

## A Nonsurgical Caries Treatment Option: Silver Diamine Fluoride (SDF)

### Video Transcript

Hi and welcome to this continuing dental education course, a non-surgical caries treatment option, silver diamine fluoride. My name is Dr. Jeanette McLean. I am a board-certified pediatric dentist in private practice in Arizona. I am a 2003 graduate of the University of Southern California School of Dentistry, and then I did my pediatric residency training in Las Vegas at a children's hospital. Just as disclosures, I have received various speaking honorariums from different dental companies, including our gracious sponsors of today's course, which is P&G Crest + Oral-B. So thanks to them for making this class possible.

I have become known as an advocate and a big supporter of minimally invasive dentistry, which has become a passion of mine and happy to discuss this topic with you today. And some people do ask, you know, well, how did you get started on this? Are introducing minimally invasive treatment options? So I will share with you that there were a few key life events that changed the way that I currently practice. You know, I practice very differently than 20 years ago. So one part was becoming a mom. Of course, that'll change anybody. But my daughter had surgery as an infant, and that dramatically impacted the way that I empathize with the parents of patients in my practice, especially when I was recommending sedation potentially for their children's dental treatment. I also experienced a medical emergency with a special needs patient in my practice that was undergoing IV sedation. He recovered. He's fine. But it was definitely a wakeup call and a scary moment to make me think, you know, like, what am I doing here? And just my general clinical observations that what I had been trained in my

formal dental training or what I now refer to as this Medicaid mentality of like overly aggressive treatment planning, like every class II was a stainless steel crown. Practically, everyone went to the operating room. I realized that that didn't equate to better or improved oral health. So it made me question, what could I do differently and what could I do better for my patients and for their families?

And if you look at caries on a national and global level, it's still bad. It's a big cause for children to be under general anesthesia or hospitalized for dental issues. And this was a 2017 article on the use of sedation for dental work in The New York Times. And they had interviewed me for that. And I did point out what I think is important to recognize is that really anyone can work to work on a patient that's knocked out. Right, behavior management seems to be a dying art form in pediatric dentistry. That's really how I feel, like that true artistry and the skill of the pediatric dentist is being able to work with the child and also general practitioner, dental assistants and dental hygienists, you know, our ability to work with children, have them build and foster a positive outlook on coming to the dental office. That that's the goal. And that's part of the joy, too, because we might have kids who start out fearful and then we can work with them to make them actually excited to come and see us, which is fun. But the bigger point I was trying to make is that parents should be told the risks, benefits and alternatives to sedation. Obviously, there's always going to be a need, especially in pediatric dentistry for children to be sedated. I still sedate patients myself. Some children are just beyond the help of minimal interventions, such as silver diamine fluoride, or have just extensive dental treatment and

pre-cooperative behavior. And obviously, they need sedation so they can be in better health. So I don't I don't question that for one second. But when it's clinically appropriate and there are alternatives like silver diamine fluoride, Hall technique, glass ionomer or atraumatic restorative treatment, et cetera. Those options certainly help us to delay, if not altogether, avoid sedation. So if and when we can use them, we should.

All right, so let's examine what is the evidence for the effectiveness of current therapies to prevent and treat early childhood caries. This is an article from the American Academy of Pediatric Dentistry's journal back in 2015, and it's had some humbling findings. So they stated that there's lack of substantial evidence to suggest that restorative treatment leads to acceptable long term clinical outcomes. Yikes. And there's certainly a need to go beyond the drill and fill dentistry and integrate other concepts of disease management to ensure long term success. And those things are definitely coming out. Things even since 2015, so much has changed about the way I practice. I think that was the first year I even heard of Hall technique, for example. So we can't drill our way out of a multifactor and behavior driven disease process. So traditional restorative dentistry like fillings, crowns, it doesn't address the bacteria or the behavior contributing to the disease. It's just treating the symptoms of the disease. Right. Like fixing the hole, so to speak. And the concerning issue regarding children is even when you even when treated under what's considered gold standard surgical dentistry in the operating room, those kids, if you look at the literature on relapse rates for caries, they could be anywhere from 20 to 80 percent, which that's bad. And I absolutely observe that. Like you could fix all their cavities and then, you know, 6, 12 months later, they come back if they're still eating the same junk and not brushing, not flossing. The parent isn't helping. They come back and there's all these other lesions. So that's scary. So restoring teeth without addressing the underlying problem is akin to replacing the windows on a burning building. Sometimes you got to replace the windows with if the house is burning down. What's the point? So I think a better way to frame this

is think of ourselves like the physicians of the mouth, like we're not just carpenters. Certainly, I can do beautiful restorative dentistry. But the bigger picture is improving oral health and improving outcomes. So I try to be a firefighter first. Who remembers good old Smokey the Bear? Right, "Only you can prevent forest fires". That's right. Only the patient can prevent their forest fire by what they're eating and drinking and how they're cleaning their teeth. Right. So as a dental provider, I want to be a firefighter first, controlling the biofilm, trying to arrest and remineralize lesions. And then I can be a carpenter second and restore teeth as time money. And in the case of children or phobic patients as behavior allows. That's a great quote from my friend, Dr. John Fratella. It is now known that surgical intervention of dental care is alone does not stop the disease process. Additionally, many lesions do not progress and tooth restorations have a finite longevity. Therefore, modern management of dental caries should be more conservative. This coming from the AAPD guideline on caries risk assessment and management for infants, children and adolescents. So our own guidelines are calling for this. Is anyone listening? I hope they are.

And I can't stress enough how important continuing education is because our understanding of caries is evolving. It's really a biofilm disease. Right. So if there's a disturbance in the normal microbiome or a dysbiosis and imbalance in a patient is losing minerals faster than they're gaining them. That that's the caries process. So just because you drill and fill something isn't necessarily stopping that process. So we've got to look at that bigger picture. And again, with regard to children, when you when you look at FDA warnings on the use of deep sedation and general anesthesia under the age of three, we need to not take it so lightly when we recommend GA. Yes, there will be kids that need it. But the less we utilize it whenever possible, that that's going to be beneficial because no one wants to see kids having these adverse outcomes. It's heartbreaking, especially in the situations where perhaps there's asymptomatic caries. We want to try to delay or avoid deep sedation and general anesthesia as much as we can. We're not going to eliminate it completely. That's for sure. And children deserve to have safe and access to to general anesthesia.

But I hope that we can reduce it whenever possible. So learning and innovation go hand in hand.

The arrogance of success is to think that what you did yesterday will be sufficient for tomorrow. So let's reflect and introspect and what could we do differently and what could we do better for our patients? And that, again, is how I started my journey into finding less invasive treatment options like silver diamine fluoride. And I had first heard about it online and my initial reaction is like I was highly skeptical, like there's just like some weird hippie voodoo. You know, I was leery, but I was really shocked when I saw just how much high quality clinical evidence was out there. I was thought, you know, how did I not know about this? It's kind of frustrating, actually, like you would think, especially as a pediatric dentist, I wish I hadn't known this a long time ago, because I can just imagine how many kids I could have helped, you know, more kids. So, again, continuing education, you never you never stop learning.

