MDA Bulletin

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FALL 2017
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Your Manitoba Dentist

MANITOBA DENTAL FOUNDATION

Presents

LAL! LAUGH-A-LOT!

A Comedy Fun(d)raiser for the MDF

Saturday November 4th

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Manitoba Dental Association

MDA Bulletin

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Manitoba Dental Association

DR. CATHERINE M. DALE, D.M.D.
PRESIDENT, MDA

President's Message

As we transition into Autumn of 2017, I am sitting down to write this and wondering where the summer has gone. I hope you have managed to make some time to enjoy the beautiful weather we have had and maybe taken in a few of the great things Manitoba has to offer during the summer months—the Folk Festival, the Fringe Festival, Folklorama, and Rainbow Stage, but to name a few of the big ones. The folks at the MDA offices have continued to be quite busy over the past several months as well.

I wanted to "dedicate" this piece to the many volunteers who take on the task of committee work for our organization. There is a lot of work going on "behind the scenes" which keeps this association functioning smoothly, ultimately leading to the promotion of good oral health for Manitobans. The thousands of volunteer hours that go into running this organization is remarkable. This truly is a body of professionals run by its members; we couldn't manage without you! So to all of the committee chairs and members who put in time reviewing by-laws, terms of reference, budgets, and the many various issues associated with each committee, stand up and take a bow: your number one fan applauds you and your drive to see your profession thrive and succeed.

There is one particular group that I have seen working hard throughout the summer months that I would like to recognize. May I be so bold as to bring your attention to the ladies and gentlemen who put in countless hours serving the public in their capacity as the Peer Review Committee. This is a group of devoted individuals who spend many, many hours ensuring that our mandate of "Protection of the Public" is enforced. Special thanks goes out to the few trained investigators who review public concerns and delve deep into documents in order to thoroughly investigate claims brought forward by both public and professionals. Two remarkable women of note are Drs. Lori Stephen-James and Jean Bodnar. I cannot count the number of times I have come and gone from the MDA offices where I have seen them working as I come in, and they're often still at it when I leave. These "super human" individuals generously give of their time while they continue to practice dentistry in their communities. Words cannot express how grateful I am.

Your MDA Board has also been meeting above and beyond our regularly scheduled board meetings. This is another group of volunteers who hasn't hesitated to come together at the MDA offices upon a moment's notice. I am pleased to share with you that this most ethical, intelligent, committed and focused group of people has worked through some very difficult issues this summer. Many of them brought their phones along on their summer holidays and didn't hesitate to engage in thoughtful discussion and respond as required to issues that don't recognize the term "vacation". Rest assured that your elected officials have worked very hard to keep the dental world "on-track", again with the goal of managing public protection within the legal framework of Manitoba and our organization.

Over the summer, the MDA was faced with an enormous challenge following the resignation of our Registrar. I want to take time in this editorial to publicly thank Dr. Marcel Van Woensel for his service to both the dental community and the public of Manitoba. After a stellar 10-plus years of tenure, Dr. Van Woensel has decided to step back and excuse himself from his intense public service schedule. I have the greatest respect for this gentleman. His gift for communication, his skill at negotiation, and his insight into the interpretation of "legalese", combined with his understanding of the issues associated with the regulation of our profession is a skill set likely unmatched across the country. Indeed, he has forged new relationships amongst dental regulators across Canada, and has helped to establish many of the current agreements within various national bodies up to and including the CDA. Along with all the others at the MDA offices, I wish to express our utmost gratitude over his dedication to the profession on both the local and national levels, and we wish him well in his next endeavors. We are currently in the process of developing search criteria for the position of Registrar and will begin the recruiting process soon.

I would be remiss if I didn't mention what a terrific job Dr. Patti Ling is doing in her role as Registrar at the present time. Dr. Ling has picked up where Dr. VanWoensel has left off, and has done so with great care and consideration towards maintaining the high standards set by her predecessor. She has certainly brought herself up to speed on matters of regulatory significance and has represented Manitoba well at the national level. Thank you, Dr. Ling, for your ongoing efforts—the dentists of Manitoba can rest assured that they are in good hands!

On July 18, 2017, Canada's federal Finance Minister, Bill Morneau, announced the release of a consultation paper and draft legislation which, if enacted, will have a dramatic impact on the taxation of Canadian private corporations and business structures that Canadian entrepreneurs have had in place for decades. An announcement was expected, as the federal government had indicated in its 2017 Budget that proposals would be put forward to address perceived inequities in the Canadian corporate tax system. However, the scope of the proposals went beyond the expectations of most tax professionals and will affect most Canadian business owners who carry on business through a private corporation. The CDA has been busy investigating the repercussions of this announcement and preparing a response to government in defense of small business owners such as dentists. The MDA will be sharing this information with you shortly, if not already by the time this Bulletin is published.

I was pleased to attend the annual MDA "Welcome to the Profession" dinner this past week. I was able to meet many of the first year dental students and the wonderful group of dentists who will be volunteering their time as mentors to these newest members of our community. The students have been back at the College of Dentistry for several weeks already after a brief summer break. I look forward to watching them grow into competent professionals and I'd like to thank the dentists who have decided to mentor them along the way—more of that volunteer spirit that makes Manitoba so special, in my opinion!

Do you like to laugh? Do you enjoy raising money for a good cause?? Then why not plan to attend the Laugh-A-Lot Fundraiser in support of the Manitoba Dental Foundation, featuring Jeremy Hotz, on Saturday, November 4 at the Burton Cummings Theatre? For more details please call the MDA office. Come out and join us for this great cause before the hectic holiday schedule begins!

Additionally, I would like to remind you all to set aside time in your calendars for the Annual MDA Convention, which will take place again at the RBC Convention Centre on January 26 & 27, 2018. There are going to be some great opportunities to meet with your colleagues and attend some great lectures, not to mention enjoy the busy social schedule which always accompanies our convention. Be prepared to find out why it's All About the Team!

Finally, I'd like to take a moment to thank Mr. Rafi Mohammed for continuing to be a guiding light to the MDA Board and the Executive. Never one to impose his opinion on us, he nonetheless serves as a sound advisor on all manner of issues which find their way to us for discussion around the board table. As each board member brings their unique perspective and insight to any given issue, Mr. Mohammed remains an impartial facilitator to help us achieve the best possible decision on a given question. Thank you for your dedication to the profession, Rafi!

Best Regards as we move into the Autumn of 2017,

Catherine

MDAA
Manitoba Dental Assistants Association

MDAA President's Message

JANET NEDUZAK
PRESIDENT, MDAA

The MDAA Board of Directors would like to thank those members who have dedicated their time to volunteer at various MDA sponsored events. Some such events have been the Selkirk Children's Festival and various community presentations of the MDA educational curriculum, "Happy Healthy Teeth." The MDAA appreciates the opportunity to collaborate with the MDA to provide education to the public regarding oral health issues relevant to all Manitobans.

The MDAA Board of Directors will return to the board table in early September where they will be planning for an upcoming CE session as well as preparing for the annual AGM to be held in January 2018. Saturday, October 28th, 2017 has been reserved for a CE session at the Canad Inn Garden City. A light lunch will be served with 4 CE credits being assigned - 2 Infection Control. Topic, time of the event and guest presenter will be confirmed. This and other information relevant to the MDAA membership can be found on the MDAA website: mdaa@mdaa.ca

Thank you to the MDAA membership for the privilege to continue to serve as your President. Together, we will continue to promote and advocate for the profession of dental assisting in Manitoba.

Sincerely,
Janet Neduzak
MDAA President

MISSION STATEMENT
"To advance the careers of dental assistants in Manitoba, and to promote the dental assisting profession in matters of education and professional activities that enhance the delivery of quality dental health care to the public."

College Corner

DR. ANTHONY IACOPINO
DEAN, COLLEGE OF DENTISTRY,
RADY FACULTY OF HEALTH SCIENCES,
UNIVERSITY OF MANITOBA

New Frontiers: Digital Dentistry Becomes Mainstream at the College of Denistry

The College of Dentistry has been committed to maintaining state-of-the-art equipment and technologies within its education and training programs for many years. This was emphasized as an important area within the "Drive for Top Five" Strategic Plan launched in 2007 and reemphasized in the strategic plan renewal of 2012. Throughout this time, many of our advances in electronic patient records, digital radiography, CT-Scan imaging, rotary endodontics, implant prosthetics, and oral-systemic health have been supported by significant donations from dedicated alumni and our stakeholders within the Manitoba dental community. I am happy to report that we can now add digital dentistry to the long list of areas that our students will be exposed to during their clinical experiences.

The notion of digital dentistry brings with it thoughts of futuristic concepts. Similar to science fiction movies and novels of years past that invariably pointed to the years 2000, 2010 or 2020 as the age of amazing advances that could not yet be conceived, the dental literature has predicted mainstream use of digital technologies for some time. However, the evolution and incorporation of digital approaches has not been entirely disruptive in nature (causing rapid change and demonstrating immediate acceptance) due to high cost, requirements for extensive training and technique sensitivity. Current systems and training programs have evolved sufficiently to address these issues, especially within the educational environment. Thus, it makes sense for the College to embrace CAD/CAM (computer aided design/computer aided manufacturing) and optical intraoral imaging as approaches to providing services in a more efficient, effective and comfortable manner.

Thanks to a generous donation from Dr. Bobby Goldberg, class of '87, we will begin to introduce the Cerec technology into the digital dentistry initiative that already includes other optical scanning and CAD-CAM systems. Under the leadership of Drs. Aaron Kim (Associate Dean Clinics) and Igor Pesun (Director, Graduate Prosthodontics Program), the College has been building a digital dentistry infrastructure highlighted by the Taras Snihurowycz Digital Dentistry/Simulation Support Facility. The comprehensive nature of our systems and applications will certainly make the College of Dentistry a leading centre for digital dentistry in North America. There are plans to offer a wide range of continuing education programs for the practicing community in addition to providing training for our students.

As the nature of dental practice continues to evolve, it will be important for our new graduates to have experience with these technologies. Additionally, the increased use of digital applications will decrease clinic and laboratory costs for the College allowing us to continue to provide an excellent dental education at an affordable cost. We will be primarily focusing on optical impressions, milled restorations and digitally-based surgical guides. As always, our students will continue to receive a strong foundation in traditional dentistry/laboratory procedures and continue to master the "basics" although the definition of what basic skills and abilities are will continue to be debated within our rapidly changing landscape. The College of Dentistry seeks to provide an outstanding dental education and serve as a resource for the dental community in Manitoba and beyond. Thank you for your continued support.

WHO'S YOUR HERO?

Our Manitoba Heroes recognizes, celebrates, and awards Manitobans who do extraordinary things to contribute to their community, without thought of reward to themselves, and follows their example by raising funds through our events and gala to donate to our named charities.

HOW YOU CAN PARTICIPATE:

1. Purchase tickets or a table
2. Be a Heroes' hero sponsor

OUR MANITOBA HEROES GALA
CLUB REGENT EVENT CENTRE
OCTOBER 28TH, 2017

In celebration of community and our theme "Compassion in Action", Our Manitoba Heroes will be donating the proceeds from the 2017 events and gala to the following charities:

Winnipeg Pet Rescue Shelter
Manitoba's first registered charity NO-KILL animal shelter

PAN AM PLACE

ANAVETS
ROYAL CANADIAN NAVY & AIR FORCE VETERANS IN CANADA
INCORPORATED
UNIT 283

OUR MANITOBA Heroes
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Visit: ourmanitobaheroes.ca for details.

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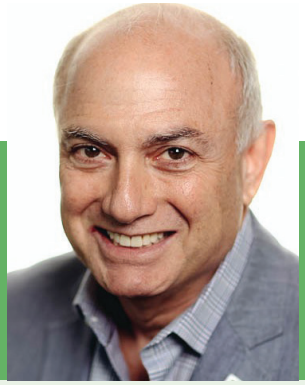


DR. JOEL ANTEL, D.M.D
CDA BOARD REPRESENTATIVE

Canadian Dental Association's Message

Many presidents, registrars, CDA reps and others begin their MDA bulletin columns with a comment on the weather and the passing seasons. I refuse to give up on summer just yet so let us continue to enjoy the weather and relaxation of the summer and move on.

