, and that dramatically impacted the way I empathize with parents during the informed consent discussion where we review the risks, benefits, and alternatives to treatment, particularly when I was advising sedation for treatment of their child. I also experienced a medical emergency with a child with special needs that was undergoing IV sedation in my practice. He recovered. He's fine. He still comes to see me every three months. He still gets caries, but at that moment it was terrifying, and it really was a wake-up call to me where it just made me look at what I was doing and question how could I get better here?

And just my general observations that the more aggressive interventions that I was trained in my formal education and residency training did not necessarily equate to improved oral health, and now I bet for all of us, COVID-19 is going to be a key event that changes the way we practice. We don't even know what that's going to be yet. We don't even know what it's going to look like, and that's part of the frustration and stress for us all now is that uncertainty. It's tough. So these things make me question what can I do differently, and what can I do better for my patients and for their families?

The first was acknowledging or recognizing that we will never drill our way out of a biofilm disease, a behavior-driven biofilm disease. The treatments we do are very important, and we'll continue to do them. However, they don't actually cure the disease process. As a pediatric dentist, what's particularly alarming to me is the traditional restorative dentistry that we do, this gold standard pediatric dentistry done in the operating room under general anesthesia, i.e., you don't have a moving target. You can [inaudible] ...

Speaker 1:
Hey, Dr. MacLean, I think we lost you. There you are.

Jeanette MacLean:
Hi.

Speaker 1:
Sorry, I couldn't hear you for a minute there.

Jeanette MacLean:
Can you hear me okay now?

Speaker 1:
Yes, now you sound great. Thank you.

Jeanette MacLean:
Okay. Awesome. All right. So it concerns me that we see these relapse rates. That just brings us back to the etiology of the disease process for caries. It's a chronic biofilm disease, and this is really where we need to pay our time and attention and educate ourselves on caries as a biofilm disease.

I've mentioned this paper through my various webinars over the past two weeks. If you haven't had a chance to read it yet, I highly recommend it. This was incredibly eye opening for me. This is from the British Dental Journal 2016, and you can find it online. It's open source so you don't have to be a member of their association; you don't have to subscribe to this journal. You can freely access this online. So please take time during this quarantine to give it a look over. It's explaining how caries, the process is essentially an imbalance or what we call a dysbiosis in our biofilm.

I love this statement from Dr. Margherita Fontana, who I consider one of our great caries gurus really globally, but she's from University of Michigan, where in the ADA Journal she stated that, "Although extensive efforts have been made to teach and perform caries management under a minimally invasive, that is noninvasive and microinvasive approach, that emphasizes clinical and public health preventive services, the drill-and-fill approach may still remain predominant in some settings, neglecting to fully address the underlying disease process.

"Over the years, experts in the field of cariology conceptualize that caries acts as a recurrent disease cycle that involves varied states of demineralization and remineralization over a patient's lifespan. This concept is the crux of modern day caries management, a patient-centered, risk-based philosophy that prioritizes prevention, early detection, and noninvasive and microinvasive treatments." I think I said an internal amen when I read that. I thought that was great to see that in our journal.

So minimally invasive treatments for proximal lesions, the topic of the day. There's many. The foundation of it is diet and hygiene, and how we as oral health providers, whether you're the dentist or the hygienist or the assistant, this is critically important to the oral health of our patients, perhaps more than anything else we do, and taking the opportunity to educate our patients and utilize motivational interviewing. We can do non-restorative caries treatments, for example, diskings, or just monitoring a

lesion, especially an open lesion. We could do topical treatments such as fluoride varnish. We could do prescription-strength toothpaste. We can now use silver diamine fluoride, which we'll talk about. We can also do resin infiltration, or Icon is the system available commercially now.

We can also do atraumatic restorative treatment, interim therapeutic restorations, or there's SMART, which is essentially SDF plus atraumatic restorative treatment or silver modified atraumatic restorative treatment, and we can do the Hall Technique. Obviously, there's no way to cover all of this, so the focus of today's webinar will be to review our basic fundamentals, which are the diet and hygiene, and then the fluoride therapies.

Then we'll look at nonsurgical caries treatment, specifically silver diamine fluoride and resin infiltration. There are other opportunities where you could learn about ART and SMART and Hall Technique online. Elevate Oral Care put a number of great webinars together that are open access and will be archived online, so you can look to those, but I want to make it abundantly clear, and I can't stress enough that right now during this pandemic, we should not be open as business as usual. We should just be seeing patients with true dental emergencies and use ADA interim guidance as to what constitutes a true dental emergency and what we should be using and wearing for our PPE. Hey, this is critically important. Again, open up those emails that you're getting and review these interim guidelines.

Now, let's get back to basics, of course, oral hygiene instruction, nutritional counseling. So we want to disrupt the biofilm, and of course we do that through brushing and flossing. So it's important that our patients continue to do that, whether it's with using a manual toothbrush, or of course we have our electric toothbrushes. This is my son, Charlie, who's now 10, and this is fun. This is something you can share with your patients if you're utilizing teledentistry right now, but encouraging kids and encouraging their parents to use helpful oral hygiene aids such as Chompers, which is a feature. If they have Alexa, you can just say, "Alexa, start Chompers." It times the kids and

keeps them entertained, so this is awesome right now. That can be your oral health homeschooling, Alexa. And, of course, flossing, whether it's string floss or floss sticks.

My son has been playing a lot of Fortnite. I'm not going to lie. We're easing up a little bit on our screen time regulations because we are in survival mode. Remember? I've got camo on today. Take advantage of the CE opportunities that we've been given. Specific to toothpaste, there's no way we can cover that in addition to the rest, so please use these wonderful resources. I love Dr. Pamela Maragliano-Muniz. She had a wonderful webinar on toothpaste, so this is something you could go back to dentalcare.com and watch the archives of the various webinars that have been generously offered over the past two weeks from Crest.

I will focus just briefly here on prescription strength fluoride toothpaste. These are great for our high-caries risks patients, high caries, xerostomia, our kiddos in orthodontic appliances. This is something we can do even without seeing the patients. If we could do teledentistry, we could prescribe these prescription strength toothpastes to our patients. Of course, we want to be conscientious of the amount that they have, especially with kids. For example, now there's options where there's actually a metered pump, so it's giving them the exact dose versus regular tubes. This is actually what my son uses, the product on the left.

Fluoride varnish of course is excellent, and it's cleared to treat dentinal hypersensitivity, and it's great for that, but we know it also helps to reduce caries, and it's available in various formats. You have the conventional 5%, which is a colophony/rosin base. We also now have some new innovations, like there's a 2.5% version that's in a food-grade shellac. That's the one that I am using, on the right.

Raise your hand if you feel like this right now. I'm raising my hand. It is concerning. I'm totally guilty of this. We have been snacking. Everyone copes with stress differently. I see some friends that are enjoying adult beverages. Some of my friends have been really good about getting on

the Peloton every day or going for a walk. I've been really awesome at eating my quarantine snacks, so yay, but it's important that we are brushing and flossing, especially because there's going to be a lot of... I am concerned about knowing what's going on, what we're going to be faced with when we finally get back to our practices. I don't doubt for a minute we are going to be incredibly busy. I hate to say it, but it's true. There's probably a lot of this happening.