So if you if you look at SDF, you know, its precursor, silver nitrate, was actually around since the 1800s. But in terms of SDF in the United States, the FDA cleared it as a device for dental hypersensitivity in 2014. And then it was first commercially available in 2015 as Advantage Arrest from Elevate Oral Care, which is the SDF product that I use. And then they went on to receive the breakthrough therapy designation, which led to the clinical trials that can help it be approved as a drug for caries, whereas now it's cleared as a device, but absolutely safe and effective and can be used in young children for treating caries. OK, but, yeah, new opinions are always suspected and usually opposed without any other reason, but because they're not already common. I definitely felt that, you know, eight years ago, as I was pretty vocal online about utilizing SDF and people really would question and criticize it, but just weren't aware that it was around. So as I mentioned that the precursor to silver diamine fluoride was silver nitrate. So it's kind of like this forgotten remedy. If you look historically back at caries. So in 1890, W.D. Miller proved that cavities were a result of bacteria infection. And then 1891, Stevens hypothesized that silver

was capable of inhibiting caries as a result of bacterial killings. So it's antimicrobial. And then in 1908, of course, G.B. Black discovered off or around that time, excuse me. So in 1909, he discovered fluoride because of the Colorado brown stain. But previous to that in 2000 or oh, my goodness, I'm getting tongue tied today. In 1908, he described using silver nitrate to treat cavities in children, calling it a first measure against the disease. That's a great way to think of it. And it's a great way to be a firefighter first, like a first measure. Absolutely. Especially if the kid is pre-cooperative. But a drawback of silver nitrate is it lacked the fluoride. It lacked the remineralization component. You will find some people like, well, you know, especially if they're anti fluoride that just want silver nitrate. Well, the reason it fell out of favor is because it wasn't particularly effective. By combining the silver nitrate with fluoride, it was more effective because it was antimicrobial and could actually remineralize the tooth structures. So this brilliant woman and scientist in Japan is the one who had the brilliant idea to combine them versus like one or the other. Like let's work in unison. So she developed silver diamine fluoride in the 1960s. And then it was first approved in 1970 and sold in Japan as Saforide. I have friends and colleagues that used to smuggle it in from Japan, which is just funny. Smuggling a cavity treatment. But so, yeah, it's been used for literally for decades and it's that combination or combination therapy of the antimicrobial power of silver with the remineralization of fluoride.

So chemically, let's look at what this is comprised of. So SDF is 25% silver, which is the antimicrobial component, 8% ammonia, which is what keeps it in solution and then 5% fluoride for remineralization, of course. And it's that synergy again of the silver and fluoride that are better in combination than individually. And the main actions are to arrest dental caries, prevent dental caries. And it's very effective at decreasing dental hypersensitivity. And the main mechanisms of action would be that it occludes dentinal tubules and forms this more favorable fluorohydroxyapatite, which is more acid resistant. And some of the cool things that that happen. This is a neat image courtesy of my friend, Dr. Jeremy Horst Keeper, where you can see what he calls the silver nanowires that penetrate down into the dental tubules and help

to strengthen and harden the tooth structure, which is really cool. Then it can help inhibit biofilm adhesion on those two surfaces where you've treated, which can help even improve gingival health and reduce recurrent caries. So pretty, pretty cool.

So now some of the big differences between now and when I had first recorded this or recorded a lecture on SDF back in, gosh, 2017. You know, this is like an updated version, but now we have evidence based clinical practice guidelines from both the American Academy of Pediatric Dentistry and the American Dental Association. So, no, this is not hippie voodoo. It is, in fact, evidence based and it's safe and effective. And they both support the utilization of silver diamine fluoride for treating caries and for desensitization. So why not everyone offer and utilize it? Right. And now as a pediatric dentist, I think it's important to point out that today's parents are very different than ten, twenty, thirty, forty years ago. A lot of parents go online to get their information and seek advice there, whether we like it or not, you know, because, of course, online, you can get good information and you can get garbage information. But they are finding out about the fact that there are different options, including silver diamine fluoride. And there was a lot of media coverage, especially when it first was available in the U.S., like the New York Times article, the various news pieces on it. So the word is definitely out. So when and if it's a clinically viable option, we should definitely offer it to patients and or their parents. But, you know, it's literally just another treatment option. We're not excluding anything that can help us. We're adding into our toolbox. So you don't need to take anything out of your toolbox. I still do a little bit of everything. Sealants, fillings, crowns, extractions, you name it. And I absolutely still do sedation. But it certainly has helped me to help kids and families to either delay, like, especially if I'm seeing one and two year olds, like, I really don't want to sedate them that little. But I also don't want to wait. And then I'm doing extractions because nothing's been done. And now the teeth have abscess. Right. I want to do something to stabilize the teeth. But I've been able to help a lot of families either delay the sedation or in some cases avoid it altogether. So I'm very

grateful to have this new tool, silver diamine fluoride.

And around the world, as I mentioned, there's Saforide in Japan. So there's different brands out there in the US. We have the Advantage Arrest product. Now it's in a black bottle. That one's from Elevate Oral Care. We also have the Riva Star product from SDI, which is an Australian company. I'll talk a little bit more about that in a little bit. The key is you want to look for at least a 30-38% SDF to have the best efficacy. The DIY version would be good old silver nitrate if you can find it. But you have to add fluoride varnish over it to have a similar efficacy. And I just want to caution people to beware or be leery of misleading marketing and/or online brands that aren't subject to strict FDA regulations on purity and concentration. Because there's been incidences with where products that were claiming to have X percent SDF then tested like it was in fact much lower than stated. So obviously it's not going to be as effective. Or there's marketing claims like, oh, this is not going to stain. Yes, it will. So just, you know, be leery. So I don't care what brand you use, use whatever you like. But it's more about giving patients non-invasive options.

All right. OK, so now we're going to move on to the clinical use of SDF. Case selection, of course, being the first important step. And really, the only true contraindication for the use of SDF would be a tooth with irreversible pulpitis. Like if it's already abscessed or if it has caries all the way into the pulp, the way I phrase it is, "we're too late to the party". Maybe they want SDF. Sorry. Maybe six months ago, maybe a year ago. So not everyone is a good candidate for SDF. And then also on the patient level, you know, it does require reapplication and reassessment and it doesn't arrest everything. So some teeth, especially if cavitated and non-cleansable benefit from restoration. So if you have patients that aren't able or willing to brush or unlikely to or patients or parents unable or unwilling to take responsibility, especially with that follow up, they're not really a great case selection. Right. It's not going to have a great outcome if they're not following up. Right. Although I think it's fair to say even conventional surgical restorative dentistry, if you have someone that's not willing to brush or do the maintenance,

that can have negative outcomes too. So again, the problem there is the patient not taking responsibility.