This summer has been an active time at the Canadian Dental Association. Government relations are always front and center nationally. The successes dealing with proposed taxation of health benefits had just ended when tax changes affecting professionals and small business owners arose. We have all seen much information about the changes and effect they will have. Here is what the CDA is doing to represent Canadian dentists on the issue.

An important role for the CDA is gathering and disseminating information to dentists on topics that impact our daily practices. Dental plan audits are part of that daily practice. Here is information that it is helpful to know.

Secure Send. What is it? What does it do? Read on.

TAXATION CHANGES

The federal government recently announced their intention to make changes to tax law for small businesses.

Finance Minister Bill Morneau released a dense and highly technical discussion paper as part of a 75-day public consultation on these proposed measures. The deadline for submission is October 2, 2017.

What are the consultation's areas of focus?

There are three areas of focus for the government in this consultation:

Income sprinkling;
Holding passive investments inside a private corporation; and
Converting income into capital gains.

What does this mean for dentists?

Such changes, if they were to proceed as proposed, could have a profound impact on all small businesses, including dental offices.

How is CDA responding to this issue?

Knowing that this was part of the government's agenda, the Canadian Dental Association has made the case over the past two years to Members of Parliament and the Finance Minister that dental offices are small businesses, employers, and contributors to their community.
To address this issue, the CDA has reached out to other like-minded organizations to align efforts, share knowledge, and identify common concerns. CDA continues to do this, and is in consultation with the provincial dental associations on a regular basis.
Given the tight timeframes and complexity of the issue, CDA has focused on developing an analysis of the discussion paper, and a submission as an official response to this process. This work has included:

A legal analysis from a tax lawyer;
An economic impact and policy analysis from a national accounting firm; and
Initial advocacy outreach.

It's important to note that the government has not created new legislation yet, though they have shared draft legislation as part of the consultation package. There is still time to influence the eventual legislation before it is introduced in the House of Commons in the fall or winter.

What can you do now?

Any dentist or other small business owner who is concerned about this process, or the possible changes that could follow, should reach out to their Member of Parliament to express their concern.

Members of Parliament will be in their ridings, returning to the House of Commons for September 18. Reaching out to your representative, providing a local perspective on how these potential changes could affect your business, your employees, and your community can have an important impact on how the government proceeds.

DENTAL PLAN AUDITS

Knowledge is Power When Faced with an Audit.
To meet the requirements of their customers – the employers who sponsor dental benefits plans for their employees and their families – insurance companies are increasing the frequency of their audits of dental offices. Even for the most diligent dental offices, an audit can be a disruptive process.
To give some background, according to the Summary Report of the Oral Health Component of the Canadian Health Measures Survey 2007-2009, 62% of Canadians have a benefit package that offsets the cost of dental care.

Most dental benefit plans are provided to employees by their employers as part of a larger package of benefits. These benefit packages usually include forms of insurance such as life insurance and disability insurance and are sold to employers by, largely, the insurance industry.

When faced with a dental audit, it's best to understand the role of each stakeholder involved.
The prepaid dental benefit model of reimbursement for dental care includes three separate groups of stakeholders each with their own interests and who have negotiated the terms of their involvement:

- Insurance Company / Benefit provider and their claims processors
- Employer / Plan Sponsor
- Employee / Plan Member / Beneficiary/Patient

As the providers of the care covered by dental plans, dentists have a role in the model but are not considered stakeholders because their only formal relationship is with the patient. Their involvement is a consequence of the fact that their patients can also be an "Employee," a "Plan Member," or a "Plan Beneficiary." This overlap means that although the businesses of insurance companies and dentists are independent, patients who are covered by a dental plan will only receive both optimal oral healthcare and the benefits they are entitled to in an efficient manner – thereby providing maximum value which is of interest to both the insurance industry and dentistry – if insurance companies and dentists cooperate to make this happen.
CDA understands the need of insurance companies to monitor their benefit programs to ensure that claims submitted against their plans provide an accurate description of the care provided and of the costs involved. At the same time, CDA emphasizes the importance of protecting of the dentist- patient relationship towards the delivery of optimum care.
Given the increasing demands for dental audits by some dental benefit providers, CDA is initiating discussions with the Canadian Life and Health Insurance Association (CHLIA) to establish criteria for reasonable claims verification processes that will be supportive of sustainability of dental benefits while being fair to dentists.
CDA looks forward to providing an update in the coming on this priority file.

CDA SECURE SEND

Secure, paperless communications for dentists is on the way
If you send patient health information by email, consider the risks. Exchanging patient information by email—with specialists, physicians, or patients, for example—risks violating a patient's right to privacy and doesn't meet the many data privacy requirements outlined by dental regulators and in privacy legislation.
Because guidelines and legislation related to protecting the security of patients' health information are relatively new and evolving, dentists should always be aware of their obligations to safeguard the confidentiality of their patients' data.

A solution for Canadian dentists is on the way: CDA Secure Send—as simple as sending an email, but built to keep patient data, like X-rays or other records, secure and in compliance with privacy regulations. The service will be connected to CDA's directory of dentists, so senders can search for dentists by name, specialty or location. Plus, there are no advertisements, no risks of a third party mining the data, and no fees for dentists who are members of their provincial or territorial dental association or for affiliate members of CDA in Quebec.
To use CDA Secure Send, you will need to sign in to the CDA Practice Support Services website (services.cda-adc.ca) and subscribe to the service. To read step-by-step instructions on this process, see: cda-adc.ca/pss/registration

I would like to acknowledge and thank the CDA staff who provided resources and support for this issue's CDA column.

I will continue to use this column as a vehicle to keep the members of the Manitoba Dental Association informed as to what is happening at the Canadian Dental Association and about national issues that affect our profession and our daily professional lives. In doing so I hope to develop our collective appreciation for both the tangible and the unseen benefits we receive through our provincial association's membership in the Canadian Dental Association. Please let me know if there is something specific you are interesting in or want information about.

Once again let me thank the members of the Manitoba Dental Association for the opportunity to serve as your representative on the CDA Board of Directors.

Manitoba Dental Association

NOTICE OF LIFTING OF SUSPENSION

TAKE NOTICE that by the direction of the Board of Directors of the Manitoba Dental Association effective 27th day of June, 2017, has lifted the suspension of DR. BAHMAN TAZANGI EDALATI's license to pratice dentistry.

Dr. Edalati is entitled to practice dentistry with the following limitations: no endodontic therapy. This restriction does not include performing emergency pulpal accesses for the relief of pain.

Dr. Edalati is practising dentistry from Unit 10-A at 475-9th Street in the City of Brandon, Manitoba.

The Manitoba Dental Association is the statutory authorized regulatory body for dentists and dental assistants in the Province of Manitoba.

DATED AT THE City of Winnipeg, in the Province of Manitoba, this 27th day of June, 2017.

Dr. Catherine Dale
President, Manitoba Dental Association

MANITOBA DENTAL FOUNDATION

A MESSAGE FROM YOUR FOUNDATION

Healthy smiles through inspired generosity

DR. CORI SUL, D.M.D
DIRECTOR, MDF BOARD

Healthy Teeth, Happy People

Dear Colleagues,
A couple of years ago I happened to run across an interesting video on YouTube called "Start with Why" by a fellow named Simon Sinek. If you haven't seen it, I highly recommend watching. In the video, Simon tries to explain why some companies or organizations are so successful while others seem to struggle at the very same tasks. He uses the example of Apple and why it dominates the market in virtually every single thing it creates. It has to do with Apple's "why".

Companies like Toshiba, Lenovo, Dell and HP all make great computers that easily outperform Apples models on pretty much every technical level. They are also hundreds of dollars less expensive. Yet almost everyone buys Apple computers. Every company knows what they do and many even know how they do it but very few know why they do what they do. Unlike these other companies, Apple focuses on why it makes its computers and that's the reason it's so successful. It doesn't matter whether it makes computers, digital music players, cellular phones, tablets or probably soon cars – Apple's core why doesn't change. Like Toshiba and the others, many of us just simply don't know why we do what we do. We all basically fix teeth everyday but despite what we likely all said in our dental school interviews, very few of us do it because have some weird affection for teeth.

The video by Simon Sinek inspired me to do some serious consideration of why I do the things I do. In some of his other work Simon talks about how the core of why you do what you do is usually evident to those closest to you and if they are able to be honest, they could tell you. To make sure I was on the right track I came up with a bit of an experiment and asked my staff to anonymously write down what they thought drove my core. 11 out of 12 people came up with almost word for word the exact two things I had come up with too. There was no limit on how many they could come up with, they had just two things just like I did. I'm going to be honest, it was almost creepy! I can't recall exactly what the 12th person answered but what I do know is that they no longer works with us. Simon also talks about how people who understand and believe in your core are attracted to working with you so it wasn't entirely a coincidence that they ended up resigning.

Many of you know me well as friends or we've worked together on various boards, events, committees, etc. and probably already know my "why". When I was thinking about it I realized that 90% percent of what I do in life and 99% of what I choose to spend my time on, all have the same two things in common. First, they give me the opportunity to help people and make things better for others. Second they are things I can have fun with and laugh at while I'm doing them. I live those two things everyday in my job but when you look at the various things I've signed up for, volunteered for or come back to - those two things are absolutely fundamental to what I enjoy and am most successful at doing.

Over the past few years I've chosen to become involved with the Manitoba Dental Foundation. It's a fun group of people who are inspired to help those people whose circumstances have led them to struggle to obtain decent dental care. I recognize that mostly through a combination of sheer luck and opportunities afforded to myself that most people don't get, me nor my family have been in that same difficult situation those people are. In fact, that same luck and opportunity has played a huge role in my privilege of being a dentist that affords me a lifestyle I never imagined. I do dentistry for the opportunity to help people and have fun while I do it but it's not lost on myself how much money I make while I get to do it. And because of that I feel I have an obligation to give back to the people who haven't been as fortunate as myself.

Being involved with the Manitoba Dental Foundation excites me not just because I get to help raise funds for important charities that make a tremendous difference in those in desperate need of help but also because it gives me the opportunity to help my friends and colleagues in the dental professions get to make a meaningful impact too. I get to help others who want to help others.

There is an endless list of charities that can use your time and money. Like most of you I've donated thousands of volunteer hours and tens of thousands of dollars to many of them. The MDF is unique in that it gives you the chance to make an impact while working with your colleagues in an area that directly relates to dentistry itself.

On Saturday November 4th the MDF is going to be holding Laugh-A-Lot, which is a comedy fun(d)raiser at the Burton Cummings Theatre that will feature Kevin McDonald and Jeremy Hotz. I know Frank Hechter and his dedicated team are going to make the event truly spectacular so I hope you open up your wallet and buy a couple of tickets to support a great cause. More importantly, I also hope you give some thought to the why you do what you do and how the Manitoba Dental Foundation can help you provide the impact you want to have on the world around you.

Cory Sul, DMD
Chair- Culture of Excellence Committee
Manitoba Dental Foundation

OPIOIDS PUBLIC AWARENESS TOOLKIT
1. TROUSSE D'OUTILS DE SENSIBILISATION DU PUBLIC AUX OPIOÏDES

Dr. James Taylor

Chief Dental Officer of Canada
Public Health Agency of Canada
Government of Canada
james.taylor@phac-aspc.gc.ca

OPIOIDS PUBLIC AWARENESS TOOLKIT

Please find below the link to the "opioids public awareness toolkit" that our federal Health Portfolio Communications team has developed. It includes information and resources to help promote awareness on preventing opioid overdoses. The link to the digital toolkit went live late last week and currently includes existing posters, videos and infographics that can be shared and used:

https://www.canada.ca/en/health-canada/services/substance-abuse/prescription-drug-abuse/opioids/resources-toolkit.html

Dentiste en chef du Canada
Agence de la santé publique du Canada
Gouvernement du Canada
james.taylor@phac-aspc.gc.ca

1. TROUSSE D'OUTILS DE SENSIBILISATION DU PUBLIC AUX OPIOÏDES

Vous trouverez ci-dessous le lien vers la «trousse d'outils de sensibilisation du public aux opioïdes» que notre équipe fédérale de communication du portefeuille de la santé a développée. La trousse comprend des informations et des ressources pour contribuer à la sensibilisation concernant la prévention des surdoses d'opioïdes. Le lien vers la trousse numérique a été mis en ligne la semaine dernière et comprend en ce moment des affiches, des vidéos et des infographies existantes qui peuvent être partagées et utilisées.