Now let's talk about diet. Of course, we know the frequency and duration of what we're eating is a big component of the caries disease process. I don't know about you, but oh my goodness, I have so many patients now, the teenagers, even the little kids, which it boggles my mind, because usually they don't like spicy food, but they're eating Takis and they're drinking Gatorade. I'm from Arizona, and they think they need those electrolytes. Like, well how about some water?

I see incredible amounts of caries in my patient population. It's a private practice. We're 20% Medicaid, 5% cash pay, and we definitely see bombed-out mouths. This is my favorite. We have kiddos with mouths full of cavities and the parents are just dumbfounded like, "How is this possible? My kids, they don't get any candy. They don't get any juice. We only eat organic." That's my favorite. I'm like, well, you have organic cavities, but they're having what I like to call it designer junk food. There's a lot of designer junk food.

That's somewhere we can help educate our patients, and if we're seeing children, educate the parents so they really understand and make smart choices with the foods that they are eating themselves and giving to their children. Because I feel really bad where a well-intended parent gets essentially duped into thinking that just because it's organic, that means no cavities. It's a bummer. I'm getting messages that people are using Peloton to work off the quarantine snacks. I need to do a better job of that.

A shout-out to Dr. Roger Lucas, who's a pediatric dentist colleague of mine in

Washington. He has this awesome book. You can order it on Amazon. I have a copy myself in my practice. I recommend it to parents, the ones that are truly interested in knowing how and why their kids are getting caries or how they could do better. So this is a great resource and, hey, you got to love that title, More Chocolate, No Cavities. That gives a big smile. He has this awesome tooth snack guide. We put this in every single new patient folder, and let's say we have existing patients, and they get amnesia, right? Or sometimes the kids are living between two households, so we'll give another copy just to make sure everyone's on board.

This I think is a great, simple way to help your patients visualize the component of their diet and how they can make easy changes at home to help reduce their caries risk by trying to focus on the foods that cannot cause decay and then limiting those foods like the orange zone that can easily cause caries, so this is really happy. I always tell them, you can have everything; we're not here to say you can't have this or that, but it's everything in moderation, and just being aware of what they're doing, or even seeing if they can pick what we call the happy medium, something in the yellow zone. Like if their kids are little cracker-a-holics, carbo-holics, how about popcorn?

If they like a treat, why not ice cream, which they have to eat quickly because it melts away? Or how about a piece of dark chocolate, because that's going to melt with body temperature versus having, say, a Sour Patch Kid that's acidic like to the level of battery acid and lingers around in their teeth. This is a great resource. You can download it off of his website, which is the dentistdad.com.

I highly recommend these other webinars that are going to be available online. One on motivational interviewing by Dr. Matt Allen. This was really, really helpful for me, and I found it incredibly empowering, because we're stuck at home and we can't really see our patients, and we feel frustrated because we want to still do something, and there is actually so much we can do with the education and then nutritional counseling and anticipatory guidance, so I highly recommend watching his course.

Then with teledentistry, if you haven't already initiated that, in many ways, especially myself and some of my pediatric dental colleagues, we're already doing this over the phone. We just haven't been billing out for it, but we get those calls, we get the emergency photos texted to us, but being able to utilize these new skills right now is going to be really helpful, so I would suggest using these.

Now let's get to the meat of today's talk. Let's look at silver diamine fluoride. SDF, silver diamine fluoride, has been commercially available in the US since 2015. Many of you might know, or maybe you don't know, that it's not new globally, it's just newer to us in the US. Some folks were smuggling in beforehand, but it was first started in Japan by a researcher there who developed it during the 1960s, and it was first approved in Japan to treat caries in 1970. Now of course here in the US, it's cleared as a device to treat sensitivity just like our clearance for fluoride varnish. Now let's say you're one of our colleagues in Canada. It is approved by Health Canada to treat caries.

We know what it does; it's just really semantics and how things get through the FDA. It's really TMI to go through. Now, NIH has funded US-based clinical trials, which hopefully will lead to drug approval for caries treatment, but in the meantime, it's cleared for sensitivity. It's composed of silver, ammonia, and fluoride, and its main actions are to arrest and prevent caries as well as to treat hypersensitivity. It's really great for that actually. Used it personally for hypersensitivity.

The main mechanisms of actions are to occlude dentinal tubules and produce this more favorable fluorohydroxyapatite, which of course makes the teeth more acid resistant, so that's great. I think what's really cool and unique to this treatment is the fact that it actually inhibits biofilm adhesion. Doesn't really change the bacteria in our mouth, but it helps to prevent it from adhering to the lesion, which is important in helping to arrest caries. I find that particularly beneficial, because this is targeting the actual disease etiology of caries, which is unique to this treatment, so that's great.

I love this beautiful image from my friend and colleague, Dr. Jeremy Horst, who many of you perhaps have read the UCSF protocol for SDF. This is an image he took of a SDF-treated carious lesion, cut-and-cross section, and you can see how a diffusion layer is created or those crust on the surface of the caries to help block acid attack and prevent additional mineral loss from the tooth. The red that you see, it almost looks like a jellyfish,

[inaudible 00:00:01], that's actually silver down in the tubules of the tooth. It's helping to harden up the lesion and arrest it. There's an abundance of evidence for SDF. More papers have been published on this than we could ever possibly cover and multiple clinical trials, multiple systematic reviews in [meta-analysis 00:00:25:19], which is the pinnacle of the pyramid, at the top of the pyramid of evidence.

The key point of the literature is that it's safe and effective. This I think is another really key point here. SDF is more effective than fluoride varnish, but to be more specific, one application of SDF is twice as effective as applying fluoride varnish four times in a year, i.e every three months that's powerful.

It's more effective than interim therapeutic restoration alone. It is most effective when applied bi-annually, i.e once every six months that there can be some variation there. In some cases you may need to do it more frequently. Then it arrests an average of 80% of lesions. Is it a cure all? No. Some lesions will not arrest with SDF alone, but if you look at the clinical trials and combine the evidence, on average, it's about 80% of lesions.

Some trials showed lower arrest rates because for example, they would apply it once and that was the end of it. We know, especially the folks that had already been using it, it needs follow up. It needs reapplication.

Now, some of the trials, the ones that had bi-annual applications, those had higher rates of arrest, even over 90%, but when you lump it all together, it's about 80%.

Another important factor is SDF satisfies this concept of the triple aim of care. Whereby it

increases access to care because you literally could do it anywhere. It's low tech. You don't even need electricity or a compressor or anything.

It improves health because it has a high levels of efficacy and it reduces cost because it's literally pennies per drop, especially if you're using the bottle version, it's pennies per drop. That is really cool about this newer treatment option.

I started using it in my practice. Sorry for the cough. I hope it's not a dry cough. Does anyone else feel paranoid lately? Anytime they get a cough or a tickle in their throat?

Speaker 2:
Yep.