Depth of the carious lesion, this is a big point of misconception I've noticed for folks. So the use of SDF in deep lesions is not a contraindication. I use it on deep lesions probably every day in the office. Irreversible pulpitis is the contraindication. So arrest, remineralize and desensitize before you drill is what I suggest, because often you can recycle, like remineralize and harden tooth structure. So then you can make a more conservative preparation, let's say, if you're going on to do a restoration later and that more conservative tooth preparation is favorable to the pulp, because then it can stay vital, it can lay down reparative dentin to further insulate and protect itself. And of course, you know, this also very different than how I was trained back in the late 1900's when I entered dental school. But complete caries removal is not necessary for caries management. Here's one such example of a patient with very deep caries that I treated with SDF. You know, ideally, if you could see about a millimeter of radiographically sound dentin between the carious lesions and the pulp, that would be ideal. But just remember, sometimes the angle of the x-ray or the location of the lesion might mislead you to think the lesion is in the pulp when in fact it's not. So taking a good patient history is important as well. You know, are they having unprovoked pain or lingering pain, things like that. So it's not just the x-ray, but the patient history that you have to consider. So these are deep lesions, but the patient was asymptomatic and they were only 20 months old at this time. And, you know, under the age of three, I really don't want them to have to get GA if possible. I don't sedate kids until they're at least two in my practice. So I initially treated these with silver diamine fluoride, which helps stabilize them. And then they didn't need to have general anesthesia. I was able to do conservative direct restorations just with minimal oral conscious sedation. I used Versed for this kiddo and it helped to save their teeth. Their older sibling ended up having to have teeth extracted because they went on to abscess. So the parent was super grateful to have this safe, effective alternative to buy time on their, you know, to take you from infant

to toddler to restore the teeth. And there's a growing body of evidence to support the safety and efficacy, even in deep lesions when you're utilizing SDF, like this paper from the California Dental Association's journal, where they looked at almost 300 adult teeth, permanent teeth, that have been treated with silver diamine fluoride. And it dramatically helped to reduce the number of teeth that would go on to need root canal therapy. So, yes, you can use it in deep carious lesions.

Now, it's not a magical cure-all and it will work better in certain lesions than others. So just to help in terms of your case selection and predicting and then having our setting, I should say, realistic expectations for the patient or parent. I think it's really good to look at this chart and information from Dr. Graham Craig, who's a dentist from Australia. To me, he's the founding father of S.M.A.R.T. Technique, who he was doing that before we even called it Smart Technique or silver modified atraumatic restorative treatment. So he was managing very fearful children with by treating their caries with silver fluoride, followed by glass ionomer restorations placed in the atraumatic restorative treatment approach. But he described how predictability of the success of the silver fluoride treatment is dependent on how open the lesion is to remineralization from saliva, as well as cleansability, like from the toothbrush. So on smooth surfaces, especially the buccal or primary incisors, it's going to be more effective. Medium effectiveness would be like in grooves, occlusal surfaces, but certainly you could add glass ionomer and seal over the top later, right? And then you'll be good to go. Now in proximal surfaces, so obviously that's not open and not easy to keep clean. So those are the areas that are less likely to arrest with silver diamine fluoride treatment alone. Not impossible. I'll show you examples of that. But it's important to express that, to say we could treat this area, but it's the least likely to arrest, especially if oral hygiene and diet don't improve and or if there's not follow up application.

All right, so you've done your case selection. And now, of course, you have to obtain informed consent, which would be reviewing the risks, benefits and alternatives to treatment. I do have a special consent form specific to silver



diamine fluoride treatment. I think it's important just because it's newer to us here in the US, so not as many people are as familiar. And of course, it has the signature discoloration, the dark black discoloration of only of the caries or decalcification. It won't stain healthy tooth structure. But it's just important, I think, to show the before and after and obtain consent. And this also points out the fact that reapplying it at least twice a year is going to be necessary to help maintain arrest. And this is available on my website if it interests you to look at this. I also have on the website, which is [kidsteethandbraces.com](http://kidsteethandbraces.com), there's a whole page dedicated to SDF. So you're welcome to go there. And there's various links to videos and downloads of articles and information and things there for folks to utilize. I have a chairside guide on there that I put together for patient education. Showing before and after images of SDF treated teeth, reviewing the pros and cons. So not just on occlusal or facial services, but for proximal lesions as well. And I also put on their teeth that were restored atraumatically with glass ionomer or what I mentioned earlier is called S.M.A.R.T treatment. But utilizing this, I think, helps show people, hey, you know, this is an option. This is what you can expect it to look like. We're going to have to reapply it. It's not going to stop everything. So you really need to work on diet and hygiene. Make sure you're coming back and having it reapplied and if needed and when possible, we can place restorations like a smart restoration to help improve aesthetics and improve cleanse ability for the long term.

All right. So surprisingly, patient acceptance is quite high. I think a lot of people just assume that folks will reject it because of the poor aesthetics. And that's not really true, especially when you present it in a well-informed way and show and explain the pros and cons. There are many people who choose SDF. I mean, I've put SDF on myself. I've had SDF on one of my daughter's teeth, which has since exfoliated, but still, you know, it's more about just, you know, if it's a clinically viable option, present the option and then that's providing informed consent that the patient can choose whether or not it's what they want. Like, here Frosty is totally stoked about his home teeth blackening kit. But anyhow, if you look at the literature on

acceptance, it's higher than perhaps you might have presumed. So in particular, with regard to children, even in the anterior, parents are more likely to choose SDF, especially when it helps to avoid the use of sedation. So just offer it and let them choose. Not everyone will be okay with it. And that's fine. There's other options, atraumatic restorative treatment, iodine. And then there's some folks that are like, "I just want to do sedation and zirconia crowns." I call it like the menu. There's something for everyone. It's about offering all the options. That's true informed consent. So this was my quote from the New York Times article on SDF, I said that "People assume that parents will reject it because of poor aesthetics", but "if it means preventing a child from having to be sedated or having their tooth drilled and filled, there are many parents who choose SDF". And in this photo, you see I'm giving a sticker to my little patient here and fun fact, which the article mentioned, is his mom is a medical doctor. She's an anesthesiologist. So she truly appreciates the risks of deep sedation. And I mean, they certainly had the financial means to do the best care for their child. And she chose, she made an informed decision to choose silver diamine fluoride for her cute little boy. And ironically, they drive literally from the other side of town. And I live in Metropolitan Phoenix. I mean, there's practically a dentist on every corner, I feel like. She passed up many other offices and drove to see us because we offered silver diamine fluoride. And this was a dental outreach program, Team Smile. It's really fun. They team up with local sports teams, but like this one was Arizona Cardinals. But on the consent forms that this clinic was offering SDF treatment, it was actually the highest approved treatment from the parents. Right. So really interesting. You know, whereas the things they perceive to be painful, like extractions, had dramatically lower consent. Fun fact, right?