=https://www.canada.ca/fr/sante-canada/services/toxicomanie/abus-medicaments-ordonnance/opioides/trousse-outils.html

52nd ANNUAL MEMORIAL LECTURE
Saturday, December 2nd, 2017

The Manitoba Chapter of Alpha Omega Fraternity and dentalcorp
Proudly Presents:

Dr. Gary Glassman, DDS, FRCD

Creating Endodontic Predictability: New & Exciting Standards in Endodontic Treatment (6CE points)

ALPHA OMEGA

dentalcorp

Hilton Winnipeg, Airport Suites
1800 Wellington Avenue

Breakfast hosted by: Crosstown Dental Lab and Maxident
Lunch to be provided by: Alpha Omega Fraternity and dentalcorp

There is no lecture fee, but donations to the foundation are most welcome

MANDATORY REGISTRATION OPENS SEPTEMBER 14

http://alphaomegamanitoba.ca/memorial-lecture/

TIMOTHY A. BROWN
PRESIDENT AND CEO, R.O.I CORPORATION

What a Great Nation

I just returned from the Grand Prix Formula 1 held in Montreal this past weekend. It was a fabulous event and one of the best highlights occurred when the crowd got to watch the talented, 18-year-old Canadian driver, Lance Stroll do his magic. He started in 17th place and finished in 9th to the appreciative roars of proud Canadians. By moving down eight places, he finished higher in the Grand Prix points system.

Being there in the presence of 125,000 people on the Island watching the race on the Gilles Villeneuve circuit, I felt a strong sense of my Canadian identity. Canadian flags were everywhere. The crowd cheered most loudly for the Canadian driver than anything else in the entire automobile race. I am so grateful to be Canadian.

While in Montreal, I met with clients in the dental industry and spoke to business owners working in many different industries. There was a common take-away for me. All of them were optimistic. They have plans to grow their business, create employment and continue to invest in their Canadian companies.

We are so very fortunate in this great nation. All dentists benefit from investment, be it local, national, or foreign; when the Canadian economy thrives, the dental industry of Canada thrives.

Recently, there has been a lot of talk about our real estate industry, the ups and downs of the market and the overheated pricing that some people fear may cause a financial collapse. Business owners are the key drivers of the economy of this nation and those business owners believe in Canada and believe in the economy at large. When they continue to invest in their companies and create employment, dental benefits and other health care benefits are sure to follow. I predict that the Canadian dental industry will continue to benefit from investment and the confidence of the Canadian business owner.

We often underestimate and understate how fortunate we are even this year, the 150th Anniversary of Confederation. I encourage all of you, as independent business owners, to praise the Canadian economy, to speak positively about our business climate and our environment to every patient and all the people that we communicate with. Each one of us has a duty to promote our great nation for all the varied reasons from freedoms to financial opportunities that make Canada the best country in the world.

God bless Canada and I can't say this any other way," I am grateful to be part of the Canadian dental industry and I hope that you feel the same. No matter what your daily struggles and all the issues that we deal with as business owners, we are very fortunate".

Welcome to the Profession

ED DERMIT
VICE PRESIDENT,
BUSINESS DEVELOPMENT CDSPI

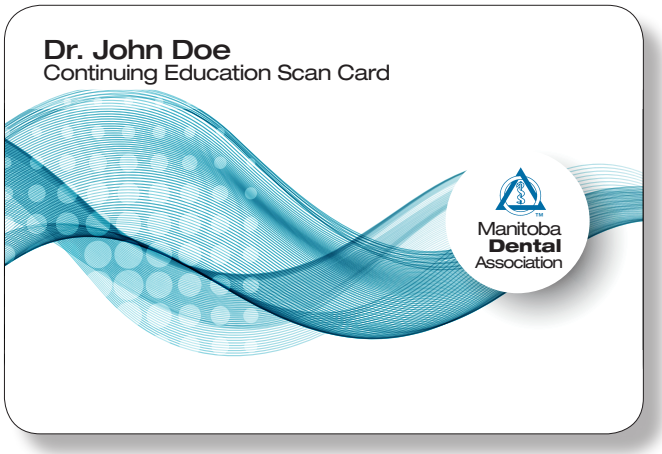
The Manitoba Dental Association and the University of Manitoba are partnered in the Mentorship program for dentistry students.

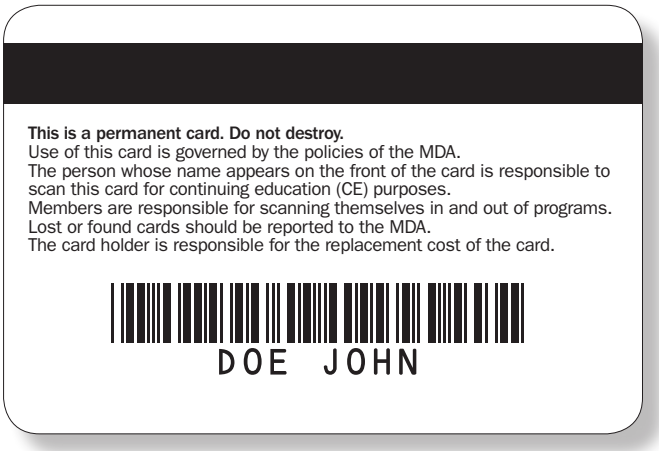
This program is designed to provide a continuous four year relationship between a practicing dentist mentor and a dental student mentee. With premium sponsor, Scotiabank, and mentorship program sponsors, CDSPI and UMDAA, 29 - Class of 2021 students and 4-IDDP Class of 2019 students were welcomed to the profession on Thursday, August 17 at the Fort Garry Hotel for dinner, introductions and a MDA pin presentation.

On behalf of the MDA and from the Mentorship co-chairs, Dr. Betty Dunsmore and Dr. Jenny Gill, best wishes to all the students!

Manitoba Dental Association

Continuing Education Scan Card





New Scan System comes into effect on September 1st, 2017

What is it?

A plastic credit card size identification card with members name and a barcode specific to that member;

A scan card is being issued to every Dentist and Dental Assistant member for the purpose of recording attendance at CE programs in Manitoba. The card is to be used only by the person to whom it is issued.

Why?

To improve accuracy of CE record keeping;

To simplify process for approved CE program providers to submit continuing education hours on behalf of members;

To reduce paper verification for attendance and increase efficiency of uploading the data into members' CE reports.

How do I use it?

There are two ways to use your card:

1. The barcode on the physical card needs to be scanned for the member when entering or leaving the session for the day.
2. Take a photo of the barcode and save it to your mobile device. Member must present barcode image for scanning upon entering or leaving CE session for the day.

Manitoba Dental Association

If you're a dentist in your first five years of practice in Manitoba, this is your opportunity to meet, eat, learn and share while earning free continuing education points.

Join us for the kick-off on Thursday, September 28 at The Inn at The Forks.

To register or find out more, contact Pam McFarlane at: pmcfarlane@ManitobaDentist.ca

MDAGPSC

MANITOBA DENTAL ASSOCIATION GENERAL PRACTICE STUDY CLUB

Pacific Dental Conference

March 8-10, 2018

Join us in Vancouver, BC

- Three days of varied and contemporary continuing dental education sessions are offered (something for your whole team)
- Lunches and Exhibit Hall Receptions included in the registration fee for all three days
- Over 140 speakers and 150 open sessions and hands-on courses to choose from, as well as the Live Dentistry Stage in the Exhibit Hall
- Over 300 exhibiting companies in the spacious PDC Exhibit Hall (Thurs/Fri)
- PDC Lab Expo on Saturday – One day of exhibits area and lectures for Dental Technicians and all Dental team (lunch included)

Pacific Dental Conference

PDC Lab Expo March 10

Online registration and program information at... **www.pdconf.com**

Featured Speakers

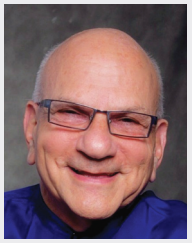
Peter Jacobsen
Pharmacology

Amber Riley
Forensics

Larry Emmott
Technology

David Hornbrook
Restorative/Operative

Juan F. Yepes
Pediatrics



Warren Karp
Health

Complete speaker roster available for viewing Oct 15th at pdconf.com

New Interactive Module on CDC's Infection Control Guidelines

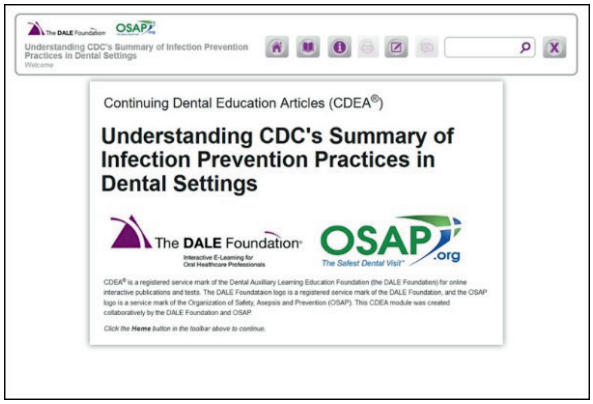
The Organization for Safety, Asepsis and Prevention (OSAP) and the DALE Foundation, the official affiliate of the Dental Assisting National Board, Inc. (DANB), have come together to co-sponsor an online module and assessment of the Centers for Disease Control and Prevention's (CDC's) *Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care.*

The online module and assessment can be accessed through both OSAP's and the DALE Foundation's websites.

Learn more

In March 2016, CDC published the *Summary of Infection Prevention Practices in Dental Settings* as a supplement to its *Guidelines for Infection Control in Dental Health-Care Settings (2003)*. The summary document highlights current infection prevention recommendations and includes a checklist that can be used to evaluate compliance.

Because of the importance of these recommendations, OSAP and the DALE Foundation created an online module, called Understanding CDC's Summary of Infection Prevention Practices in Dental Settings, that adds interactivity to CDC's summary document — such as links to definitions for key terms, and links to references and resources.



This module is intended for dentists, dental hygienists, dental assistants, dental office managers, dental lab technicians and other oral healthcare personnel who are responsible for any aspect of infection control in their practice setting. OSAP and the DALE Foundation award 2 CDE credits to those who successfully complete this online module by passing the assessment at the end of the article.

A total of 35 states' dental rules, regulations or statutes mention or mandate compliance with CDC guidelines; and 23 states have infection control CDE requirements for dental professionals. Additionally, dental assistants who hold DANB certification must annually earn at least 2 CDE credits in infection control to renew their certification.

To purchase this OSAP-DALE Foundation online module and assessment, visit the DALE Foundation's product catalog or OSAP's website.

About OSAP
The Organization for Safety, Asepsis and Prevention (OSAP) is a growing community of clinicians, educators, researchers, and industry representatives who advocate for safe and infection-free delivery of oral healthcare. OSAP's mission is to be the world's leading provider of education that supports safe dental visits. OSAP is an ADA CERP-recognized CE provider.

About DANB
The Dental Assisting National Board, Inc. (DANB) is recognized by the American Dental Association (ADA) as the national certification board for dental assistants. DANB's mission is to promote the public good by providing credentialing services to the dental community.

About the DALE Foundation
The Dental Auxiliary Learning and Education Foundation (the DALE Foundation) is the official DANB affiliate. The DALE Foundation benefits the public by providing quality continuing education and conducting sound research to promote oral health. The DALE Foundation is an ADA CERP-recognized and AGD PACE-approved CE provider.

Dental Assisting National Board, Inc.
444 N. Michigan Ave., Suite 900
Chicago, IL 60611
Connect with us:

CDA SECURESEND

Manitoba Dental Association

Frequently Asked Questions

General

What is CDA Secure Send?

CDA Secure Send is an easy, simple to use electronic document sharing system that allows dentists to exchange documents and information in a secure and compliant fashion.

Why should I use it?

Exchanging patient information by unsecured email with specialists, physicians, or patients, for example, risks violating a patient's right to privacy and doesn't meet the many data privacy requirements outlined by dental regulators and in privacy legislation.

CDA Secure Send meets the legal obligation to safeguard the confidentiality of patient data. It's as simple, and easy-to-use as sending an email.

How is CDA Secure Send different from email?