Jeanette MacLean:

Okay. I was really, really excited when I saw SDF on the cover of the ADA Journal. This was like nerd Christmas come early for me because I was an early adopter and there was a period of time, where especially in the dental forums online, people treated me or looked at me like some crazy witch doctor. They were very leery because they just didn't see the evidence yet or weren't aware that there was all this evidence for SDF. This was such a great moment because for me, it just helped confirm and increase awareness that this absolutely is an evidence-based treatment.

This particular paper was a systematic review with meta-analysis that showed yearly 38% SDF applications to expose root surfaces of older adults are a simple, inexpensive, and effective way of preventing caries initiation and progression.

Now, we have the first ever evidence-based clinical guideline from the American Academy of Pediatric Dentistry, which advocates for the use of silver diamine fluoride as a part of a comprehensive oral or dental home, I should say.

Then the ADA released their first ever evidence-based clinical practice guideline. The first one that came out was the nonsurgical treatments for caries management, which of

course is our topic today. This was another huge moment I felt in helping to solidify the evidence and help give reassurance to dentists and hygienists in the United States that this is a viable treatment option.

Now, if you read this paper, you'll notice the recommendations specific to SDF are mentioned in cavitated lesions. That's because the existing body of evidence, the clinical trials for the most part, are focused just on cavitated lesions. Does not mean it won't work on a non-cavitated surface, it's just that's what the metric was.

Now, ADA has come out with these great... I don't know why this looks so blurry. I apologize for that, but it must be somehow the transfer, but you can find these online and download them. These are from the ADA, they have chairside guides for permanent teeth, and primary teeth, and [decisiontries 00:00:30:43].

The New York Times article on SDF in 2016, brought a lot of public attention and even the attention of dentists to this as an option because in many cases the patients were asking for this treatment. This is sort of how I got thrown into the speaking world because of being in that article.

Now, informed consent, it's not necessary to have a separate consent for silver diamine fluoride, but I think it's important because it is so different and new. I want to make sure people really understand what we're doing. Now, Dr. Jeremy Horst created his consent for the UCF Protocol call and it's available in multiple languages and you can download it for free.

Now, as a pediatric dentist, I didn't want to show root caries, so I created a version of that, with a patient of mine and their primary incisors, just so people could see the color change.

Then of course I added a line for the parent's signature and the fact that it needs to be reapplied. You can download this for free off of our website, which is kidsteethandbraces.com. I actually have a whole page dedicated to silver diamine fluoride.

Please go there and you're welcome to use any of the resources on there. There's downloads, there's videos, there's links to literature. There's a lot of content on my blog as well. Just articles that I've given or excuse me, written.

The code for SDF is 1354 and it's in our CDT book or the [inaudible] it's Interim Caries Arresting Medicament Application Per Tooth. This is not a full mouth code like varnish, it is per tooth. You use it like you would use any other site specific treatment for caries. Where I'm applying it specifically to a certain tooth and surface and documenting it in the patient chart as such.

For example, we use Dentrax. If I'm treating the occlusal buccal of 19, in the Dentrax file, it says, "Number 19, occlusal buccal 1354." It's important to remember that SDF does not restore form or function. Cavitated lesions stay cavitated. There are holes in the teeth. They can harden up. If you can keep them clean, they can perhaps maintain arrest, but you have to reapply the SDF. It's important that everyone, not just the dentist and the hygienist, but also, the folks who work in insurance companies understand that this is not a cure all.

Toxicity of course is also important. People hear 38% SDF and think, oh my goodness, it's so much fluoride and really it's not. If you compare a drop of SDF versus your conventional 5% fluoride varnish, it's significantly less amount of fluoride. To be more specific, your conventional unit dose of fluoride varnish is 11.3 milligrams of fluoride. Whereas a drop of SDF is just 2.24 milligrams of fluoride.

Now, if you are looking at a potential lethal dose or what we call the LD 50, we're looking at a 500 fold safety margin. You're not going to kill anyone with SDF, but we still worry about exposing our patients to excessive fluoride.

Especially as a pediatric dentist, I want to be conscientious and to use fluoride judiciously. This is important. We look then at the probable toxic dose, i.e the amount they'd have to ingest to potentially vomit. The Whitford's Probable

Toxic Dose for fluoride is five milligram per kilogram. Your typical one year old baby is about 10 kilograms. That baby would have to ingest 50 milligrams of fluoride to possibly have an upset stomach and vomit.

If you look at a drop of SDF, plus a 5% varnish, that's 13 and a half milligrams of fluoride. Who even uses the entire unit dose of varnish. I hope people aren't using the whole thing. There's a lot in there. So you're probably not even getting close to 13 and a half.

I mentioned, I use the 2.5% version, so that's even lower. You're looking at 5.63 milligrams of fluoride. I'm not concerned at all. I will apply them the same day.

A little more on toxicity specific to the silver component. You're looking at under five milligrams silver in a drop. Unit dose is essentially like two drops worth. So less than 10 milligram of the silver.

If you look at the studies on short serum, pharmacokinetics of well diamine silver fluoride, silver diamine fluoride, you might hear it used in different ways. There's also just silver fluoride. For example, in Australia, there's an ammonia free version, but they found that fluoride exposure was below the US Environmental Protection Agency, aka EPA, oral reference dose. We already established that. It's a small small amount.

Silver exposure on the other hand, exceeded the EPA oral reference dose for cumulative daily exposure over a lifetime, but for occasional use typically bi-annual application, which is what we're typically doing with SDF. If it's an unrestored caries lesion, it was well below the concentrations associated with toxicity. You're not going to turn anyone into the Smurf man. You're not going to turn them blue, I promise.

Now here's another paper looking at the serum safety. This is from the ADA Journal. SDF was well tolerated and no adverse events related to SDF were reported. It's a very, very safe treatment. It's a small, small volume. We're placing it very infrequently.

I created this chairside guide. You can also download it from my website. It shows before and after SDF treated teeth. Reviews, the pros and cons and of course ties in the fact that this is the patient's disease. We can't stop them from getting caries. It's their diet and hygiene that is critical for long term success. Not just for SDF, but for anything we do for them.

I feel it's really important to remind patients of that. It can be empowering for them. They really are in control of a major component of course.

I also have before and after smart treated teeth and then the proximal application, which is what we're going to discuss now. Just showing the color change and reviewing the pros and cons.

Now, the armamentarium is quite basic. Like I said, you don't even need electricity. I like to keep everything together in a little bin, we call it the RSDF kit, but it's everything there. You can kind of grab and go with what you're going to need for an application. Just depending upon the size of your practice, perhaps you have one of these at each chair or in each operatory. Let's say you're a hygienist and you're going into nursing homes. Maybe you just have one, whatever suits your needs.

I do have a basic application video available online. I have a YouTube channel. You can link to it from our website on the SDF page, or you could just go to YouTube and it's Affiliated Children's Dental. You can like and subscribe, but there's a basic application. That's not what we're talking about today.

Today we're talking about proximal application, but before I show you that I want to reiterate the fact that the ADA evidence-based guideline talks specific to cavitated coronal surfaces. It doesn't talk about SDF for proximal lesions, just because there isn't enough evidence for that specific.

There's limited evidence for SDF to treat proximal lesions. If anyone is in academics out there, this is such a great opportunity. Perhaps these are already happening, but to

do a randomized control trial comparing SDF proximally versus a placebo or a varnish.