Okay, so continuing on with our clinical utilization, I like to keep things bundled in what we call our SDF kit. We have SDF in every operatory in our office. And then we have these multiple kits in the open bay. It's just for quick and easy application because typically we're doing it right at the initial exam or the re-care exam. And you can just keep all the little goodies in there for helping you to apply it to the teeth. You can make your own little kit. But here's just

the basic protocol. So first and foremost, hand it very carefully because it can absolutely stain. So make sure you always wear gloves. Then place it on the bare countertop. In fact, I recommend to keep it stored in the original box because it is light sensitive. So you don't want to expose to light. Don't dispense it until you're ready to use it. You don't want it just sitting out in ambient light, but handle it very carefully so you're not accidentally getting it places on your clinic or on the patient that you did not want to get it. I like to put Vaseline on the patient's lips just to help prevent stain, protective eyewear, patient bib, of course. Now the tooth just needs to be clean. If they've just had their prophylaxis, if it's their recall exam, great, you're good to go. If they're coming just for SDF, you could literally clean it with a microbrush or toothbrush and you're good to go. The tooth does not need any caries removal whatsoever. In fact, I would encourage you to use this more as a pre-treatment prior to restorative. Normally, if I'm putting a restoration, I'm not putting SDF the same day. Just be personally. My glass ionomer can help desensitize. It won't stain. Now if this is someone where it's incipient caries or we have behavior issues or sensitivity or whatever, I'm not altering the tooth in any way. I'm just removing plaque and applying it to the tooth because remember, you might recycle some of that affected dentin and remineralize it and further insulate and protect the pulp. Okay, so it is a liquid that you want to absorb by capillary action. So definitely take the time to isolate the teeth well, especially in the lower arch. So I like a dry aide, cotton roll. There's various things you can use for isolation. And then the tooth needs to be nice and dry. So usually, I'll just blow gently the compressed air. But some patients won't be able to tolerate this, whether their teeth are hypersensitive, like let's say they have molar incisor hypomineralization or hypersensitivity exposed roots. Maybe they're just real jumpy and phobic and don't like loud noises. You can also use cotton or gauze to dry the tooth. You don't want it sitting in a puddle of saliva because again, this is a liquid it needs to absorb by capillary action. So if there's a bunch of spit puddling there, it's not going to be as effective, right? You can just use logic there. But you'll also notice it'll make this kind of milky white

precipitate. And it also tastes awful. So if it gets into a pool of saliva, it of course, rolls back to their throat, and they're going to taste it and not have a great experience. So definitely take the time and care to carefully isolate and dry the teeth and you'll have a happier patient and you'll have a better outcome. Okay, and now you're going to apply it with a micro brush, at least for a minute, I set a little kitchen timer for a minute, you can do as long as three minutes. And you don't have to sit there and scrub the entire time, but definitely make sure that the treatment site is thoroughly saturated with a solution and allow it to absorb by capillary action. It's not varnish, you're not swabbing it everywhere, you want to apply it very mindfully to specific site lesions, you know, because it can stain, you don't want to accidentally stain a surface that you had not intended, maybe there's some subclinical gum line decalcification or restoration margin, so just handle it very carefully. You don't want to rinse it off. That's a point of confusion that some folks had stemming from a paper from UCLA, but logic applies there too, you know, if you apply a liquid that you want to absorb, you don't want to just go and rinse it right off, right? That'd be like putting sunscreen on and immediately jumping in the shower, so don't just rinse it off, just leave it alone. And then this confusion came from the AAPD protocol because they misunderstood the wording of the package insert. You just apply it and allow it to dry on its own, you don't blow air on it or you don't light cure it. If you light cure it, it'll precipitate the silver out of solution, so you'll notice immediately it'll turn jet black, but now the silver is no longer in solution, so it's not going to absorb into the tooth, which sort of defeats the purpose of why you're applying it. Keep it simple, right? Just, our joke is dry, apply, and say goodbye. So just allow it to absorb by capillary reaction for at least a minute. You could blot excess after a minute, and that's all you have to do. Now, this extra step is technically optional, but I do it, and there's now growing evidence to show it actually increases efficacy, but I like to cover the SDF treated site with fluoride varnish. As mentioned, often I'm doing this at their exam, so they're getting a full mouth varnish. So typically, what I'll do is as the SDF is absorbing, I'll apply varnish to the other teeth, which helps eat up some of that minute

that we're waiting, especially on a squirmy little kid, and then I'll cover the SDF treated site last. What you don't want to do is contaminate your varnish brush with SDF and then go and paint all the other teeth, because you might accidentally cause stain elsewhere. So don't do that. If for some reason you have to cover SDF treated teeth first, get a fresh drop of SDF, get a fresh varnish brush. I'll say that again, get a fresh drop of varnish and get a clean new varnish brush. Ah, there we go. So fluoride varnish helps increase the efficacy by about 4%. So there's brand new clinical trial evidence coming out of Egypt. I'll show you that paper in a second, but I've always been covering it with varnish. We have not 100% arrest, but with overall pretty good outcomes. But the reasons I liked it was it helps to mask the poor taste, so it improves the patient experience. It also keeps it where you placed it, so I'm not getting a bunch of unwanted stain on other surfaces. And there's, like I said, there's a growing body of evidence to demonstrate the benefits of fluoride varnish. So the first one coming from Graham Craig, so he would cover his silver fluoride treatments with a stoma adhesive wafer or orabase paste, because he figured that's like a barrier to saliva, which would help to prevent the SDF or in his case silver fluoride from being diluted by saliva. And then Steve Duffin, he was doing the DIY SDF before we had it here available. So the silver nitrate covered with fluoride varnish. My retrospective analysis with Ohio State used SDF and fluoride varnish. Here's that brand new paper out of Egypt showing that it had significantly greater caries arrest than SDF alone by adding that the varnish increasing arrest by about 4%. This is a paper out of Canada, they also found arrest rates as high as 96%. So in comparison to the highest arrest rates in the previous clinical trials, like the ones in the AAPD and ADA guidelines, the highest arrest rate there was with a bi-annual or every six years was with a bi-annual or every six months application. They got as high as 91%. Now this one was 96%. It's about 5%, so 4%-5%. Okay. And here's the updated package insert on the Advantage Arrest product from Elevate Oral Care. Originally it said air dry, which people got confused by. So now it just says allow to air dry. Like if you paint a wall, you allow it to dry

in ambient air. You don't blow a hair dryer on it. And do not rinse. Yeah, don't rinse it off. And notice, nowhere does it say to etch. It doesn't say to light cure. So just turn your ears off to the white noise. Call it. Keep it simple. That's part of the beauty of SDF is it's simple. Don't add a bunch of unnecessary steps that might be unpleasant, especially for kids. They don't want a curing light in their face. You don't want to have to etch a moving one-year-old. You know, keep it simple.