While CDA Secure Send is easy to use, it's not intended to *replace* email, and does not have typical email functionality. It is a secure, electronic courier service to move information from A to B. In fact, to minimize privacy risk as well as maintain system efficiency, CDA Secure Send messages are deleted automatically 15 days after being sent. Dental offices should retrieve any messages and attachments they wish and save it to their internal record-keeping system.

Who can I communicate with?

CDA Secure Send allows you to send information securely to anyone. For two-way communication, however, only those who are listed in CDA's directory of Canadian dentists can do so. This list can be seen as a drop-down menu once logged in to CDA Secure Send. Those not listed in CDA's directory of Canadian dentists can only then receive CDA Secure Send information.

Using CDA Secure Send

How do I send a file?

To send a file, sign in to the CDA Practice Support Services website at services.cda-adc.ca. From there, choose the "CDA Secure Send" tab.

Choose a recipient from the drop-down menu or click on "Find a Recipient" Once you've chosen the recipient, you can add a note and choose the file you wish to send. Click "Send" and the recipient will get a notification that a file has been shared with them. If the person you are sending to is not listed on the "Find a Recipient" list, manually type in the destination email.

How do I find a particular specialist or dentist?

Log into CDA Secure Send. Click "Find a Recipient." Check the drop-down menu of the CDA Canadian dentist directory for the dentist or specialist. If not listed there, simply add the email address manually. Please note that those not on the CDA directory of dentists in the "Find a Recipient" drop-down menu can receive files but are not able to communicate back with you via CDA Secure Send.

>>

CDA SECURESEND

Manitoba Dental Association

Can I send files to labs or to a patient's physician?

Yes. Simply add the email address manually. Please note that labs and other locations not in the CDA Canadian dentist directory can receive files but are not able to communicate back to you via CDA Secure Send.

How many files can I send at a time?

You can send no more than 20 files at a time up to a total two GB size.

How do I save the files I receive?

Save files by downloading them to your computer. You can save individual files by clicking the blue "Download" link beside each file or you can download all the files by clicking the green "Download All" button below the files.

How long are my messages kept?

Your messages will be kept with CDA Secure Send for 15 days. For files you wish to keep, export the selected files by going to the "Activity" tab and choose 'Export All" or "Export Selected."

The recipient is not on file. Will they get my message?

If the recipient is not on file with the CDA Canadian dentist directory, the sender must manually enter the email address. The recipient will then receive a link that, when clicked, will allow the recipient to securely download the message and any attached files. Because they are not on part of the CDA Canadian dentist directory, two-way communication is not possible.

I'm having problems sending files. How can I get help?

We are happy to help with any problems you may experience. You can reach us by clicking on the "Help" button or by calling 1-866-788-1212.

Happy Healthy Teeth Curriculum

GARY PAIGE, DENTAL IMAGE THERAPY,
DR. KEVIN FRIESEN, HANOVER DENTAL
DR. RICHARD SANTOS

Happy Healthy Teeth curriculum – a dental care education plan for your practice and the community.

Why do we do this and what does it cost us?

1.Community outreach-helping lower income children-some promotional value
2.Expected-improved Oral Hygiene/Healthy Habits-equip audience with proper oral hygiene tools
Unexpected-required A/V tools to deliver entire program can be unavailable (projector, screen, etc.) Prepare to give program by talking to participants and using 4 key visual aids in the curriculum
3.Approximately 6 hours of salary for Rebecca Kremer, R.D.A-30 Toothbrushes/floss/toothpaste
4.Sense of accomplishment/contribution-participation in community

Clinic History:

For more than 30 years the Winnipeg dentist clinics at Garden City Shopping Centre and St. Vital Centre were part of Dentrix DentalCare– a national dental company owned by Dr. Roger Watson. They were some of the first retail dentistry locations (mall-based dental clinics) in the country.
In 1989, Dr. Mark Johnston, a recent graduate of the University of Manitoba's dentistry program, became an associate at the Garden City location. In 2006 he became a partner, and in the same year he bought both locations from Dr.Watson, renaming them as Dental Image Therapy Centre's. Dr. Johnston operated the clinics under the philosophy that if you treat your staff right and treat your customers right, business will take care of itself. He thought it was important to be active in the communities surrounding the clinics – to build a connection and to lend a helping hand whenever possible.
Those philosophies are carried forward to our staff today through our current partners/owners, Dr. Donald Dziewit, Dr. Linda Simpson and Dr. Patrick McManus.

We believe it's important to give back to our community, including its most vulnerable people. Our team is happy to be able to help in providing health & education.

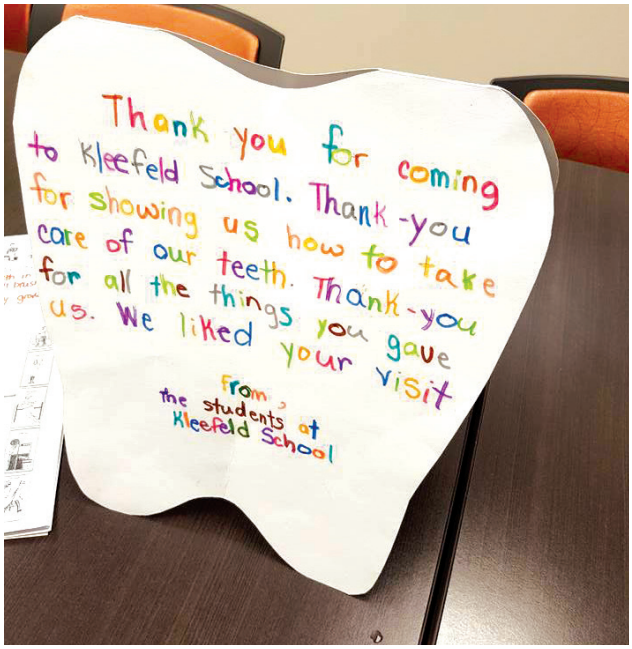
Happy, Healthy Teeth- An oral health education curriculum developed in 2009-2012 by an MDA committee and approved for use in Manitoba early years schools by the Department of Education in the province of Manitoba. The resource was translated to French and approved for use in schools by the minister of Education for K-6 classrooms.

This resource was relaunched in the fall of 2015 to be implemented in early years schools for oral health month in April as well as part of the science presentations in the grades 5 and 6 school curriculum. Currently, 2 Manitoba dentists, Dr. Richard Santos and Dr. Kevin Friesen of Steinbach and one practice manager, Gary Paige of Dental Image Therapy have found different ways to implement this resource.
Public relations of the MDA has used this resource in summer education programs in the Seven Oaks school division, parent and baby programs across Winnipeg and Selkirk and at SAGE(Special Area Groups of Educators) in Winnipeg for the Manitoba Teachers Society.
Happy Healthy Teeth has covered the age ranges of K - grade 1, grade 2-3 and grade 4-6 with lesson plans, support materials, student activity sheets and power points for classroom or community presentations. A dental assistant, dentist, practice manager or dental health educator, like myself, can deliver each section that is divided into the 3 modules. Each module has lesson learning objectives, key messages and discussion topics. This information is formatted into 10-15 minute lessons. Each has extra activities and discussions so you can select the method that works best with the student group you are presenting to.
The time is here to grow this resource for targeted information for junior high, senior high and adult groups. With these groups, additional MDA messaging about oral cancer, tobacco use and other topics can be incorporated. If you are interested in volunteering in this area, please email our MDA Executive Director, Rafi Mohammed at: rafi@manitobadentist.ca

Hanover Dental, based in Steinbach, has been doing Dental Presentations since 2015 throughout Southeastern Manitoba. We see an average of 3000 children a year as Dr. Luke Singh and his staff visit Daycares, Preschools, Elementary Schools, Prenatal-Postnatal Classes for Mothers, and also Senior's Homes. Teachers and students alike love our Oral Health Presentation which focuses on Dental Hygiene, Nutrition, and Children's Dental Growth and Development. We have done presentations at 16 Elementary Schools, including Steinbach Elementary Schools as well as rural schools in the southeast including Mitchell, Blumenort, Kleefeld; just to name a few. In addition we have visited multiple daycares including the Kindercorner Daycares, Steinbach Family Resource Centre and preschools in the Southeast as well.

We incorporate a Dental Tooth-fairy as part of our presentation with the aim of interacting one-on-one with students in order to create a positive dental experience, hence eliminating fear or anxiety when going to visit the dentist. Our patients and their families mean everything to us, we want to give back and present them with every opportunity we possibly can.

Hanover Dental is a growing business within the Steinbach Community which grew from 4 dental rooms to 12 rooms within the last 5 years. Steinbach is the third largest city in Manitoba and one of the fastest growing areas with a population of over 15,000 now. Hanover Dental strives to be the first choice in dentistry in Manitoba. We are committed to improving the lives of our patients, team members, and communities through preventive education, continuing care and charitable giving.



Raising Your Game

DR. CARLA COHN
PAST PRESIDENT, MDA

As dentists, we prize information. We all know the importance of staying on top of things clinically, but what about staying on top of practice management opportunities and personal finances? Fortunately, you have a valuable ally—CDSPI.

Most of us are well aware that CDSPI provides competitive insurance plans, financial planning services* and investment solutions. But the advantage they offer goes well beyond that. It's their expertise that sets them apart, expertise that is invaluable in helping you grow and protect your wealth.

It starts with their own knowledge and experience, with a team of accredited, licensed advisors who work exclusively with dentists.

But then they go to the next level. They access other experts for us to enhance our knowledge base. These include lawyers, accountants, estate planners, health and wellness professionals, and others who participate in CDSPI sponsored events across the country.

It may be a presentation at a dental convention about managing your wealth and mitigating risk through insurance. Or a forum to provide important information and advice to new dentists. Or a Life Goal Planning workshop for retiring dentists. At whatever point you are in your career, information and insights are designed to help you raise your game. These events are also a great way to network and catch up with colleagues in your area.

You will receive invitations, either by mail or email, for events in your region, and you can check for upcoming events in CDSPI's publication, The Edge.

There are many benefits to being a member of the MDA. Some of the most valuable are the programs and services offered by CDSPI. I encourage you to take full advantage of them to enrich your personal life and your practice.
Sincerely,

Dr. Carla Cohn
Past President
Manitoba Dental Association

*Advisory services are provided by licensed advisors at CDSPI Advisory Services Inc. Restrictions to advisory services may apply in certain jurisdictions.

WEALTH MANAGEMENT FOR DENTISTS

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are crucial to your practice.

They're crucial to us as well.

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Since 1959, CDSPI has been focused on serving the
needs of dental professionals. **It's all we do.**

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The Best is Yet to Come

ED DERMIT
VICE PRESIDENT,
BUSINESS DEVELOPMENT CDSPI

A leading expert on retirement lifestyle education discusses how to plan for a rewarding life after dentistry.

You may have plenty of ideas about how you will spend your money in retirement, but it's equally important to think about how you will spend your time. To provide guidance in this area, CDSPI has partnered with Dr. Alan Roadburg, who conducts inspiring Life Goal Planning workshops at dental conventions and forums. Dr. Roadburg is also the author of the book, Life After Dentistry, which is co-sponsored by CDSPI.

Dr. Roadburg, how is retirement generally perceived in our society?
On the positive side you have a sense of freedom—freedom from responsibilities, from set schedules, from expectations. We've all seen the commercials of blissful couples on a cruise, glorious days spent on the golf course, or classes to enhance your life in a multitude of ways. But is that sustainable? On the flip side, dictionary definitions contain words like: "leave work", "old age", "withdraw", "cease", and so forth. You want to make sure that these preconceptions don't become a self-fulfilling prophesy.

And how do you do that?
Have a plan. CDSPI emphasizes having a financial plan to help ensure a comfortable retirement, but what about a life plan for a nourishing retirement? That's the basis for my Life Goal Planning workshop.

Why is a plan important?
When dentists start their careers, they have plenty of training and practise at dental school before they ever treat a patient, and continuing education helps them stay on top of their game. But retiring dentists have literally no experience in that new realm.

You worked with CDSPI to do an in-depth survey of retired Canadian dentists. What was the purpose of this, and what did you learn?
Their experiences and insights are invaluable to those whose retirement is on the horizon. I look at them as retirement mentors. In fact, because we surveyed retired dentists, they represent the best source for insights into retiring from dentistry. There are insights about planning your time and how to integrate this with a financial plan, transitioning, the importance of involving your spouse and family, volunteering, and much more. On the flip side, they point out some of the drawbacks to be aware of.