Now the first mention of using silver nitrate, which of course is the precursor to silver diamine fluoride on silk floss to treat proximal lesions was from GV Black. In his classic textbook, which was essentially standard issue to dental students in the start of the 20th century. Blacks operative dentistry had two volumes. Volume one was on oral diagnosis. This is my personal copy that... I'm not that old. It's not from when I was in dental school in 1908, but I have one friend who always likes to tease me of how old I am, but anyhow.

I bought these on eBay. They smell like my grandparents basement in Cape Cod, that musty funky smell. This was volume two in the set on the technical procedures. Do you notice a difference? This one looks like it was never opened. It's in good shape. This looks like it has been dragged through the mud. Isn't that an interesting statement?

This is super cool. Dr. Horst discovered this. This is a 1981 Japanese study on treating proximal lesions with SDF. This was a really cool study because it actually showed or compared contralateral lesions and lo and behold, the side treated with SDF fared better than the side with placebo. There is evidence we just need more.

I actually sent this when they were calling for input on the ADA guide. This is one of the things I sent in, but again, to reach the level of evidence they're looking for, you have to have large size term clinical trials. We need that.

Now I do have a retrospective study of my patients. This is with some colleagues from Ohio State University, and this paper has actually been approved for publication. I think it's actually coming out next month, but we looked at my patients that I was applying SDF proximally and the arrest rates were comparable to what I already cited to you because remember we're applying it bi-annually. I also cover my applications with varnish, which is not necessary, but that's how I do it. Yeah, so we need more evidence is what I'm trying to get to.

In the meantime, I've been using it and having for the most part success. 100%? Of course not. We already know SDF's not a 100%, but I am still having success. I'm going to share success and failures with you.

Proximal application, you follow the same basic protocol where you protect the patient and your clinic because SDF can stain. So you want to handle it with gloves. Make sure you're not setting the product on a bare countertop because you don't want to stain your clinic surfaces. Storing it upright in the original box, dispensing it immediately before you're going to use it, and then recapping if you're using the bottle, recapping it tightly and immediately, and putting it back in the box.

Protecting your patient with eyewear and a patient napkin. So you don't accidentally stain their clothes. I like to put Vaseline on their lips so that I don't accidentally stain their lips.

Now, that's particularly important for proximal application if you're using, for example, the super floss product. Now that advantage arrest is tinted blue, that's helpful, it used to be clear as you'll see in some of my other photos. Look at how you have to be mindful of where that floss is laying across their lip. Some of the very few, few times that I've accidentally stained patients, it was from proximal application.

Just simply isolate and dry the area that you want to treat and then place the floss into the contact. Don't predict it. Don't wiggle it around, just put it in contact. Think of it like replacing the microbrush in the contact. That is essentially the vehicle to deliver the SDF into that tight proximal space.

If you have an open contact, great. If it's a light contact, you could just apply it with a microbrush, no problem, but in these tight wide flat contacts of the proximal surfaces, especially of primary molars. This is helpful to deliver the SDF between the teeth on a sometimes moving target.

Again, put it in the contact of an already clean dry surface, and then use the microbrush to apply the SDF to the floss when it's already in place. Again, now that it's tinted blue, if you're

using the advantage arrest product, you'll see it very clearly. This is when it was still clear because I've been doing this since 2015.

I can't even remember now when they tinted it blue. Then once upon a time, the bottle was white and now the bottle is black. That's nice, so yeah.

[inaudible] and the buccal and then I like to go up over the marginal ridge and you can just see it seeping in that contact. Then I wait a minute, we just set a little kitchen timer. Some of my colleagues mentioned they have Alexa. They say, "Alexa set the timer for one minute." Hey, that is a great method of infection control. Maybe I need an Echo Dot in every operatory now so we don't have to touch the kitchen timer in this post COVID-19 world. Where I don't know if anyone's watched that video. If saliva were red, that is embellished upon my brain now.

We let it sit for a minute and it's just sitting there. I'm not wiggling it around, just leave it in place. Then after a minute I grab both ends of the floss. If you can see pooling SDF, you don't want to splash. You could dab it with a piece of gauze to make sure you're not, I'm going to accidentally splash it, but grab both ends and just pull it directly occlusally out of the contact versus sliding it out the side, which you might accidentally get it on the lip and make them have a tattoo, a temporary tattoo.

At that point, I like to cover the SDF treated site with varnish. Again, that is not necessary. It's not a part of the clinical trials that our AAPD Guidelines were based on, but I do cover the area with varnish. I have a long winded reason for that, but part of the benefit is it helps keep saliva out of there longer. It helps keep the SDF where I put it. So it's not going to accidentally travel to other places and stain other areas. It also masks the poor taste because it has a very poor taste. With children, that's beneficial because then they're not freaking out. If it touches their tongue and burns or tastes bad.

You do not want to light cure. It is not necessary for the efficacy. Again, the clinical trials and none of them were light curing their

SDF and it is light sensitive. If you expose it to a bright curing light, it is going to immediately turn everything it touches into jet black because it's going to precipitate the silver out of solution.

Remember the picture from Dr. Horst where the silver is seeping by capillary action down into the tubules? If you precipitate the silverado solution, you're not giving it a chance to get down there. Don't light cure it.

You don't want to rinse it off. You don't want to blow compressed air on it after the fact, just let it soak in by capillary action. It's as simple as that. We don't have to over complicate it.

They have updated the package insert for advantage arrest. That is helpful because that did create some confusion because it used to say air-dry. Now it specifies, "Allow to air dry, do not rinse." Air-dry means like if you were to paint the wall, you just allow it to dry in ambient air. You don't take a device and blow dry it. You just allow it to dry and then you don't want to rinse it off. That's just common sense.

SDF is a liquid that's going to absorb into the tubules of the tooth. So we want to give it a chance to absorb into the tooth. Think of the tooth like a sponge and it's sucking it up.

Let's watch a video on super floss. These videos, again, they're available on YouTube. You can watch them later. I have another version with an older patient. I have tons of videos on YouTube that you can use for yourself.

I like to use them to educate our patients, so the parents and the kids. It helps them understand what's going to happen to them. I find that it helps reduce their fear and anxiety. It's a useful tool. Let's watch. (silent)

(silence). All right. So, I hope you can tell from that particular video, I chose that one because that patient was younger and more apprehensive, and clearly what we were doing is very low tech. It's simple. It's not painful, but she was so apprehensive. So, she came to us as a second opinion over three years ago, where the previous provider was recommending sedation to treat proximal carious lesions on her. So, I

can't remember her original treatment plan, but I believe they wanted to do the four quads, but hopefully it's obvious to you, especially... Because I treated all four quads. If you can see the distal of her upper right first primary molar, you can appreciate that lesion that's clearly into the dentin there. Mom did not want to do the sedation, she was apprehensive about that, so we offered to do SDF instead.

And now it has been over three years, I need to get updated bite wings on her, but you can see that nothing progressed. The lesion's arrested, and her behavior has improved dramatically. I mean, she was, no offense, a little bit of a [inaudible 00:02:57]. It was like brain surgery just to put a little piece of floss in there, but we got it done. But she built trust and confidence in us and now has a positive outlook on dentistry and likes coming to her visits, and the fear is gone, so that's great. And we were able to successfully treat her lesions noninvasively, so the mom is very appreciative.