All right, so I do have a basic application video, which I'm going to go ahead and try to play here. And hopefully you can hear the audio on here, but I'm just going to do a play by play. So I'm applying Vaseline to her lips to help prevent any stain on her face. (video sound)"Yeah. You're the best. Let's see. There they are. Okay, I'm going to dry them off. Can you open big? It's almost like they're stained with whatever." And I'll state the obvious, not every one-year-old is going to be as cooperative as her. We get it. But I didn't want to put videos on YouTube of screaming, crying children, because this is simple and painless, you know, because often children or parents are watching those videos. So I want them to know this is in fact, simple and painless. Some kids will be dramatic, and some kids are just badly behaved. And what else is new in pediatric dentistry, right? So I'm going to dry her teeth with compressed air. If she was pre-cooperative, utilize your team to help you. So often this is four-handed dentistry where maybe I'm isolating and the assistant is applying the SDF or vice versa. Sometimes it's all hands on deck just to paint something for a minute, which is too funny. Like if only they knew what the alternative involves, you would think maybe they'd, everyone would be a little better for this easy painting. This is before the product was tinted blue, the Advantage Arrest product. So it's nice that you can see it. They also have a gel now too. This is the liquid. And those pretty large lesions. So I'm making sure I get the whole drop on all four of those teeth. So one drop was able to treat all four of these. (video sound)"But you'll be adorable regardless. Start the timer for one minute. I'm gonna do one minute. See how it's starting to turn color already? So once it gets exposed to light, it'll be really colorful. You're so sweet." And you'll



notice they're already starting to turn color a bit. Usually, the color change happens over a 24-hour period. (video sound) "She does like candy. Who doesn't, right? I like candy too." I don't put any Vaseline or anything on the gingiva. The pH of this product is only 10. It doesn't burn soft tissue. But if they have pre-existing gingivitis, it might burn, like create a burning sensation because they have gingivitis. And I don't put Vaseline because I don't want to accidentally block the enamel and then block the absorption of the SDF. So now while that's absorbing, I'm gonna make use of time and start putting varnish on her other teeth, like I had mentioned earlier. And then I'll cover the SDF treated teeth last. So I'll do the other ones and then I'm gonna do the front teeth last.

Okay, so nice and simple. Okay, I mentioned the pH. There are products that have a much higher pH. Like the ammonia-based Riva Star product has a very high pH and it's intended to be used with a rubber dam or a gingival barrier. And I do realize like in certain parts of the world, like in Europe, like that might be the only product currently commercially available to you. So just make sure that you know this so you're not accidentally burning soft tissue. And it will stain. Like you can see this is a hygienist who used it on their own child because they thought, "Oh, it's the non-staining SDF," and didn't realize it wasn't developed for the use, like we use SDF in the US. It was intended to be part of like a restorative process. But anyhow, obviously no gingival barrier rubber dam was utilized and there was a soft tissue burn and staining on the lips. So just like I said, use whatever you want, but just be aware of what can happen. My bigger issue is like I always knew about adding potassium iodide or KI, but I knew it would reduce efficacy, so I don't use it. So if that's the only product available to you, I would suggest to use, to only use the SDF component, not the KI component, because it will still stain and open lesion over time. And more importantly, it reduces the efficacy. Like in this study demonstrating that after 12 months, the teeth which had KI placed had about twice the odds of becoming pulpally involved, which really defeats the odds of what we're doing. So just be aware. Now, as I mentioned, it can stain. It can stain

skin, clinic surfaces, uniforms. So handle it very carefully. Our joke is like, "Handle it like it's plutonium." But like you wouldn't know if you came to my office that we even had SDF. And it's everywhere, but we haven't made a mess because we handle it carefully. So it's really important to train your team to handle it correctly and carefully. And sometimes you will get accidental stains. And the funny thing is it usually shows up like the next day or the following Monday. But there are various cleaning products that can help get it out. My personal favorite is Comet. And normally it'll wipe right off of our tile and countertops. Now on skin, hydrogen peroxide is great for getting it off. But there's other things like hair dye removing pads, but not everyone has those handy. Most people have hydrogen peroxide in their house or you could get it at a pharmacy. But it'll wipe right off of skin. Lips and fingertips that are thicker, drier, it's going to be more tenacious. You could use a slurry of salt and water to make like a scrub to lift the stain. It will just fade on its own after a few days or a week.

So no worries. But if you handle it carefully, you're not going to have accidental stain. Okay, now we're going to move on to the next section, which is the proximal utilization of silver diamine fluoride, meaning between molars in the back. So I do use it on proximal surfaces. Initially I was applying it with a puffy floss to get it proximal. And I have various videos on YouTube. I don't know if I mentioned, but I do have a YouTube channel where there's tons of SDF application videos as well as various other minimally invasive dental treatment videos. But like, for example, using the super floss, which is nice and puffy to apply it proximally. So yes, it will stain. Even if it's a non-cavitated, if it's carious, it will stain. Like you can see here, there were carious primary molars and SDF was applied proximally. So once those teeth exfoliated, you can see the arrested incipient lesions on the mesial aspect of their permanent teeth. But of course, the new healthy premolars erupt and then block that stain. So aesthetically, it's not a big deal, but it's important that people are aware of it and make an informed decision whether or not to use it. And often, especially

if it's way in the back, most folks are like, "Oh, that's fine." But some people might not want it. And now we have alternatives like there's Curodont, especially for someone who's older and cooperative, where they could sit longer for etching and a five-minute application, you could do, say, Curodont on non-cavitated aspects of permanent teeth. I mentioned earlier, I do have the handout for proximal application, the pros and cons and photos of what that will look like. And often, you don't see much if there's not a ton of decalcification. If there's more extensive caries, it's going to be darker. So they just need to be aware. Once in a blue moon, even though we show them these pictures and they sign a consent form, they'll get a call. "I think there's a cavity. It's dark." Like, "Yeah, there was a cavity. Remember we painted the stuff on?" Oh, people have amnesia. It's very amusing. So now, people have questioned, is the floss really necessary? I will admit, I use the floss less and less. Now I'm more just saturating the contact area and allowing it to absorb and get in there. It'd be nice to see a really well-designed clinical trial comparing with and without floss to closed proximal surfaces. This paper came out in 2021, but if you really dissect it, the design was poor. And what they neglected to mention is the teeth that didn't use floss had no adjacent tooth. And we already know, like, if it's an open lesion, it's going to be more likely to arrest. So that was very misleading.