Could you give us an overview of how your Life Goal Planning workshop works?
It's a bit more complicated than this, but generally the planning breaks down into three phases: a) determining goals; b) brainstorming ideas to achieve them; and c) using this information to create your plan.

Let's start with goals. In your career, and in your personal life, you're fulfilled by satisfying certain needs, and by using certain skills that you acquire over time. When you retire, there is the chance that these needs will not be met or skills will go unused. In my workshop, dentists literally list these and evaluate them, prioritising them, and identifying where shortfalls may occur in retirement. This can also be done on your own, using the book as a guide.

In your experience, and from the research, what types of things do dentists identify?
Many dentists cite patient and peer interaction, the ongoing stimulation that a practice provides, and a sense of achievement near the top of their lists. Satisfaction from leisure activities is very broad ranging, including things like shared time with your family, working with your hands, travel, coaching sports teams, playing an instrument, and many others. An advantage that dentists have over most other professions is that they can—and many do – continue to work after retirement. This helps ease the transition and allows them to continue to satisfy some of their core needs.

What happens once people have created their lists?
That's the fun part. We're looking for ideas, and a group setting provides a font of them. With many participants providing suggestions from diverse backgrounds, you tend to get a rich tapestry of ideas to help develop your plan. You collect suggestions that are made to you, as well as suggestions you make to others. I've found that this process of projecting onto others can turn into a valuable source that you can use for your own life goal plan. By the way, I suggest that you also do this with friends, family and colleagues who know you best.

What are the most important things you want dentists to take away from the workshops?
That retirement is a glorious opportunity for self-fulfillment. Depending on when you retire, it may be from a quarter to a third or your total lifespan. Think about that. A joyful retirement is not something you can leave to chance. I want anyone who attends a workshop, or uses my book, to feel confident that they can be masters of their own destiny—that they are in control.

After a successful academic career as a tenured professor, teaching and conducting research on a variety of sociology topics, Dr. Roadburg established The Second Career Retirement Program. He is the author of several books on this topic, including Life After Dentistry.

CDSPI (www.cdspi.com) is a not-for-profit organization providing quality insurance, investment and other programs meeting the specific needs of the Canadian dental community at all stages of their careers. Financial planning and advisory services are provided by licensed advisors at CDSPI Advisory Services Inc. Restrictions to advisory services may apply in certain jurisdictions.

What's a Practice Worth?

DR. TOM BRENEMAN
PAST PRESIDENT MDA AND CDA, PRACTICE SALES AND TRANSITION SPECIALIST, TIER THREE BROKERAGE LTD.

Simply, most think of the value of a practice as a function of the gross revenue, or billings, of the practice. "I figure my practice is worth about 60% of billings", or, "No way I'm paying more than 100% of gross for a practice!" are common comments. The simple fact is that gross revenue is a terrible predictor of practice value. We see Canadian general dental practices selling for anywhere from 30% to 200% of billings and some times for far less. Obviously, it isn't simply about revenue.

The real determinant of a practice's value is expected future earnings. And that only makes sense - it is future earnings that will allow the purchaser to pay off their purchase loan and fund their lifestyle objectives. So, a purchaser's expectation of earnings is what will determine what they are prepared to pay. Note that we're discussing "expected" future earnings, not current earnings. This is an important distinction.

Current revenue and current costs are not a reliable indication of what to expect in the future because some dentists will undertake most procedures themselves; others will refer considerable amounts of dentistry out; others take different approaches to treatment planning;, and some have different skill sets in gaining case acceptance; thus dental billings tend to be highly dependent on the dentists themselves. This can result in a fourfold variation in the level of billing per patient across different dentists. Given this variation, the current revenue done by the current dentist is not a reliable predictor of the future. A purchaser looking at a practice operated by a dentist who is very conservative and refers a lot of work out will naturally expect that future revenues could be much stronger, while purchasers are going to be concerned about their ability to sustain revenue in a practice where the owner is doing a wide range of procedures themselves that the purchaser may not be able to do.

Once we know current revenue we also need an accurate handle on the size of the patient base in a practice. Simply put, in many areas there are too many dentists and not enough patients making patients a scarce resource and a key driver of value. The patient base along with current revenue is used to determine how much dentistry is being done per patient, and how sustainable that revenue will be in the hands of a purchaser.

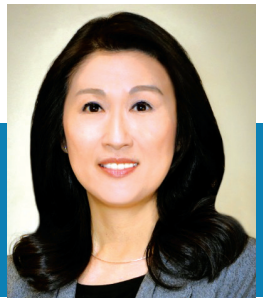
Broadly speaking, in an urban practice with normal levels of insurance coverage, the average dental billings, including lab are about $352 per patient per year, but there are wide variations. As one moves away from the average, purchasers will have very different expectations of future revenue relative to current revenue.

Hygiene revenue tends to be a major driver of practice value but from a very different perspective. In a single dentist practice, dental billings are an attribute of the departing vendor but hygiene billings are an attribute of the practice that the purchaser will be buying. Experience has shown that strong hygiene programs tend to stay strong in a transition, and given the higher profitability and sustainability of hygiene revenue they can add considerable value to a practice. Conversely, weak hygiene programs tend to stay weak and can take years to fix. An average practice will have hygiene revenue of approx. $220 per patient per year.

Another key element of expected future earnings is whether the practice is growing, shrinking or stable. Year to year changes in revenue over the past 3 years will heavily influence a purchaser's expectations for the future. The all-too- normal tendency of older practitioners to slow down as they near retirement can have a negative effect on value but the resulting trends in the size of the annual patient base, and hygiene patient base are even more important. If the practice has management software that can give both current patient counts and historical ones as well, this becomes valuable in understanding whether the trends observed in year-to-year revenue are underpinned by real changes in the size of the patient base.

So, how does all this translate into practice value? What about the variance of 30% to 200% of gross production? A prudent purchaser is going to use the factors that were discussed to do their own assessment of what future revenue and costs will be and that is what will determine how much they will be prepared to pay.

Even at today's higher prices, buying the right practice can still be one of the best investments a dentist will ever make if they understand what should drive the value of their purchase.



DR. NANCY AUYEUNG, DMD

Dental Amalgam: Friend or Foe?

Dental amalgam was first introduced to North America in the early 1800's. It has been and is still used today as a restorative material to repair and restore function in teeth for more than 150 years. However, concerns regarding its use and safety have periodically recurred since then. This article is intended to aid the discussion about dental amalgam between dentists and their patients.

1. What is dental amalgam?

Dental amalgam is an alloy of metals including silver, copper, and tin which are bound in a mixture with liquid mercury. It is an easy-to-handle, durable, strong and cost-effective dental restorative material. Amalgam does not require refrigeration, has a long shelf life and is provided in capsules that are mixed in a machine that combines the components for compaction into a tooth preparation. The material is shaped by the dentist to restore tooth form and function. It takes several hours for amalgam to fully set before it is recommended for full function.

2. Isn't mercury known to be a poisonous substance?

As a single element, mercury is a poisonous metal to which we are all exposed through the air, water, soil and food. Very small amounts of mercury vapor and particles are released from amalgam with chewing and bruxism. Mercury's toxicity is related to the amount absorbed from all sources by the body and accumulates in organs and tissues, mostly the kidneys, and to a lesser extent in the brain, lungs, liver and gastrointestinal tract.

3. What amount of mercury does a person take into the body from natural sources and how much comes from amalgam fillings?

The amount of mercury absorbed depends on a number of factors, some of which include the type of food you eat, your occupational exposure, environmental levels and the number of amalgam fillings you have. The Health Canada report entitled, "Assessment of Mercury Exposure and Risks from Amalgam", estimates that for the average Canadian adult 20-59 years old, the amount of mercury absorbed by the body from all sources is about nine millionths of a gram per day. Of this total, dental amalgam is estimated to contribute about three millionths of a gram per day.

4. Is the mercury absorbed by the body harmful? Is dental amalgam safe to use in the mouth?

For the overwhelming majority of people, no harmful effects are known to be caused by the average levels of mercury exposure from amalgam fillings. Whenever a foreign substance is used in the human body for therapeutic purposes, there is an element of risk that must be considered. It is recommended that patients discuss the risks and benefits of proposed procedures and materials with their dentist prior to beginning treatment. According to Health Canada, current evidence does not indicate that dental amalgam is causing illness in the general population but does recognize that a small percentage of the population is hypersensitive to mercury.

5. Can dental amalgam be safely used for every patient?

There are patients who may be sensitive to the components in amalgam, just as individuals who are sensitive or allergic to other chemical substances or even food.
Health Canada suggests that alternatives be considered for patients with impaired kidney function. Although dental amalgam itself is not linked directly to such conditions, there is evidence that total body burden of mercury is of particular concern with these patients. Amalgam may similarly be contraindicated for workers with occupational exposure to heavy metals or for individuals with greater than average exposure to mercury because of diet, which is primarily seafood.

6. Should special considerations be taken with pregnant women and children?

Dentists consider a number of factors in determining treatment for children and pregnant patients. Mercury can be absorbed, reach body organs and cross the placental barrier. In consultation with the patient and weighing the risks and benefits as well as the urgent need for treatment, dentists may recommend alternative restorative materials, other forms of treatment, or delay treatment as necessary.

In the dental treatment of children, considerations may include the extent of treatment required, medical sensitivities and allergies, and the level of cooperation of the child to treatment in conjunction with other factors. Alternative materials are considered when suitable and recommended as indicated.

7. Should I have my amalgam fillings replaced?

Replacement of restorations may be considered for individuals sensitive to components in dental amalgam. Patients may seek a medical consultation to confirm possible sensitivities, allergies or contraindications to using amalgam for dental treatment. Dentists recognize patient concerns with respect to choice of restorative materials or to refuse treatment with any material. You should note, however, that the dentist may be concerned about the retention, durability or strength of alternative restorations in particular applications, when considering a restorative material. Health Canada states that "A total ban on amalgam is not justified and neither is the removal of sound amalgam fillings in patients who have no indication of adverse health effects attributable to mercury exposure. " Take a common sense approach to your decisions about dental amalgam. If you have concerns, ask the dentist about alternative materials. It is highly recommended to have a fulsome discussion with the dentist regarding the risks, benefits and costs of treatment and choice of materials in the best interest of a patient's health."

July 2017 Interview with Dr. Benoit Soucy, Director of Scientific Affairs at the CDA by the CDA Oasis Manager, Chiraz Guessaier– interviewer. If any questions, please email Oasis at: oasisdiscussions@cda-adc.ca

Can you tell us what the Minamata convention is and how it came about?

In 2009, the United Nations environmental program passed a decision to come up with a legally enforceable tool to minimize mercury emission that results from human activity. And, that started a long negotiation process that led to the conclusion of the Minamata convention, which is essentially a blueprint that says what mercury products will be used in the future, which ones will be phased out, which one will be phased down, and also puts a lot of restrictions on mercury trade and how trade needs to move around the world so that the impact on the environment can be minimized.

What are the broad requirements of the Minamata convention for Canada?

The broad requirements for Canada are very far reaching, they really touch anything that uses mercury from batteries, to lighting, to pesticides, to vaccines anything that would contain mercury is included under the Minamata agreement. As far as dentistry is concerned it's only a concern for dental amalgam. And that was a major issue because we had a lot of difficulty getting the world to understand that there is no perfect substitute for dental amalgam, even countries that banned amalgam, have included exceptions for situations where amalgam is the only product that could be useable. Those exceptions are going down, there are fewer and fewer situations where we can't use amalgam, there is progress being made on some substitute materials that are very interesting, some of them are purely in the knowledge of the behaviour of the materials that are already available, others are on different materials or
improving the existing materials. But there are still situations where we need amalgam. And the big reason why we need amalgam is it is about the least expensive restorative material that we can have and it is also one that doesn't require refrigeration, which means that if you are in a situation where you need to deliver an expensive oral health care, in a situation where you cannot have refrigeration: we're talking about a lot of the third world countries, developing countries, amalgam is extremely important in those countries. In Canada, we need amalgam so we can deliver cheap quality care to populations who are underprivileged and it's very important to specify when we say that, that it is quality care that is either equal or better than what you would get with alternative restoratives.

So, bottom line, dentists will still be able to use amalgam?