So, of course, I also use it in permanent teeth, particularly for incipient lesions where... but say, there's not the best hygiene, not the best diet, I don't want to go in and start drilling and filling these. I will have kids that we graduated, quote unquote, graduated from the practice, come back, and they'll have these crazy treatment plans where they want to do like MODs on every tooth in their head and none of them were even cavitated. They're just these E1, E2 lesions. So, that's concerning. A class two on this is not going to last the lifetime of that tooth. You're going to drill away a ton of sound enamel just to access it, so why not remineralize these spots? Of course, at the very beginning, the baseline was diet and hygiene, right? So, keeping these clean, monitoring the diet, but that alone can stop E1, E2 lesions like this that are non-cavitated.

However, as we all know, compliance is... It's easier said than done. So, sometimes we will tell these patients till we're blue in the face to brush, floss, drink water only between meals, limit your carbs in-between meals, but it's easier said than done, especially right now in quarantine time. I will probably go get a snack... I don't even want to admit it. We're just going to

pretend... But yeah, that's the reality. That's why I'm very confident we're going to be very busy when we get back to work.

Anyhow. So, I find that this treatment option resonates very well with the parents of these teens and college students, where that parent has a mouthful of MODs in their own head, where now, as they're getting older, they're leaking or cracking or now they need the root canals and crowns. So, it really resonates with them, the concept of treating these earlier and less invasively to help preserve the integrity of the tooth and to delay or, hopefully altogether, avoid a surgical intervention, so you can prolong the lifespan of the natural dentition. That's the goal here.

So, that's a patient that we did this for, and hopefully you can appreciate, like on the mesial of his upper left first permanent molar... Of course, he had smaller lesions all throughout, but we were able to stabilize that. And there's very little visible discoloration. You can barely see it. So, I do show pictures of these. However, when we do our case, I'm going to show you a case study for proximal resin infiltration. You need to be conscientious of buccal, subclinical caries or white spot lesions, because especially in permanent dentition, especially if it's in the smile line, doesn't mean that they won't necessarily choose the option. You just have to be aware that they could potentially see the discoloration, and for certain patients that might not be acceptable, and that's fine. But for others, they may prefer this because it is quick and simple and inexpensive.

And of course, if there's more extensive caries, like for example these kiddos that normally I would have treated them surgically with fillings, however, they weren't, at a stage of cooperation yet without having to use sedation, so we did STF instead. So, in those cases you will absolutely see more discoloration, so it's important for the parent in that case to understand what they're looking at, which are arrested carious lesions. And I always felt confident that I was getting it in there, getting it to the proximal surfaces, and that it was actually doing something. Again, the evidence is limited, but I was observing successes with my patients.

So, here's, I thought, was a cool visual of that. So, this particular patient has had kissing lesions in every quadrant of their mouth between MOs and there's some crowns, and what happens with these kids, right? Chronic biofilm disease. You bet we tell him every time they come to brush, floss, watch what you're snacking on, but again, it's easier said than done, right? So, the disease cycle carries on, and now the mesial aspect of all for first permanent molars now have carious lesions. These are non-cavitated. They're, I would say, E1, some E2. So, we did SDF because I don't want to have to do an MO on a... Gosh, how old was he at the time? Probably 10, 11. So, we did SDF, and it was really cool because as the primary molars exfoliated, you could see those incipient lesions, shiny hearts and arrested on the mesial aspect of the first permanent molar.

And then, as the other teeth erupted, it covers that, or masks that, stain, so I felt it was a nice service for him to help prolong the lifespan of his natural dentition by treating the caries and arresting it before it progressed to an actual hole or cavitation in the tooth. And this is, I thought, a really cool visual from my colleague, a pediatric dentist and France, Dr. Gabriel Domenici, showing the penetration of SDF in a non-cavitated surface, where there's not a hole, or cavitation, but there are porosities created by acid attack at the surface of the enamel and the SDF can get in there and arrest and remineralize. So, I thought that was a beautiful image.

And it's kind of neat. I thought this is any example, because this kiddo had what I normally once upon a time would have automatically done a DO comp on that. Heck, I know folks that would do a stainless steel crown for a little DO. That's what I was trained in residency. Everybody went to the OR, we did eight packs on everybody. So, I treated this patient with SDF instead, and you can see the SDF approximately there underneath the enamel on the marginal ridge there, and it almost looks like a filling. So, I thought that was kind of neat, but we followed that for... Well, it will be coming up on three years. If we were actually open on April 4th, I could've got you a new pitcher, a new bitewing. But again, not a cure all. Sometimes you win. Sometimes you lose.

Here's another kiddo with four quads of kissing lesions, they would have needed sedation to tolerate four quads of conventional restorative, ie numb drill fill, which I still do plenty of that, too, so I don't want anyone to misconstrue that. This is just another tool in your toolkit. I've dramatically reduced the amount of sedation than I do, but I absolutely still do conventional restorative dentistry. Not right now, just emergencies only, but at the beginning of March, I was. Anyhow, so four quads with SDF. This is an admitted non-flosser. They came back six months later, we hit it again, everything looks stable.

And then, there was a lag in the time they came back, so instead of coming back, six months later, it was more like nine months later. And sure enough, the upper left quad, those got larger. Okay? They got worse. Again, this is an admitted non-flosser. They're permanent molars have now erupted, so what does that do? It tightens everything up. Right? So, I then did conventional class two. I did Fuji II LC fillings here. Kid did great because they were already used to us working... She was already used to us working in her mouth and built trust with me and reduced her fear, so we did the fillings. But the other three quads look fine, and they've been stable since.

So, two out of eight, not too shabby, but just remember that it's not always going to work. The areas that are most likely to progress are proximal lesions because saliva doesn't flow through there and the toothbrush can't reach in there. I mean, how many people are actually flossing that aren't dentists and hygienists? I'm sure there's a statistic, but we tell them and they don't necessarily do it. So, they're not disrupting the biofilm, and it gets stagnant in there and produces acid and you get carious lesions. Here's another longer case followed for two and a half years. Hopefully, you can appreciate the DO on L, or the lower left first primary molar. But yeah, I didn't need a surgical intervention.

Some tips to avoid accidentally staining areas that you don't want to stain if you're doing SDF. Like I mentioned, place the floss into the contact, then apply the SDF to it and allow it to soak. But if you're trying to avoid staining, let's

say, a facial white spot lesion, you could cover that surface with a varnish to help prevent it from absorbing the SDF. So, this is an example of a patient where they've had prior proximal SDF treatment. And you notice how the facial aspect of that primary cuspid is not stained. Here they are from the front, so you really don't see the discoloration. Now, if this white spot lesion was already arrested, shiny and hard, it wouldn't stain with SDF anyway. The problem is it's really difficult, if not impossible, for us as clinicians to judge the activity of a lesion. Shiny hard means arrested, [inaudible] would be active, and an active carious lesion, and only active carious lesions, will stain with SDF.