I mentioned our retrospective analysis of teeth treated with floss on proximal lesions. And we had about 84 percent arrest after about a year. And then this is an older paper from Japan showing proximal treatment of caries with SDF using floss. And this one at least had a control side, like a contralateral side. And the SDF treated side did fare better. It was better off. And actually, it was G.V. Black who first described using silver nitrate to proximal lesions using silk floss. Ooh, fancy. None of us are original. He was doing this before all of us. But yeah, I'd love to see a really well-designed study on if it's necessary to use the floss. I'm seeing decent outcomes with just applying and saturating the contact and letting it absorb. Because my fear is, like, well, what if the SDF is wicking up into the floss versus going into

the tooth? Or like, for example, with Curodont, you're just squeezing the liquid into the embrasure space but not using any floss. But yeah, that'd be a really great clinical research study for a residency program.

And now you don't have to wait until there's a hole in the tooth to use SDF. You know, it can be non-cavitated in porous, like in these examples. And this is a proximal lesion, of course, and a really cool image from our colleague Dr. Gabriel Domenici from France showing, once this was cut in cross-section, you can see even though this is intact but carious, it penetrated well into the dentin. So it gets in there. Okay, but as mentioned, these proximal surfaces, especially in baby teeth that are really wide and really flat, tight contacts, SDF is less effective. It's not 100% effective, it's not 0%. It's just really important to communicate that to the parent or guardian so that they're coming back, having a new bitewing in six months, reassess, and reapplying it. It's not like you can paint it on there once and they're good to go.

All right, so here's an example. This patient had four quadrants of kissing proximal lesions. I feel like I see this every day now. The caries are insane post-COVID. Well, COVID-es just, I've seen so much decay. But anyhow, they came as a second opinion because the previous dentist wanted to do conventional fillings with sedation. And the parent was really reluctant to do sedation. Heard about SDF, came to us, had SDF applied to all four quadrants. Behavior was not good to start. I have one of my videos on proximal application is with her and you can see it. She's like, "Eh," more whiny and difficult. Obviously way more, way better behavior now that she's older. But they really made that commitment to change and improve behaviors, improve diet and hygiene, come every six months, have it reapplied. And this was all we had to do until the teeth exfoliated. So here's three years later. You can see it's going to stain any decalcification. So you see a little bit of the marks on the gum line. And then as teeth started exfoliating, you can see how it got in there proximally and really neat. This one came out at one of her visits. You can see it's almost like a liquid filling, like it absorbs in there. You can see it. Okay, that's like four years later.

Here's six years later. Now she has almost all permanent teeth. There's still one baby molar. Beautiful, healthy, permanent teeth coming in. She still has the upper left primary second molar, which has had SDF. Doesn't really look like much stain, if anything. And now the healthy new teeth coming in. So yeah, it's great. Great option. Lovely, no sedation, no drilling, no filling success.

But sometimes you win, sometimes you lose. It is not 100% effective. Here's a patient that was an admitted non-flosser and stayed non-flosser, sadly. They were pretty good about coming back and having it reapplied, but there was one span where they were about three months overdue. And sure enough, one of the quadrants of, you know, four quads of kissing lesions, eight carious lesions, one quadrant got worse and the teeth cavitated. In which case, as I explained to them from day one, if it looks worse, we're going to be doing fillings. Now where it's successful, again, it's like a liquid filling. You can see it looks kind of gray. There's a little discoloration, no big whoop. But here they cavitated. So I did conservative class II RMGI fillings. This is Fuji 2LC here. But she was older, used to having things, you know, put in her mouth, like dry suction, et cetera. And she did fine. I didn't have to do sedation. And the parent was still grateful that we took that less invasive approach by doing the least invasive thing initially and then adding on when needed.

All right. So some tips to avoid accidental stain. Varnish, again, I'm a big fan of it, not only helping to increase efficacy, but it can also help you to prevent stain where you don't want it. Like in this scenario, she's got this gumline decal, smooth intact. I don't want to stain that just because it's in the smile line. You can use varnish. This is FluoriMax, which is much thinner. It's like a food grade shellac. So I'm just using it as a barrier as I apply the SDF proximally. And she's had SDF before. This is not the first application. So you can see if you're careful, you can really minimize unwanted stain. Okay. Or like in this scenario, sure, I could have applied SDF all over all of this decal. And not just the smooth surface carious lesions, but the cavitations. But instead, I did varnish, MI paste, and then only applied

SDF to the cavitations just to try to minimize the caries. And they were arrested. Now, long term, you'll still see some radiolucency. It's a radiolucent material, but you might see repaired dentin. It's just an enamel. Sometimes you do see increased radiopacity as it becomes more dense. The key is you're looking for stability of the lesion size. Now for hypersensitivity, you know, if there's no caries, normally you won't get stain like in this case, but it's just important to warn them because you could get some discoloration. In this case, the varnish stained, but once that's polished off, there's no stain. And that's actually my tooth. I applied it to myself. Talk about DIY dentistry. My assistant helped isolate, but I was having terrible hypersensitivity. I have this retained primary molar and it's had this like weird calcific metamorphosis of the pulp chamber. And I have some recession, so I was getting really bad hot cold sensitivity. And I like being the terrible dental patient was so dragging my feet because I thought, oh, this is finally the end. I'm going to need an extraction and an implant. I was just dreading taking this PA and I was pleasantly just surprised to say, oh, okay, okay, not bad, but the sensitivity was bad. So I treated it with SDF and it was night and day improvement. And I only applied it one time. This is a long time ago. That was probably 2018. But anyhow, it's very effective for desensitization. And you would not know I have SDF on my tooth.

Another great use for molar incisor hypo mineralization. Those teeth are notoriously hypersensitive, softer enamel, you know, sometimes just painful just to brush or eat and quite miserable. So it's really great to have the option of applying SDF now, of course, glass ionomer as well. But it's really fantastic for desensitizing these teeth because sometimes you see them on a very young five, six, seven year old and they're having a lot of discomfort and you want to stabilize the teeth and then you can make those long term decisions like are we going to retain this tooth? Is it going to need a crown? Are they going to eventually extract it and do second molar substitution, but at least stabilize and get the kiddo out of pain. So I wrote an article about that for decisions in dentistry and that's like open source online.

I have it linked on my website too if you want to check it out. And you know, if it's just mild, you will see very little stain and if you time it to place glass ionomer over it, at least two weeks later, glass ionomer will stay white and it's very opaque and masks any discoloration. Now on more extensive lesions, of course, you're going to see more discoloration.

Now in terms of toxicity, you can treat multiple teeth with just one drop of SDF. It really depends on the size of the tooth and the size of the lesions. If you have a whopper molar, maybe that will take a drop. But like that baby I showed you with the four incisors, one drop was plenty for all that teeth. But a good rule of thumb would be one drop for every 10 kilogram of body weight is a very safe dose. It's just ultra concentrated and you're using a very small amount and you're using that little drop. So it actually has less fluoride than say conventional fluoride varnish. And you can put SDF and fluoride varnish safely on the same day and just very low toxicity. So this is one of the studies. Fluoride exposure was below the US EPA oral reference dose. Silver was higher, but you know, for cumulative daily exposure over a lifetime. But occasional use, like whether it's, you know, once every six months, it's well below concentrations associated with toxicity. You won't turn anyone into a smurf, I assure you. Here's another study. This was in an ADA journal. SDF was well tolerated, no adverse events. It's safe and efficacious.