Actually, in Canada, we are lucky enough that thanks to the work that was done in the early 2000's, we will see no impact of Minamata. We have already put in place all the measures that were needed to be in compliance with Minamata before its acceptance so we have all the requirements that resulted from the MOU (Memorandum of Understanding) that was signed between CDA and the ministry of the environment in 2002 that has placed us in compliance even before it was written.
I think it's important to keep in mind that no matter what material we use, there will be an impact on the environment, there will be people who will be concerned about the side effects of that material and we have to be prepared to work on the management of those side effects if we want to keep the privilege to use the best materials for the nest situations.

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Radiation Protection

Radiation Protection Services is a department of Medical Physics, CancerCare Manitoba (CCMB).

We are responsible to the Government of Manitoba, through the Office of the Chief Medical Office of Health and CancerCare Manitoba, to provide leadership on the radiation protection responsibilities that fall within the regulatory jurisdiction of the Province. Our expertise includes matters associated with ionizing and non-ionizing radiation.

Services include:

- administration of the Manitoba X-ray Safety Regulation 341/88R, pursuant to the Manitoba Public Health Act
- consultations, in-services and shielding specifications for x-ray applications
- consultation and device surveys related to non-ionizing radiation protection
- radioactive source leakage testing on a fee-for-service basis as a CNSC accredited leakage testing and analysis facility
- gamma meter calibration on a fee-for-service basis as a CNSC radiation meter calibration facility
- general consultation, advice and training to the public on matters related to radiation safety
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X-ray Machine Registration

Provincial regulation requires that all x-ray equipment must be registered with Radiation Protection Services.

X-Ray Compliance

Dentists

Dentists should contact us regarding x-ray questions:

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- Imaging technique changes;
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Microbiome Associated with Severe Caries in Canadian First Nations Children

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Abstract

Young Indigenous children in North America suffer from a higher degree of severe early childhood caries (S-ECC) than the general population, leading to speculation that the etiology and characteristics of the disease may be distinct in this population. To address this knowledge gap, we conducted the first microbiome analysis of an Indigenous population using modern molecular techniques. We investigated the caries-associated microbiome among Canadian First Nations children with S-ECC. Thirty First Nations children <72 mo of age with S-ECC and 20 caries-free children were recruited in Winnipeg, Canada. Parents or caregivers completed a questionnaire on general and dental health, diet, and demographics. The plaque microbiome was investigated by sequencing the *16S rRNA* gene. Sequences were clustered into operational taxonomic units and taxonomy assigned via the Human Oral Microbiome Database, then analyzed at the community level with alpha and beta diversity measures. Compared with those who were caries free, children with S-ECC came from households with lower income; they were more likely to live in First Nations communities and were more likely to be bottle-fed; and they were weaned from the bottle at a later age. The microbial communities of the S-ECC and caries-free groups did not differ in terms of species richness or phylogenetic diversity. Beta diversity analysis showed that the samples significantly clustered into groups based on caries status. Twenty-eight species-level operational taxonomic units were significantly different between the groups, including *Veillonella* HOT 780 and *Porphyromonas* HOT 284, which were 4.6- and 9-fold higher, respectively, in the S-ECC group, and *Streptococcus gordonii* and *Streptococcus sanguinis*, which were 5- and 2-fold higher, respectively, in the caries-free group. Extremely high levels of *Streptococcus mutans* were detected in the S-ECC group. Overall, First Nations children with S-ECC have a significantly different plaque microbiome than their caries-free counterparts, with the S-ECC group containing higher levels of known cariogenic organisms.

Keywords: oral health, dental health survey, preschool child, healthcare disparities, Indigenous population, *Streptococcus mutans*

Introduction

Early childhood caries (ECC), defined as decay involving the primary dentition in children <72 mo of age, is the most common chronic disease of childhood (American Academy of Pediatrics 2016). ECC is a critical public health concern due to its high prevalence, high treatment costs, negative effect on quality of life, and potential long-term complications (Schroth et al. 2009; Martins-Júnior et al. 2013; Schroth et al. 2016). Severe ECC (S-ECC) is an aggressive form of decay that is overrepresented among Indigenous children in North America, including Canadian First Nations, Métis and Inuit, and American Indian and Alaska Natives, and it reflects an underlying extreme oral health disparity in these populations (American Academy of Pediatrics and Canadian Paediatric Society 2011; Irvine et al. 2011). In some Canadian First Nations on-reserve communities, the prevalence of decay in the primary dentition can exceed 90% (Schroth et al. 2005). S-ECC is a major cause of hospital visits for young children (Sheller et al. 1997), and it frequently requires rehabilitative dental surgery under general anesthesia due to the extent of decay and the young age of the children affected (Schroth and Smith 2007; American Academy of Pediatrics 2016). Alarmingly, children living in communities with a high proportion of Aboriginal residents have pediatric dental surgery rates nearly 8 times higher than those living in communities with a low Aboriginal population among children 1 to 5 y old (Canadian Institute for Health Information 2013; Schroth et al. 2016)

In addition to the well-known microbial and host-related causal factors of caries, the etiology of ECC includes many

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A supplemental appendix to this article is available online.

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additional factors, such as socioeconomic status, nutrition, and education (Reisine and Douglass 1998; Fisher-Owens et al. 2013). The early presentation and rapid progression in young Canadian First Nations, Métis, American Indian and Alaska Native children suggests that ECC in these populations may have distinct attributes and etiology (Schroth et al. 2009; QUEST 2015), which warrants further study.

In the current study, we utilized next-generation sequencing to analyze the plaque microbiome from Canadian First Nations and Métis children, with and without S-ECC, to investigate the role of the oral microbiome and to identify microbial characteristics that may account for the aggressive presentation. Defining the etiologic microbiota for S-ECC in these populations will potentially facilitate improvements in care and caries prevention policies, important steps for reducing the extent of S-ECC and improving overall quality of life.

Materials and Methods

Study Population and Design

The study protocol was approved by the University of Manitoba's Health Research Ethics Board and reviewed by the Assembly of Manitoba Chiefs' Health Information Research Governance Committee. Children who were <72 mo of age and identified by their parent or legal caregiver as being Canadian First Nations or Métis were included in the study. Thirty children with S-ECC had severe tooth decay involving multiple primary teeth and were recruited from the Misericordia Health Centre in Winnipeg, Canada, on the day of their scheduled dental rehabilitative surgery under general anesthesia. Twenty caries-free children were recruited from the community and assessed to ensure that there was no evidence of caries (dmft = 0, no cavitations or white spot lesions). Dental examinations and caries assessment were performed by R.J.S. Children who had taken antibiotics within the last 3 mo were excluded. All parents or caregivers of participating children provided written informed consent.

Health-Related Questionnaire

All parents and caregivers completed an interviewed questionnaire proctored by members of the study team. Information was collected on nutritional habits, oral hygiene habits, socioeconomic and demographic characteristics, and history of previous dental visits.

Sample Collection and Sequencing Analysis

Plaque samples were collected from each subject by swabbing a sterile interdental brush on all available tooth surfaces, and samples were immediately frozen at −80 °C in 15% glycerol until used for analysis. Extracted DNA was sent to the Forsyth Institute for library preparation and Illumina sequencing of the amplified V3-V4 16S region. Sequencing data were analyzed with QIIME 1.9.1 (Quantitative Insights into Microbial Ecology; Caporaso et al. 2010). Detailed DNA extraction, sequencing, and analysis methods are supplied in the Appendix.

Statistical Analysis

Questionnaire and microbiological data were linked in an Excel spreadsheet (Microsoft Office) and analyzed with Number Cruncher Statistical Software 10 and GraphPad Prism 7. Bivariate analyses, such as chi-square, Fisher's exact, and *t* tests (Aspin-Welch *t* test for unequal variance), were performed where appropriate. For sequencing data, differences in the relative abundances of taxa between the groups were determined with the Kruskal-Wallis test, controlling the false discovery rate to correct for multiple comparisons (Hochberg and Benjamini 1990). A corrected P value ≤0.05 was considered significant. Differences in weighted and unweighted Unifrac distances between the groups were analyzed with analysis of similarity. A P value ≤0.05 was considered statistically significant.

Results

Demographics and Health-Related Questionnaire Data

A total of 50 children were recruited: 30 with S-ECC and 20 caries free. The mean age of all children was 40.7 ± 11.6 mo. Results from the health-related questionnaire are presented in Table 1. A considerable proportion (56.7%) of children with S-ECC resided in First Nations communities, while all of the caries-free children lived in the Winnipeg region. We found a significant difference in household income ($P = 0.032$) between the groups, with S-ECC children coming from households with lower incomes.

There were significant differences in the proportion of children with S-ECC who were bottle-fed in comparison with caries-free children ($P = 0.021$). Children with S-ECC were also bottle-fed for a significantly longer duration ($P = 0.028$), and the age in which the child was weaned from the breast was significantly lower among S-ECC children (3.3 ± 5.4 mo vs. 12.9 ± 11.4; $P = 0.015$). Children with S-ECC were also less likely to be exclusively breastfed at any point in their infancy ($P = 0.0015$).

Plaque Microbial Community

Plaque samples were obtained from 20 caries-free subjects and 30 subjects with S-ECC. Sequencing generated a total of 3,502,879 sequences after quality filtering, with an average of 66,855 (range, 34,190 to 89,179) sequences per sample and a median length of 421.

Alpha (within-sample) diversity was calculated at a maximum depth of 30,000 sequences per sample, with the rarefaction curves shown in Figure 1A. On average, the samples from caries-free and S-ECC subjects did not differ in terms of species richness or phylogenetic diversity.

Principal coordinates analysis was used on weighted and unweighted Unifrac distances to examine clustering of samples between the S-ECC and caries-free groups (beta diversity;

Table 1. Demographics and Health Characteristics of Study Population.

Variable	Caries Status		*P* Value
	Caries Free	S-ECC	
Age, mo[a]	37.4 ± 10.3	42.8 ± 12.2	0.11
Sex[b]			
Male	9 (32.1)	19 (67.9)	0.20
Female	11 (50.0)	11 (50.0)	
Weight at birth, g[a]	3,529.9 ± 699.0	3,421.3 ± 573.2	0.57
Premature[b]			
Yes	2 (16.7)	10 (83.3)	0.073[c]
No	18 (48.7)	19 (51.4)	
Feeding habits[b]			
Child was breastfed			
Yes	13 (52.0)	12 (48.0)	0.083
No	7 (28.0)	18 (72.0)	
Child was exclusively breastfed			
Yes	12 (70.6)	5 (29.4)	**0.0015**
No	8 (24.2)	25 (75.8)	
Child was bottle-fed			
Yes	16 (34.8)	30 (65.2)	**0.021**[c]
No	4 (100.0)	0 (0.0)	
Age the child was weaned			
From the breast[a]	12.9 ± 11.4	3.3 ± 5.4	**0.014**
From the bottle[a]	17.9 ± 8.9	25.8 ± 12.0	**0.028**
Times per day the child snacks[a]	3.7 ± 1.7	3.9 ± 1.4	0.71
Oral hygiene habits[b]			
Child brushes ≥ daily	17 (51.2)	16 (48.5)	**0.032**[c]
Child brushes < daily	3 (17.7)	14 (82.4)	
Yearly household income, $[b]			
≥28,000	7 (70.0)	3 (30.0)	**0.032**[c]
<28,000	12 (32.4)	25 (67.6)	
Family size[b]			
Other children	2 (50.0)	2 (50.0)	1.00[c]
Only child	18 (39.1)	28 (60.9)	
Receives social assistance[b]			
Yes	13 (37.1)	22 (62.9)	0.41
No	7 (50.0)	7 (50.0)	
Lives in a First Nations community[b]			
Yes	0 (0.0)	17 (100.0)	**0.000010**[c]
No	20 (60.6)	13 (39.4)	
Age of child at first dental visit, mo[a]	20.8 ± 16.0	27.8 ± 14.6	0.11

Values are presented as mean ± SD or *n* (%). Bold value indicates $P \leq .05$.
S-ECC, severe early childhood caries.
[a]*T* test.
[b]Chi-square analysis.
[c]Fisher's exact test.

Fig. 1B). Weighted Unifrac distances take into account abundance of each taxon, while unweighted distances are based only on presence/absence data (Lozupone and Knight 2005). The samples significantly cluster according to caries status (caries free vs. S-ECC) for both weighted and unweighted distance measures ($P < 0.05$, analysis of similarity).