But when in doubt, if they don't want to visibly see stains in the smile line, use another form of treatment, and/or if they're okay with that, you could cover that area with varnish. Another thing I do is let's say they're getting a full mouth of varnish treatment, and then the site specific treatment of carious lesions with their SDF, while the SDF is absorbing for that one minute, I will apply varnish to the other teeth first and then cover the SDF treatment site last. So, that way I'm not contaminating my varnish brush and then accidentally dragging SDF and staining other areas I had not intended to. Okay?

Now, let's say you have to cover the area, for whatever reason, or you forget and you cover... Let's say you get to chatting and the timer goes off and you cover that first so they don't taste it. Oops. Now, your brush is contaminated with SDF that instead of if saliva was red, if saliva were black. Okay? So, now that SDF is on your varnish, you can't see it yet, right? Because the silver hasn't precipitated out yet. Just you'll have to get a new brush, so just get a new brush and apply varnish elsewhere, uncontaminated varnish elsewhere. Okay?

And sometimes I'll do multiple contacts at once. We call this the rack of lamb. Shout out to Dr. E.L. [Cimchi] in New Jersey who I think he coined, or he was the first to show, a rack of lamb. So, I thought it was a funny visual. But look again, see the blue? So, it's soaking in the contact. Be really careful where those little pieces of floss are lying. You might even just have to hold them out straight like I am on the

left, my gloves are holding it, because on the rare occasion I've stained kids, it's typically a proximal application, so it got on the lip and the face. Because I do delegate this to my team, as well, so you want to make sure whoever's doing the application is trained in how to properly handle it and to be very careful.

So, in case of accidental stain, you could clean it off with hydrogen peroxide. That'll quickly and easily get it off of skin. Okay? Like the face. However, in thicker areas or drier areas like a lip, or let's say the palms of your hands, it's going to be more tenacious of a stain, so you could then use salt with a little bit of water added to it or what we call a salt slurry to help exfoliate that and then to bind the silver and minimize the stain. So, that's some of the tricks you can do. Or let's say you have someone call after the fact, maybe you didn't realize you got it on them, you could instruct them at home to use hydrogen peroxide. And then, just depending on how quickly their skin cells turnover, it could be there a couple days. It could be there a couple weeks, but it will eventually go away. So, we say it's like a henna tattoo.

Okay. Maybe now that I can't work, I could get a job at a carnival. Oh, wait, those are shut down, too, but I could do temporary tattoos. Okay. Sorry. I digress. Potassium iodide has become a common question recently with the launch of the Riva Star product in the US. That is a version of SDF created... Originally, the concept was from my friend, Dr. Graham Craig, and then his PhD student, Dr. Jeff Knight, so shout out to them. So, they developed Riva Star, but that was really intended for being a cavity cleanser and dentin desensitizer in permanent, posterior teeth followed by the immediate placement of a glass [inaudible] or base or restoration. So, very different from what the majority of us in the US are using SDF for.

So, the majority of folks in US, or the interest or boom and SDF in the US, was based upon treating cavitated or open lesions in, let's say, pre-cooperative patients like me as a pediatric specialist or special needs, medically compromised, and then on the other end of the age spectrum, our geriatric population. So,

it never really was about cosmetic dentistry. It was about meeting patients who could not otherwise tolerate conventional surgical restorations. Because, yeah, if you can just do a glass [inaudible] restoration, you could even just skip SDF altogether, right? And your restoration will stay white, glass ionomer is very good at desensitizing and arresting caries, it chemically seals at the margin, et cetera, et cetera, so I don't really see the point of taking an extra step or increasing the overhead cost by adding an extra treatment. But specific to open lesions, the potassium iodide can mitigate initial stain, but it's important to understand that it will still stain in time an open lesion.

And then there's one also research to show that it can decrease the efficacy of the SDF alone because it's shrinking the zone of inhibition. So, this is a study from my friend, Dr. Steven Duffin. Shout out to Dr. Duffin. Hi. Oh, that reminds me, he actually offered anyone who can DM through social media, the first person to message me, he will offer a copy of his smart oral health book, which is available on Amazon. So, yeah, send me a message if you would like a copy of that excellent book.

Okay. So, moving on. So, yeah, when this product initially launched in the US, it did create confusion the way that it was initially marketed, so you just have to understand. And I also want to say, I don't care what brand you use. That's not important to me. Okay, we have a winner. Lily. Let me take a screenshot. Shoot. Okay. It's not important to me what product you use. I just want you to understand what you're using. Okay? Because I don't want you to accidentally get stained and have an upset parent or an upset patient. The pH is different, so you're supposed to use this product with a gingival barrier or rubber dam. So, I don't want accidental soft tissue irritation and then an upset patient or parent, et cetera. So, that's the point of me even bringing this up, that it does not matter to me what brand you use, just understand what you're using. Okay?

Dr. Craig has an awesome lecture that you can watch on YouTube. His channel is Dental Outlook, which is where he explains it in more detail. And this is an example of a child treated with the product on open lesions, and you can

see it's still stained. And then, I mentioned the pH, but just being careful you're not getting it on the soft tissue so you could create like a bleach burn or a soft tissue burn. Okay? And then, there's the independent studies to that end, regarding standing over time. Okay? So, enough about that.

Now, another way that you can use SDF proximally, I've shown you already, incipient lesions, right? On pediatric patients or, let's say, noncompliant with hygiene and diet patients, right? To help prevent placing a restoration. Another way you can use it, proximally would be to treat existing restorations to help extend the life of that restoration. So, here's a common thing you might see, and this particular patient was medically frail. So, shout out to our hygienists that are going out in the field in the nursing homes. I know right now you can't, but this is a great service that we can offer because, in many cases, these patients cannot tolerate conventional restorative. Yeah, it would be great to cut that crown off and replace it, but a lot of times these folks can't even get to the dental office or they're not medically stable enough to have treatment done, whether they're on poly-pharmacy or they're immune compromised or they're on blood thinners, whatever it is.

So, instead of doing nothing, we could do this interim treatment, if you want to call it that. I don't really love that term, but a noninvasive treatment to help arrest caries at the margins, existing restorations, help target treat sensitivity. So, this is actually my office manager's mom who's extreme high risk for... Well, she's already had two strokes, but just extremely high risk. And we did SDF, and she had dramatic improvement in the sensitivity that she was having. So, that is just... I feel good to have done that service for her. So, please keep that in mind. It's another option.

Now, as far as follow up, specific to proximal lesions, if they're between the teeth, you can't really feel them, right? You can't really see them. Maybe you'll see a little bit of gray. Okay? Obviously, you don't want to see the cavity clinically opening up and getting bigger. That would be a failure, right? Now, radiographically is really where you're going

to do your assessment of a proximal lesion. SDF is radiolucent, so what you're watching for is stability of the lesion size. If you're talking about a lesion into dentin, you want to make sure it's not growing larger or getting closer to the pulp. You may in time see secondary dentin formation, like odontoblast laying down a layer of protective dentin. That's insulating the pulp, walling it off from the offenders, right?