Now in terms of a follow-up assessment, clinically it has that signature matte black look to it. It should feel firm to a perio probe or dycal instrument. It may in fact feel hard as a rock, even with an explorer, but not necessarily. It depends on what kind of caries is there. And I'll show you, I'm pretty sure I have an example of that coming up. But anyhow, sometimes it might still feel soft. It doesn't mean the SDF didn't work, but there could be like literally necrotic carious tissue, like mushy caries that can't remineralize versus just affected dentin that can get quite hard or just enamel that maybe is just chalky and porous and then could get quite hard. Radiographically, like I mentioned, is radiolucent. So you're watching for stability of the lesion, hoping for secondary

dentin formation if it's beyond the enamel. And then of course the patient, they should be asymptomatic, have less sensitivity.

In terms of frequency of application, at a minimum you want to apply it biannually to an unrestored caries lesion. You shouldn't reapply it more than once a week. Then the overall average is about 80% arrest of caries lesions when you look at all the clinical trials. Once a restoration is placed, you don't have to keep reapplying the SDF. You don't have to remove SDF-treated tooth structure prior to placing a restoration resin and glass ionomer bond very well to SDF-treated tooth structure. Now in some situations, like I'll show you an example, on primary incisors, like if they're shiny and hard, it's arrested and then you could perhaps go to active surveillance. But it's just important to communicate it's a treatment. It's not a cure. Proper diet, hygiene, and daily fluoride use will provide a, or excuse me, will play a critical role in the success of the treatment. And if a tooth is non-cleansable and broken down, a restoration is favorable when possible.

Now in terms of codes, these are the codes in the United States, 1354 for caries arrest. So interim caries arresting, medicament application. And then there's a newer code 1355 for primary prevention, which is caries preventive, medicament application per tooth. That's an additional code. It doesn't replace 1354. And they're both per tooth. It's very important to be aware of coverage and limitations. So make sure you're reading the patient's explanation of benefits, because there's some plans that don't cover it. There's some plans that don't cover it at the frequency that the clinical guidelines have shown is needed for efficacy. Don't you love it? Aye, aye, aye. Or they'll put waiting periods on restorations. Like let's say you're trying to keep a kid out of sedation and you do SDF and then want to do glass ionomer, they might make you wait six months before they're going to allow you to bill a restoration. Or they might deduct the SDF fee if you try to put a restoration. Doesn't mean you can't do those things. Just be aware so you don't get a surprise. No one likes surprise bills. And wouldn't it be nice if they just covered it as it's supposed to be used? Like

I love when I'll see insurance plans that only cover it on permanent teeth. Really? Or like once every three years? Are they not reading the clinical evidence that people that are making them? Again, I'll stop there.

Now in terms of this concept of SDF as a sealant, SDF is not a sealant. A fissured groove will still be a fissured groove that's not as cleansable and more likely to have caries progress even with SDF. So no, SDF is not a sealant. And I get that the intention is good, but it frustrates me that that kind of thought process is out there because SDF is not sealant. And in this case of a newly erupted permanent molar, there's a lot of stain and a tooth that would have no stain if it just had gloss ionomer sealant. So I don't recommend utilizing it like a sealant because it's not a sealant. And the AAPD takes issue with this messaging as well and discourages utilization of that newer code, the 1355 preventive application of SDF. They had two papers come out about that. The AAPD does not support the use of the code 1355 for use of SDF as a primary preventive agent in children. Now it makes perfect sense for primary prevention where there's more evidence like on root surfaces of older adults. In fact, it was on the cover of the ADA Journal. So yearly 38% SDF applications to expose root surfaces of older adults are a simple, inexpensive, and effective way of preventing caries initiation and progression. So absolutely use 1355 all day on that scenario.

So SDF can be a standalone treatment, especially for primary incisors. Super effective. That may in fact be all you need to do, especially if aesthetically they're not concerned. And there's plenty of people if given the option where they're like, this is fine, the teeth are going to fall out, then you'll have people that are like, absolutely not. My daughter is a child model. And they're all going to want sedation and cosmetic restorations to each their own. It's all good. I have it all on my menu. And they could be quite severe caries and have long-term clinical success, especially in primary incisors or open lesions like this baby. They were so little and had failure to thrive and quite extensive caries. And their parents who were both physicians and know what type of

online information is good versus garbage, they found out online about silver diamine fluoride and came to me for a second opinion to have it as a treatment to avoid IV sedation for zirconia crowns. And this is all we had to do until the teeth exfoliated. And you'll see here by this point, the teeth were shiny and hard. So I just went to active surveillance. He had the SDF applied four times total. And then this was just rock solid. And then you can see over the years, here's four years later, five years later, the permanent teeth are starting to come in. Obviously, you need some ortho. Anyway, this is all we had to do. Happy kid, happy parents, great free advertising that they tell all their friends.

So the big picture, it's a great first line of treatment, especially for children. Like in this example, here's this cute, beautiful little 19 month old baby. Sure, she could have had deep sedation and zirconia crowns. Is that really necessary at 19 months old on asymptomatic caries? I don't think so. And again, it's the parents' choice, but they have to understand the risk benefits and alternatives. And in this case, the parents did not want to put their tiny baby under deep sedation and opted for silver diamine fluoride, which stabilized the teeth until she was older. And then when she was three, I was able to do conservative direct restoration. So often they'll say like, oh, maybe when they start preschool or kindergarten, or like, if they are bothered by it, we can fix them later. That's like a typically the way things play out. At least that's been my experience.

Here's another one of my patients that had a garden variety of minimal interventions, SDF, S.M.A.R.T. fillings, Hall technique, you name it. This is Autumn, who is adorable. I mean, she used to be so difficult just like, exhausting, bless her heart. And now she's like, fine, but that's the true skill, taming the wild beast to become the happy dental patient. But as her teeth started to exfoliate, she was so excited. Like she wanted her mom to take a picture to show me, and like they brought in the teeth. They were so excited about it. But it's just important, I think, to look at the big picture. Like obviously, this is a happy, healthy child. Some people are very negative about SDF



and thinking like, “oh, it’s ugly. No one’s gonna want that”. That’s not true. Like if it’s an option, present it, leave it up to the family to decide. Because there’s many people who choose it. And in her case, she thought it was kind of cool. Like she would tell her cousin, it’s like, oh, they put medicine on their teeth. So to me, this is beautiful. You know, there’s beauty in the simplicity of this as a safe and effective treatment option, especially for children who would otherwise had to be sedated.