Taxonomic Identification and Relative Abundance

Taxonomy assignment revealed 10 phyla, 4 of which were differentially represented in the caries-free versus S-ECC groups: Firmicutes (39.4% vs. 47.2%, $P = 0.01$), Actinobacteria (14.4% vs. 6.8%, $P = 0.002$), Fusobacteria (16.8% vs. 11.3%, $P = 0.008$), and TM7 (0.5% vs. 0.24%, $P = 0.008$). A total of 95 genera and 290 species were detected, and those with the highest relative abundances are listed in Table 2. Twenty-eight species-level operational taxonomic units were significantly different ($P < 0.05$) in the S-ECC versus caries-free groups. Most of these species have been associated with either health or caries; for example, the caries-free group had 5- and 2-fold higher abundances of *Streptococcus gordonii* and *Streptococcus sanguinis*, respectively, than the S-ECC group, while the S-ECC group had 7- and 9-fold higher levels of an *Haemophilus* species (HOT 036) and a *Porphyromonas* species (HOT 284), respectively. In addition, a *Veillonella* species (HOT 780) was 4.6-fold higher in the S-ECC group, although the relative abundances were low.

Streptococcus mutans was detected in all samples, with a 3-fold higher amount detected in the S-ECC group as compared with the caries-free group. However, the S-ECC group contained

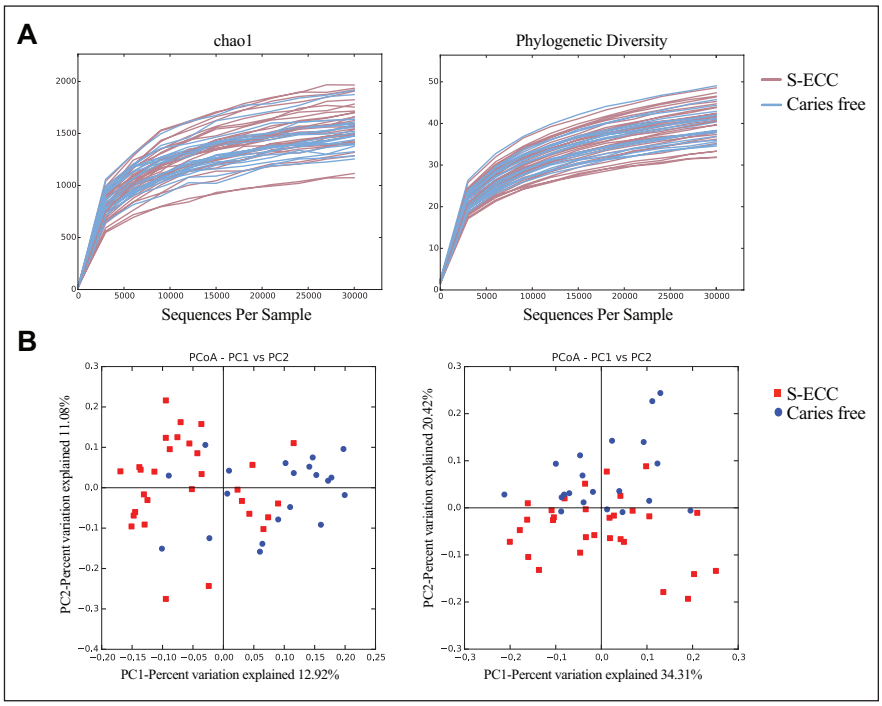

Figure 1. Diversity analyses. (**A**) Rarefaction curves of alpha diversity indices. Left: chao1 (species richness); right, Faith's phylogenetic diversity index. (**B**) Beta diversity shown by principal coordinates analysis (PCoA) of unweighted Unifrac distances (left) and weighted Unifrac distances (right). The plaque microbial communities significantly clustered by caries status ($P < 0.05$, analysis of similarity). S-ECC, severe early childhood caries.

subjects with extremely high values. Six subjects in the S-ECC group were carrying >5% *S. mutans*, 2 subjects with >10%, and 1 subject with an extraordinarily high level of almost 23% of the total species detected. For comparison, in the caries-free group, there was only 1 subject with >5% *S. mutans* (Fig. 2). *Scardovia wiggsiae* has been recently characterized as a possible important factor in ECC (Tanner, Mathney, et al. 2011); in the current study, S-ECC children had on average 7-fold-higher levels of this organism than the caries-free children, although the relative abundances were low (0.007% vs. 0.001%).

S-ECC Subgroup Analysis

Since the majority of children with S-ECC (17 of 30) resided in First Nations communities, we further investigated the microbiome of this group according to place of residency (First Nations community vs. non–First Nations urban community). Beta diversity analysis based on weighted Unifrac distances revealed that the subgroups were significantly different (Fig. 3A). The average species richness (chao1) of the samples in each subgroup was not different (data not shown). At the species level, *Fusobacterium nucleatum* subsp. *vincentii* was significantly higher in the children who did not reside in a First Nations community versus those from First Nations communities (0.5% vs. 1.7%, $P < 0.05$). While the average relative abundance of *S. mutans* was higher in the subjects from non–First Nations communities, this was not statistically significant (4.9% vs. 1.4%, $P = 0.3$). At the phylum level, Fusobacteria was also significantly higher in the children with S-ECC who did not reside in a First Nations community (14.9% vs. 8.5%, $P < 0.05$). The top 100 species-level taxa identified in each subgroup are shown in Figure 3B.

Additionally, we investigated if species richness correlated with caries severity based on dmft (mean 10.8 ± 3.3) and dmfs (45.3 ± 19.1) scores among those with S-ECC, and we found no correlation in either instance (Pearson's $r = 0.20$ and $r = 0.23$, respectively).

Discussion

To the best of our knowledge, this study is the first to use advanced microbial analyses to investigate the oral microbiome of North American Indigenous children, specifically, Canadian First Nations and Métis children, affected by S-ECC. Despite recent advances in understanding the role of the oral microbiome in health and disease, knowledge of its importance in the etiology of ECC is lacking, especially in Indigenous populations. The literature clearly reveals that Indigenous children suffer considerable oral health disparities when compared with other children of the same age. Much of this discrepancy stems from the historical and ongoing effects of colonialism and racism that have resulted in major socioeconomic and health care inequities (American Academy of Pediatrics and Canadian Paediatric Society 2011). With rates of S-ECC in these populations drastically higher than rates in the general population and with the potential for S-ECC to negatively affect systemic health and quality of life, it is critical to investigate the underlying causes and identify any potential unique risk factors that may exist (Schroth et al. 2009; Schroth et al. 2016).

The results of the health questionnaire confirm previously reported behavioral and socioeconomic risk factors, including less frequent brushing, bottle-feeding, later age at weaning, and lower household income (Reisine and Douglass 1998; American Academy of Pediatrics and Canadian Paediatric Society 2011). It has become apparent that S-ECC is a complex, multifactorial disease and that there is a major microbiological component (Irvine et al. 2011; QUEST 2015).

We analyzed the plaque microbiome in each group by sequencing a region of the *16S rRNA* gene. The results of the beta diversity analysis revealed a statistically significant separation between the microbiomes of children with S-ECC and those caries free, indicated in Figure 1 by clustering of the samples into their groups. Overall, this result signifies that plaque microbial communities from the S-ECC subjects were more similar to others within the S-ECC group than they were to the communities from caries-free subjects. This finding

Table 2. Relative Abundance of the Top 25 Species- and Genus-Level OTUs Detected in Plaque of Caries-Free Children and Children with S-ECC.

	Median Relative Abundance, % (Range)	
OTU	Caries Free (*n* = 20)	S-ECC (*n* = 30)
Species level		
Streptococcus HOT 058	23.7 (12.3 to 42.0)	26.7 (11.1 to 42.3)
Leptotrichia shahii	3.4 (0 to 16.7)	2.1 (0.2 to 11.7)
Lautropia mirabilis	3.2 (0.2 to 11.6)	2.2 (0.05 to 10.0)
Haemophilus parainfluenzae	2.0 (0.01 to 7.2)	3.1 (0.12 to 12.6)
Veillonella dispar	2.2 (0.15 to 9.4)	3.0 (0.33 to 19.0)
Rothia aeria[a]	2.4 (0.37 to 7.6)	0.52 (0.004 to 1.7)
Corynebacterium matruchotii[a]	2.0 (0.66 to 5.4)	0.85 (0.13 to 5.4)
Actinomyces naeslundii[a]	1.8 (0.68 to 6.2)	0.67 (0.15 to 5.7)
Rothia dentocariosa	1.7 (0.12 to 24.5)	0.70 (0.16 to 5.5)
Abiotrophia defectiva	1.1 (0.07 to 6.3)	1.3 (0.003 to 5.7)
Gemella haemolysans	0.87 (0.09 to 3.8)	1.2 (0.15 to 5.3)
Granulicatella adiacens	0.82 (0.14 to 2.3)	1.1 (0.02 to 2.4)
Porphyromonas HOT 279	0.63 (0.03 to 3.5)	1.1 (0.02 to 8.4)
Granulicatella elegans[a]	0.32 (0.03 to 1.2)	1.0 (0.003 to 4.0)
Leptotrichia HOT 225	1.0 (0.03 to 4.5)	0.45 (0.008 to 5.9)
Fusobacterium nucleatum ss. vincentii	0.54 (0.04 to 3.8)	0.88 (0.09 to 4.1)
Corynebacterium durum	0.80 (0.14 to 9.4)	0.41 (0 to 4.3)
Streptococcus mutans	0.15 (0.006 to 10.4)	0.73 (0.02 to 22.9)
Prevotella melaninogenica[a]	0.10 (0.002 to 3.6)	0.71 (0.03 to 11.8)
Alloprevotella HOT 473[a]	0.04 (0 to 1.7)	0.69 (0.001 to 9.3)
Gemella morbillorum	0.58 (0.11 to 3.3)	0.69 (0.07 to 2.0)
Haemophilus HOT 036[a]	0.07 (0.003 to 0.3)	0.56 (0.001 to 3.5)
Streptococcus sanguinis[a]	0.56 (0.19 to 0.8)	0.28 (0.13 to 0.7)
Neisseria mucosa	0.44 (0.09 to 1.2)	0.34 (0.02 to 1.2)
Aggregatibacter HOT 458	0.25 (0.003 to 2.3)	0.43 (0.05 to 2.8)
Genera level		
Streptococcus	28.3 (16.8 to 49.6)	31.3 (12.8 to 50.0)
Leptotrichia[a]	10.5 (4.2 to 23.7)	5.7 (0.61 to 30.4)
Neisseria	7.5 (0.70 to 27.9)	9.0 (0.22 to 26.4)
Rothia[a]	4.8 (0.72 to 29.9)	1.7 (0.04 to 10.3)
Fusobacterium	4.8 (0.65 to 12.3)	3.7 (1.1 to 9.5)
Haemophilus	2.1 (0.01 to 7.5)	4.6 (0.13 to 12.8)
Veillonella	2.4 (0.18 to 10.1)	4.1 (0.39 to 19.8)
Corynebacterium[a]	3.3 (1.4 to 14.8)	1.6 (0.01 to 8.1)
Actinomyces[a]	3.2 (1.4 to 9.4)	1.8 (0.25 to 7.4)
Lautropia	3.2 (0.19 to 11.6)	2.2 (0.05 to 10.2)
Prevotella	0.93 (0.17 to 9.1)	2.5 (0.20 to 26.5)
Granulicatella	1.3 (0.22 to 2.6)	2.3 (0.06 to 5.7)
Gemella	1.6 (0.20 to 4.9)	2.0 (0.29 to 7.0)
Porphyromonas	1.3 (0.08 to 5.1)	1.8 (0.023 to 9.2)
Capnocytophaga	1.5 (0.48 to 5.1)	0.94 (0.19 to 2.7)
Abiotrophia	1.1 (0.07 to 6.3)	1.3 (0.003 to 5.7)
Kingella	1.2 (0.61 to 2.5)	0.80 (0.065 to 2.1)
Alloprevotella[a]	0.13 (0.003 to 1.7)	1.0 (0.006 to 9.5)
Aggregatibacter	0.88 (0.01 to 3.3)	0.99 (0.14 to 4.1)
Campylobacter	0.59 (0.14 to 2.5)	0.46 (0.08 to 3.9)
Selenomonas	0.29 (0.02 to 3.7)	0.54 (0.02 to 4.2)
Cardiobacterium[a]	0.45 (0.04 to 2.2)	0.17 (0.002 to 0.7)
Lachnoanaerobaculum	0.43 (0.16 to 2.6)	0.32 (0.03 to 1.6)
TM7 [G-1][a]	0.33 (0.004 to 1.4)	0.11 (0.005 to 1.8)
Bergeyella	0.33 (0.03 to 0.8)	0.27 (0.05 to 1.2)

HOT, Human Oral Taxon; OTU, operational taxonomic unit; S-ECC, severe early childhood caries.
[a]$P \leq 0.05$, Kruskal-Wallis test, corrected for multiple comparisons by the false discovery rate method.

demonstrates that the composition of the entire microbial community is a determining factor in S-ECC for this population.