Now, I will anecdotally share, I guess it's not totally anecdotally because I just showed you x-rays, but on radiographs, especially on a lesion confined to enamel, so a E1, E2, over long periods of time, I have seen remineralization and the little gray triangle you would see on a bitewing that a non-cavitated decalcification spot where they remineralized and the radiolucency goes away. Now, if you're treating them for sensitivity, obviously you want them to still be asymptomatic and have decreased sensitivity. And just anecdotally for sensitivity, I have found reapplication to be less frequent. So, in my own mouth, I've used SDF for sensitivity, and it's lasted me over two years. I've had patients where we've used it for hypersensitivity.

... he had an MIH and one treatment has lasted over a year and then symptoms came back, so we just applied it again. So, that sensitivity is reapplied differently than when you're treating caries. Caries, of course, you want that minimum of a biannual application. So, more on frequency. A mild caries, like an incipient lesion, you just want that Q six months, the biannual application. So a non-cavitated caries lesion. This awesome flowchart is from Dr. Jeremy Horst. I thought this was really useful because this is where people really get confused. So, remember a minimum of an unrestored caries lesion you want to do biannual application. So, I'm trying to apply it at the exam whenever possible, especially when I'm treating my Medicaid patients, sometimes it's hard for them. I have patients where they have to take two buses to come to see me, or they face a lot of barriers to access care. So, if we could do it right then and there at the exam, let's do it.

Why force them to come back for something that's relatively quick and simple? So we try

to do it right then and there. And if it's an incipient non-caries lesion, I just see them at their six month recall. Reassess. Remember, radiographically I want it to not look any larger. If it still looks good, we'll reapply the SDF and we'll see them in another six months. Now, let's say, I'm treating a kid with a cavitated caries lesion that normally I would have been filling, but let's say they need sedation and let's say, mom's says, "No, thank you. I don't want to sedate my baby," and we do SDF, someone like that, my personal approach is to do what you could think of as a loading dose where I get them back in a couple of weeks and apply it again and, or restore it if they'll allow me and then I see them at six months.

Now, let's say you have grandma in the nursing home on 12 meds and shot salivary glands and her mouth is totally dry. Maybe you want to see them in three month, so just use your best clinical judgment. Okay. Well that actually ends the STF part. Let me check in. Where are we at? Oh, wow. Time is flying. Maybe I should wait on the questions until the end. Someone said, yay chocolate. And I don't know if Sharon, our moderator, if you're still on, if you noticed any of the questions specific clinically to STF?

Speaker 3:

I do, yes. Some of the hygienists were wondering if they can apply SDF and if it stains teeth.

Jeanette MacLean:

Oh, thank you. Okay. So I think I ended up covering regards to this stain. It will only stain active caries lesions, okay? So it's really the best caries detector we have. So if there's no decay, if there's no active caries, it will not stain. So for example, when I use it on my own tooth for sensitivity and I've shown that in my full STF lecture, I show my own tooth, there's no stain. It stained the varnish and then when the varnish was polished off, there's no actual stain on my enamel or dentin. Oh, now in regards to who can do it. Now, I know in my own state in Arizona, I can delegate it to my assistants, I can delegate it to my hygienist. Now, nationally, what you want to do is look at your state Dental Practice Act, okay? And you can find that online and they have verbiage on who can do what and who and who can and cannot apply even

say, topical fluorides or varnish, so look to that, make sure you're compliant.

Now, there are certain states where hygienists can apply this independently. So let's say for example, Oregon or Colorado, I mean, there are some CE requirements, but for example, expanded practice hygienists, I forget all the terminology but the independent practice. So in some cases they can independently apply this without prior diagnosis from the dentist. However, in other states, it may need an existing diagnosis from the dentist. And in some circumstances that could even be teledentistry, where you're sending an image and a radiograph to the dentist and then applying. So hopefully that answers that. And at the end of my slides, I actually have the web pages where you look. ADHA has a really cool graphic that they put together, I don't have it in this particular presentation, but it almost looks like a wheel, like a circle and by state it shows what hygienists in those particular states are allowed to do and it really varies.

For example, our newest hygienist, who's been with us now two years ... Hi, Joy. I don't know if you're listening today, but hi, I love you, miss you. She came from out of state where they weren't even allowed to do local anesthetic, but here in Arizona, you bet I love my hygienists doing the local anesthetic, right? I would call it good cop, bad cop, which is great for pediatrics. So anyhow, go to your Dental Practice Act for your state, follow that just to make sure you're not getting yourself in trouble. Sorry, that was a long winded answer. So on that note, let's move on to ICON because I want to make sure we get through it and then I'm happy to take more questions at the end. So let's talk about resin infiltration. So this is another nonsurgical noninvasive caries treatment that you can do on proximal lesions. So before it's actually cavitated, you can essentially fill it with a resin, fill in the porosities created from acid working on the surface of the enamel without taking a burr and drilling it out and then gluing a filling in there.

So it's like a filling without the drilling is the concept for resin infiltration, okay? So it's another way to create a diffusion layer, a block,

the attack of acid at the surface of the tooth and to block loss of minerals from the tooth. And this concept was first described over 40 years ago, however, the only commercially available product we have is the ICON system from DMG and that has been available since 2009, so that's how long we've had it. 11 years. Now, the earlier focus of the research and literature was on the use of ICON resin, infiltration to treat interproximal lesions, okay? Proximal, caries lesions, so that's what we're talking about today, specifically. And I like the wording of the point, the purpose of this as a treatment option. So noninvasive, preventive measures involving fluoridation, dietary control and oral hygiene instruction, as well as invasive restorative methods are the standard of care, or standard treatment options for proximal caries. Intermediate treatment options, similar to pit-and-fissure sealing on occlusal surfaces that have been shown to be effective in preventing and inhibiting caries, have not yet been established on interproximal surfaces.

Remember this was written in 2009. Recently the application of resins on interproximal caries lesions has been studied and improved, leading to the development of new materials, which can infiltrate and seal the caries lesion proximally, improving the inhibition of caries progression. So clinical data shows this new technique compliments existing treatment options for interproximal caries, right? It's bridging the gap between the OHI and the prevention and then the surgical intervention, the drill and fill, by delaying the time point for a restoration and consequently closing the gap between noninvasive and invasive treatment options. Cool. So here's the ICON system and I first heard or started using this, I should say, in 2013 and my great mentor Dr. Richard Chaet who has a wonderful practice in Scottsdale, he's now retired, but he used this extensively and his practice goes on and they use ICON resin infiltration frequently and for the original purpose, the proximal lesions.

And I thought this was interesting. He had a retrospective that showed 98% success for proximal lesions confined to enamel, so your E1, E2, less so for proximal lesions past the DEJ, because technically you can use resin

infiltration up to a D1 but it has to be non-cavitated. And you can't always tell from a bite wing whether or not that surface is cavitated, right? So he prefers confined to enamel, but technically you can go up to a D1, okay? So the outer third of the dentin. Now this is bringing up the point that I was trying to make, interproximal surfaces if you're treating them, you have to remove large areas of sound enamel to do a filling. So you're drilling away a lot just to access that proximal caries lesion, so that's where doing something less invasive has so much advantage. And there is evidence for resin infiltration, we have a Cochran review. There's been many papers published, for example, in the ADA Journal. But most importantly, paramount is this evidence based clinical practice guidelines.