But it most certainly is not a cure-all. Here’s an example of a tooth where I very clearly explained to the mother, this is a cavitated proximal surface. They were super anti-fluoride, wanted, but only wanted minimal interventions. I’m like, this would do better with a hall crown. It’s just like where you crown the entire tooth atraumatically. Where they’re like, no, just SDF, just SDF. And sure enough, this, this lesion just continued to get worse as I had worn them. And eventually, this tooth abscessed and had to be extracted. But this is like one of, gosh, a dozen cavities in their mouth. But still, of course, I like any failure, I feel badly. But ironically, that the parent was still grateful that we took that non-invasive approach. The kid ended up having it extracted by me with local anesthetic and did great. But, you know, it’s just so important to never give a misconception to anyone that this is a magical cure for caries or one and done. It’s not. It’s not going to work on every tooth. It needs to be reapplied. Cavitated non-cleansable lesions benefit from restorations.

Now, when to consider doing a restoration for form, function, and aesthetics? Well, first of all, not every SDF-treated tooth is going to need a restoration. Like I showed you, those primary incisors where the aesthetics weren’t a concern or incipient lesions, hypersensitivity, maybe you’re putting it at a restoration margin to extend the life of that restoration or perhaps it’s a baby tooth that’s getting ready to exfoliate, that might be all you need to do, which is great. But certainly, there’s going to be other teeth that need a restoration down the road. So just use your best clinical judgment assessing the calendar age of the patient, the dental age of the patient, how cleansable is the lesion, any associated risk factors, like could it fracture, is the lesion growing, like that

proximal lesion I showed you before where I switched to doing class II fillings, how’s their behavior, are they, you know, what’s their age in terms, like do they still need sedation or not, are they older, heavier, etc. And then, of course, the patient and parental preference as well within reason, you know, sometimes they want, which isn’t, in reality, a good thing. Right. And this is a neat little decision tree from my friend and colleague, Dr. Jeremy Horst Keeper, where you can think of it this way, like if you have a caries lesion, and it’s cavitated and not cleansable, you could do some non-invasive restorations, you can certainly do conventional restorations if tolerated. But there’s some other options, like there’s atraumatic restorative treatment, S.M.A.R.T treatment, Hall crowns, etc. And as mentioned, S.M.A.R.T. is silver modified atraumatic restorative treatment. So silver diamine fluoride to initially arrest and remineralize carious lesions, and then a glass ionomer cement restorative to restore and also further remineralize because of course, it’s antimicrobial and releases minerals. So it’s like medicine and a restoration. So like these examples of some kiddos in my office with smart fillings.

And then when would you jump to doing a crown in respects to primary teeth, you know, obviously, if a restoration, like a filling, a multi-surface filling, that’s, if I just fill this, it’s going to break. Yeah, this kid’s like, what, only four, that tooth is still going to be there until they’re 9-10 years old, they would benefit from a crown. But since it was still vital and asymptomatic, I could put separators and do what we call a Hall crown. So separators to create the space, and then a well-fitted stainless steel crown filled with glass ionomer cement to wall off that caries lesion, think of it like a wound, protect it from the oral environment and the dietary carbohydrate substrate needed for the carious lesion to progress. And then a vital pulp will wall itself off because the odontoblast can lay down a protective layer of reparative dentin and arrest and remain vital and live happily ever after.

All right, so big picture, SDF is safe and effective. It’s more effective than fluoride varnish, like one SDF treatment is more effective than doing varnish four times a year. It’s more effective

than in-room therapeutic restoration alone, but most effective when applied twice a year and on average arrests about 80% of lesions. It satisfies the concept of the triple aim of health care, whereby you can help increase access to care, improve health and reduce cost. And the newer concept is this quadruple aim of care where you're also adding in improved provider experience, so the care team wellbeing, which I certainly appreciate because it's definitely less stressful when you can paint cavities versus having to do shots and drill cavities on little tiny squirmy kits. And if you're concerned, you can literally do this treatment without any aerosols.

Now let's examine our Native American Indian and Alaska Native children population where there's been quite a challenge in managing early childhood caries and they suffer four times the amount of tooth decay than white non-Hispanic children. This is a patient of mine where the mom flew him five times from Oklahoma. He could have had all his treatment done for free with Indian Health Services in Oklahoma, but they were only offering her at the time, times have changed, yay, but they were only offering general anesthesia and like conventional surgical dentistry and she was really scared about, like she had seen in the media, these highly publicized reports on young children who died due to complications of general anesthesia for dental treatment and she was afraid, rightfully so, afraid for her little boy. So we did more conservative approach and lots of SDF and glass ionomer. Now this is the Warm Springs Protocol from now retired Dr. Frank Mendoza who is a IHS pediatric dentist in Oregon tribal region where historically 90% of the Head Start kids had decay and he was just felt frustrated because after decades of caries interventions and prevention programs, he just, there was no discernible change in the rate or severity of the disease. So in 2013, he decided to like, I'm going to implement this pilot program of DIY SDF, so silver nitrate plus fluoride varnish, because that was right before we had Advantage Arrest yet in the US and his results were fantastic. So about 85% arrest of lesions, 75% with no new lesions and more than 50% reduction in the GA cases. And he

felt it was safe, fast, easy and inexpensive. I like it. The parents like it. The kids love it, right? So now this protocol has been recommended to all IHS programs and he said after 32 years, I believe I finally have something that works. Yay!

And then here's to Tasahli back a year later and he brought cousins. You get great word of mouth referrals from offering minimal interventions. So it's great, great free advertising. I mentioned that before. But I get emotional, I apologize, but his name Tasahli in Chickasaw means "scream". And I think his mother's actions are a scream for change in the way we deliver care to children.

And that brings us to the end of the presentation. And thank you so much. I hope you learn to think or two. I hope I got you excited to add SDF into your toolbox. Or if you already have it in your toolbox, I hope it gave you some tips and tricks to improve your utilization or maybe even increase your utilization or how you're wording it to patients and their families. And I certainly appreciate your taking this class and your attention. And I have a lot of resources available to you as mentioned. My website which is [kidsteethandbraces.com](http://kidsteethandbraces.com) has a whole page dedicated to SDF and other pages on Hall crowns and Curodont and resin info. You name it. All kinds of fun, minimally invasive topics. My YouTube channel is my office name, Affiliated Children's Dental Specialists. And there's all kinds of technique videos on there that you can use to help you or to help train your team. My Instagram is @drmaclean, I like to post lots of case studies here. You know, I showed some throughout the presentation, but you can see case studies on Hall crowns, S.M.A.R.T. fillings, you name it. And I have lots of other content available online either on demand, like a number of classes on Dentaltown or monthly live webinars like on ACES. I do pediatric dentistry for the general practitioner, pulp therapy and stainless steel crowns. And then you can see where I'm speaking live in person. I list that on my website as well. Okay. So hope to see you perhaps at a meeting one day and take care.