Alpha diversity describes the number of different types of sequences within a sample. In the current study, we calculated species richness and phylogenetic diversity of each sample, and on average there was no difference between the S-ECC and caries-free groups (Fig. 1). Some studies have shown that increased alpha diversity is associated with health (Gross et al.

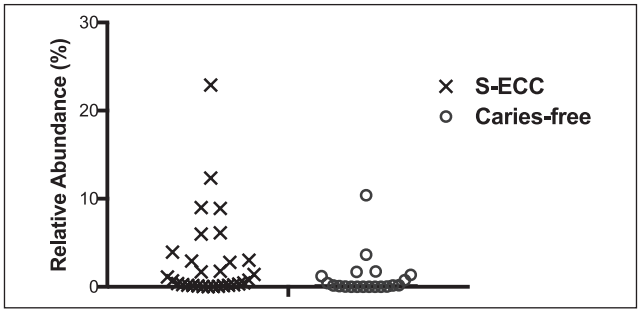

Figure 2. Relative abundance of *Streptococcus mutans* in all subjects. Percentage relative abundance of *S. mutans* is plotted for each subject. S-ECC, severe early childhood caries.

2012; Belstrøm et al. 2014; Xiao et al. 2016); however, other studies report the opposite (Griffen et al. 2012; Xu et al. 2014; Johansson et al. 2016). For example, in a study of young children, Xu et al. (2014) found no significant difference in the species diversity of those with caries and those without. Interestingly, Johansson et al. (2016) showed that in a population of Swedish adolescents with and without caries, the groups did not differ in terms of alpha diversity, but when compared with a caries-active population of Romanian adolescents, the Swedish subjects had much lower alpha diversity. This finding suggests that the extent to which species richness correlates to caries status is not the same in all populations, with the environment potentially playing a major role.

Four phyla were significantly differentially represented in each group. The S-ECC group had a higher abundance of Firmicutes, while Actinobacteria and Fusobacteria were higher in the caries-free group. This result supports a recent longitudinal study in young children, in which Actinobacteria decreased and Firmicutes increased as caries progression proceeded (Gross et al. 2012) and a study that reported a significantly higher relative abundance of Firmicutes in children with S-ECC versus caries-free controls (Jiang et al. 2013). Regarding the most abundant taxa, 7 of the top 25 genera detected were significantly different between the groups. *Alloprevotella* was significantly increased in the S-ECC group; this genus was also reported to be increased in a study of adult subjects with caries (Xiao et al. 2016). The genera *Leptrotrichia, Rothia, Corynebacterium, Actinomyces, Cardiobacterium*, and TM7 [G-1] were significantly higher in the caries-free group. These genera have been frequently identified in plaque and associated with health (Tanner, Kent, et al. 2011; Xu et al. 2014; Johansson et al. 2016; Xiao et al. 2016).

Of the top 25 most abundant species detected, *Granulicatella elegans, Prevotella melaninogenica*, and a *Haemophilus* species (HOT 036) were significantly more abundant in the S-ECC group. *G. elegans* and *Prevotella melaninogenica* have been reported to be increased in children with S-ECC when compared with those caries free (Kanasi et al. 2010; Ling et al. 2010; Tanner, Kent, et al. 2011). Conversely, we found that *Rothia aeria, Corynebacterium matruchotii, Actinomyces naeslundii*, and *Streptococcus sanguinis* were significantly increased in the caries-free group. Both *C. matruchotii* and *A. naeslundii* have been associated with health and caries-free

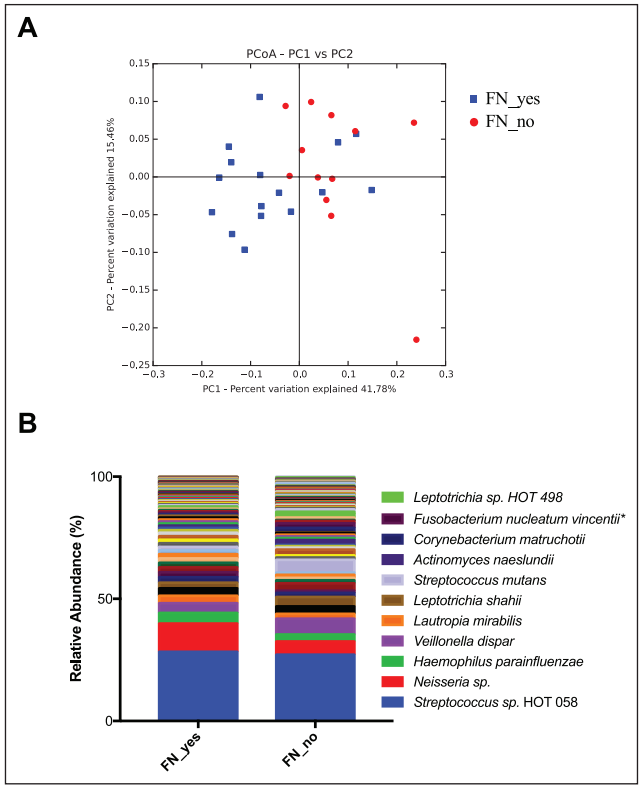

Figure 3. S-ECC subgroup analysis. Subjects from the S-ECC group were further divided per their residency in a First Nations community. (**A**) Beta diversity shown by principal coordinates analysis (PCoA) of weighted Unifrac distances. The plaque microbial communities significantly clustered by place of residency ($P < 0.05$, analysis of similarity). Blue, resides in First Nations community; red, does not reside in a First Nations community. (**B**) Average of the top 100 most abundant species identified in each group. FN_no = does not reside in a First Nations community ($n = 13$); FN_yes = resides in a First Nations community ($n = 17$). *$P < 0.05$ (Kruskal-Wallis with false discovery rate correction). S-ECC, severe early childhood caries.

status (Marchant et al. 2001; Gross et al. 2010; Tanner, Kent, et al. 2011; Ma et al. 2015). *S. sanguinis* is a known health-related species that has been shown to have an inverse and antagonistic relationship with *S. mutans* (Caufield et al. 2000; Kreth et al. 2008). *Rothia* spp. are commonly detected in plaque (Aas et al. 2008; Bik et al. 2010; Kanasi et al. 2010; Ling et al. 2010), but *R. aeria* has not been previously well associated with health. Caries-free subjects in our study had almost 5 times the amount of *R. aeria* on average as compared with the S-ECC children. Interestingly, another *Rothia* species, *R. dentocariosa*, has been associated with S-ECC (Jiang et al. 2016), but in our study, the caries-free group had >2-fold-higher levels. This discrepancy may be one example of the uniqueness of this particular population, and it reinforces the need for further study of dental health in Indigenous children.

The relative abundance of *S. mutans*, the quintessential cariogenic organism, was 3 times higher in the S-ECC group than in the caries-free group, but the average value masks the extremely high levels of some children in the S-ECC group (Fig. 2) of up to 23% of the total taxa detected. Interestingly, a recent study comparing the microbiomes of European

adolescents with and without caries from 2 countries showed that the relative importance of *S. mutans* in determining caries status was different according to where the populations resided; the role of *S. mutans* as an important etiologic factor was more pronounced in the population lacking access to caries prevention and treatment strategies, as opposed to one in which there was adequate dental care (Johansson et al. 2016). This finding supports the idea that the cariogenic etiology of certain populations may be unique on the basis of socioeconomic or geographic factors, and the high levels of *S. mutans* in some subjects in our study may be a reflection of that.

Notably, 2 subjects in the caries-free group (of 20 total) had a high relative abundance (>2%) of *S. mutans*; these 2 subjects also had high levels (>2%) of *R. aeria* and *C. matruchotii*, 2 species significantly associated with caries-free status in this study. In the S-ECC group, 10 subjects (of 30 total) had high abundances of *S. mutans*, with none exhibiting high levels of *R. aeria* and *C. matruchotii.* This result suggests that certain health-related species may protect against the risk of carrying a high abundance of *S. mutans*, and it indicates that the balance and structure of the microbial community as a whole may be the most important factor in determining caries risk. The ecologic plaque hypothesis describes plaque as a dynamic microbial community in which pathogenic and protective species exist in a delicate balance, and the development of caries is the consequence of a shift in the population toward a virulent state, as opposed to the consequence of the virulence of a single pathogen (Takahashi and Nyvad 2008, 2011). Our results fit in with this ecologic perspective.

Interestingly, subgroup analysis of the S-ECC group based on residency in a First Nations community revealed that the plaque microbiomes of the 2 subgroups are overall significantly different, with the phylum Fusobacteria significantly higher in the children who did not live in a First Nations community (Fig. 3). Previous studies have found the genus *Fusobacterium* associated with healthy tooth surfaces (Jiang et al. 2013; Xu et al. 2014). This observation generates questions regarding environment as a risk factor, and it paves the way for further investigation.

This study is not without limitations. Due to budgetary constraints, we relied on a convenience sample of children with S-ECC on the day of their dental surgery. All controls were from Winnipeg, and those with S-ECC were from different First Nations communities or off-reserve communities, including Winnipeg. Some questions were retrospective, which might have resulted in recall bias, and the potential for response bias on the part of parents and caregivers is noted. The primary goal of this pilot study was to generate data on this understudied population to provide the foundation for future larger studies.

Overall, this study yielded important information on the microbiome of First Nations and Métis children with S-ECC and those free from caries. The only previous study to investigate the microbiology of Canadian First Nations children with S-ECC was a longitudinal observation in 1985 (Milnes and Bowden 1985). Therefore, this study is the first to investigate the microbiome of this population using modern molecular techniques. We confirmed previous reports that implicate behavioral as well as microbiological factors in the development of S-ECC, with *S. mutans* as the major cariogenic factor, along with many other species. Furthermore, we found that the S-ECC and caries-free groups represent disparate plaque microbial communities, supporting the notion that there is potentially a distinct caries-causing community that can eventually be identified and used for diagnosis and prognosis. It is clear that socioeconomics, cultural factors, and microbiology all play a role in the high rates of S-ECC experienced by Canadian Indigenous populations, but the finer details are still very much unknown. Therefore, it is imperative to continue to study the underlying causes (including the microbiome) of the extreme oral health disparities that these populations face to provide prevention and treatment services that accurately reflect the underlying etiology.

Author Contributions

M. Agnello, L. Cen, contributed to data analysis and interpretation, drafted and critically revised the manuscript; J. Marques, contributed to data acquisition, analysis, interpretation, drafted and critically revised the manuscript; B. Mittermuller, A. Huang, N. Chaichanasakul Tran, contributed to data acquisition, drafted and critically revised the manuscript; W. Shi, contributed to conception, design, data analysis, and interpretation, drafted and critically revised the manuscript; X. He, contributed to design, data analysis, and interpretation, drafted and critically revised the manuscript; R.J. Schroth, contributed to conception, design, data acquisition, analysis, and interpretation, drafted and critically revised the manuscript. All authors gave final approval and agree to be accountable for all aspects of the work.

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GEORGE P. B. CADIGAN
June 1, 1948 - August 23, 2017

Photo taken July 15, 2017 in our backyard. We thought he never looked better, but apparently he really was sick. George Cadigan, age 69, died of cancer on August 23, 2017 with his loving wife Sharon by his side. To celebrate George's life, a short service followed by a reception was held on Tuesday, August 29, 2017 at 2:00 p.m., at the Winnipeg Squash Racquet Club, 275 Stradbrook Avenue. All are encouraged to share in a photo-tribute, stories and condolences for the family by visiting George's memorial page at IntegrityDeathCare.com

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