So I mentioned this at the start and I'll mention it again now, but specific to non-cavitated, coronal, proximal lesions, they do see evidence for the use of resin infiltration, okay? So there is evidence for that. Now more recently I've seen a shift in interest in publication to using ICON in the aesthetic zone, right? That's where a lot of people are interested in it just more recently and that was an after thought of, oh, wait, if we can use it between teeth, how about on smooth surfaces in the smile zone? So this fabulous paper, this is 2013 ADA Journal. So if you're going to read any paper on resin infiltration, especially if you're interested in it in an aesthetic zone, this is the paramount, the pinnacle of the paper, so highly recommend that. Obviously that's not the topic today, but just to show you, for example, like here's a doozy of a case of someone with poor hygiene during a phase one ortho, with severe decalcification and we treated it with resin infiltration.

So I can't remember now how old she was. I think she was about eight, eight years old. Do you want to do a bunch of resins on an eight year old? Do you think that's going to last? Heck no. Do you want to do veneers on an eight year old? Absolutely not. So again, bridge the gap. This is a wonderful service to save her natural dentition and you can use it for congenital enamel defects. So I have other resources online if you're curious but now

back to proximal lesions, so infiltrates with a penetration coefficient, like how well it can absorb into the pores of the tooth greater than 200 centimeters per second can inhibit or arrest lesion progression. So that's a key concept, penetration coefficient. So the ICON resin infiltrant is a different kind of resin than say our conventional resin sealant, which has less penetration coefficient, it's only 31 centimeters per second, versus the TEGDMA or triethylene glycol dimethacrylate or ICON resin, it penetrates much, much better.

So remember, you need more than 200, well it's 273. So that's why you can't just put Pynthor sealant and think it's going to soak up, it's not going to be as efficient. So you can do some, I call it poor man's ICON, but edge bleach seal you could do on a smooth surface but it's not going to work for this process because you need more than 200 of your penetration coefficient and that is the metric. Someone was confused by that and it is confusing because usually with teeth we're talking millimeter, right? And so, in fact, I went back to this particular article just to be sure, but that's the metric they're using. Okay. Someone just touched the whiteboard and it wasn't me.

We are past an hour and a half. So thank you so much. If there's anything you want to wrap up and then we can do a Q and A.

Speaker 3:
Can we go longer?

Jeanette MacLean:
Let me give some instructions for a verification code and for those that stay on we can stay on for another little bit and ask questions if that will work for you. Okay. So a couple of things, the verification code for this course is lowercase, jmac9. Remember you have 7 days to verify this course. You can verify by logging into your [inaudible] account and on your dashboard, click the green verify button next to the course and enter that code. Make sure you are entering the correct code. We will not be giving this code out afterwards. So please don't email to ask us, so take notice of it now, jmac9 nine, all lowercase. And that's the number nine at the end, jmac9. And please allow us 7 days

to confirm your attendance to this webinar. We base this on our analytics and how long you were in the room, so thank you. Dr. MacLean, would you like me to ask you some of the questions that were asked during the ...

Let me power through and then let's do questions.

Speaker 3:
Okay, perfect. I will turn my mic off.

Jeanette MacLean:
Okay. All right. So I'm going to skip through and just get to the meat of this. So you're getting the resonance of the porosities of the tooth on a non-cavitated but caries surface, so the infiltrate fills without drilling the pores in the tooth, okay? This is the system, it's available in a smooth surface and approximal kit. If you're doing proximal lesions, again, you can go up to a D1 but you need the proximal kit. This is all on the DMG website you can look at it as well, but for example, proximally, if it's up to a D1, if it's cavitated, you cannot use this product, okay? All right. Let me skip past this. You do need a rubber dam and it has to be compatible with the ICON system, otherwise it'll melt. So for example, you can't use these latex free Flexi-Dams that are made with thermoplastic elastomers or it would literally melt.

That would be bad, so that's only when it's latex free. So there is a list of compatible rubber dams that you can get from DMG, here's some of them. So yeah, make sure you're using a rubber dam because this is hydrochloric acid. You don't want to irritate the [inaudible] and will heal. We have before and after pictures to share, there's free materials that you can get for patient education. The code for resin infiltration is 2990. The CDT code. It's usually not covered by insurance, but you can, if you're allowed to, bill for uncovered services, a lot of people are happy to pay out of pocket for this. It's done in one appointment, depending on your state Practice Law, you can even delegate this. I know in Arizona, you can delegate it to a dental assistant to do the proximal treatment.

I would not delegate anterior or [inaudible 00:17:18], no. So here's the system. Here's an example. Look, buckle decal. I don't want to

stain that with SDF. It shows when she smiles, she doesn't want it to stain. Those are her permanent teeth. So a perfect example of a good case selection. You put a separator to create room between the teeth. You could use a topical for the clamp for your rubber dam, remove the separator, clean the area, so there's no plaque or food debris, okay? Rubber dam isolation. If you need to move the teeth further apart, there's this wedge system. Place the applicator into the contact and etch the area for two minutes, remove it and then rinse the area for 30 seconds and then you're going to dry it with oil free air and apply the ICON dry for 30 seconds, which is an ethanol.

Okay? Turn your light off because you don't want it to set up the resin. Place the resin infiltrant applicator into the contact, the green side facing the surface that you want to infiltrate and allow it to absorb for three minutes. Then remove it, disperse excess with air, floss the contacts, you're not gluing the teeth together, like here for 40 seconds. 40 seconds. Put a new tip on. Infiltrate again, this time just one minute, so this will accommodate for polymerization shrinkage, disperse with air, floss like here 40 seconds, you're done. Remove the wedge, rinse it thoroughly, it tastes terrible. Remove the rubber dam. Voila! Piece of cake, right? I have a video online you can watch if you want to see how that's done.

Okay. Post op instructions you can download from my website, see how quick we're going. Here's some cases. So I've had success and I've had failures. So just like with SDF, even with resin infiltration, you can have failure, so really keep it to enamel only if you can. My failures have been when it was already in dentin, so just be aware. Minimal interventions definitely are a practice builder by word of mouth, parents talk to parents, patients talk to patients, but you could also put it in your newsletter, your website, your blog, your social media, people are looking for providers of SDF and resin infiltration. Trust me, they're calling and emailing my office on a weekly, if not daily basis. If you are a provider for resin infiltration, be sure to get on the provider directory that they have available because patients can find you. Here are those sources, go to your dental assisting board, your dental hygiene board.

Look at what services you're allowed to do because in many places you can do resin infiltration and SDF. We have marketing postcards to mention that we do these services. I have an ICON page on my website, you can go there and these things are there, you can download these articles for patient education. More information. Here's my Instagram at Dr. MacLean at Affiliated Children's. My website, kidsteethandbraces.

com. The YouTube is Affiliated Children's Dental Specialists, tons of videos there. I have the full version of the cosmetic use of noninvasive treatments on demand on dentaltown if that interests you. Tons of free webinars going on right now, of course, this series from CE Zoom, so be sure to sign up for that. Elevate has a bunch. Whew, we did it. Okay. And keep smiling. We're going to make it guys. All right so, questions?