

Intro

MC: Welcome back to The Med Thread as we start our second season, talking about drugs and medicine, pharmacy, history, culture and society. We're continuing to blend these together to understand where the science came from, how we got to today and more importantly, answering why we're using and providing these drugs, services, and programs.

My name is Mike and I'm the drug information pharmacist at the School of Pharmacy at Memorial University. I answer questions about medications and their use from healthcare professionals across Newfoundland and Labrador.

CB: And I'm Cathy, a pharmacist at the school's MTS Clinic. The MTS Clinic is a pharmacist run clinic where we work with patients to help them manage medications. We make sure they that patients get the right medications and the full benefits of them.

This year we're bringing in more guests to tackle topics like weight loss, blood pressure, cholesterol, and palliative care. For today, we're ringing in the year with a topic close to my heart and linked to one most common New Year's resolutions—to quit smoking. You've likely seen ads such as these:

[Clips from:

Vape e-cigarettes: <https://www.youtube.com/watch?v=ej4EBjvonNY>

Blu e-cigarettes: <https://www.youtube.com/watch?v=oQelKE-aBNg>]

MC: But is that really true? And what should we know about vaping. No doubt you've also seen the numerous vape stores in town, sometimes with elaborate window displays and sometimes with cloudy, opaque glass making you wonder what's inside. It's becoming a bigger thing!

CB: In 2014 the word 'vape' was Oxford Dictionary's Word of the Year. They found that we were thirty times more likely to see 'vape' in 2014 than in 2012 and use of it doubled compared to 2013. A lot of this is also related to the growth of the e-cigarette industry, which was reported to exceed \$200 million in Canada in 2017 and expected to cross \$43 billion worldwide by 2023. (Oxford dictionary: <https://en.oxforddictionaries.com/word-of-the-year/word-of-the-year-2014>
News reports:

<https://www.prnewswire.com/news-releases/global-vapor-products-market-outlook-and-forecast-2018-2023-market-and-is-expected-to-cross-43-billion-by-2023-300589389.html>

<https://www.cbc.ca/news/fifth/e-cigarettes-welcome-back-big-tobacco-1.4224426>

<https://www.theglobeandmail.com/report-on-business/industry-news/marketing/selling-vaping-e-cigarette-industry-grapples-with-cloudy-rules/article35625105/>)

MC: Last year, the government of Canada amended The Tobacco Act, turning it into the Tobacco and Vaping Products Act, to provide some regulation. A few of the changes include regulating where you could sell them, what's required for labelling, where and how it can be advertised, and importantly, allowing nicotine to be in the products.

1 – What’s vaping?

CB: We’re extremely excited to have Dr. Leslie Phillips here with us today to discuss e-cigarettes and vaping, what we know about them, what we don’t know and how it’s impacting our society. Dr. Phillips is a friend, a colleague, a fellow pharmacist and professor at the School of Pharmacy here at Memorial. She specializes in mental health and smoking cessation programs in our province. Welcome Leslie!

LP: Thanks Cathy, it’s a pleasure to be here. And happy National Non-Smoking Week to everybody out there.

MC: We’ve got so much to talk about today, but let’s start with the basics first. What is an e-cigarette and how does it work compared to traditional cigarettes?

LP: Well an e-cigarette is a battery operated device and it heats a liquid, not tobacco. That liquid is commonly referred to as e-juice or e-liquid and it heats it to produce a vapour or aerosol. Vapes are available in many different forms, cigalikes which look like cigarettes, vape pens, box mods which kind of look like a cigarette box with a straw in it, and most recently pod vapes which look a lot like a USB stick.

CB: There’s definitely a lot of forms of these e-cigarettes and vape products and using these sorts of products is not that new. For decades we’ve been able to use nebulizers to vapourize liquids and use this vehicle to deliver drugs directly to the lungs for conditions like asthma. How did we get to today’s vaping products from those nebulized asthma medications? What about the history of the e-cigarettes?

LP: Well the first prototype for e-cigarettes I think, was introduced in about 1965. The modern e-cigarette was actually invented by a pharmacist in China in 2003. It wasn’t though until about 2010/2011, when there came a big explosion, really, on the Canadian market, of multiple types of e-cigarettes and flavours. So, there’s probably today, more than 450 different types of vaping devices and thousands of flavours. They became so popular that by 2016, the uptake of e-cigarettes was about 10 times what it was in 2011. And most recently, Juul, which is the most popular selling pod vape, sold 35% of its shares to tobacco giant Altria, formerly known as Philip Morris, for the pickly sum of \$12.8 billion.
(<https://www.cnn.com/2018/12/20/altria-takes-stake-in-juul-a-pivotal-moment-for-the-e-cigarette-maker.html>)

CB: It’s funny that you say there was that explosion in 2010/2011 because I certainly remember seeing them in a pharmacy I was working at back then. And I’m surprised to know now that they were sold, to reflect back on them being sold in pharmacies because they’re certainly more regulated now.

MC: I wonder about the original production of these e-cigaretes and why it was made and why that particular pharmacist decided that this might be a good idea.

LP: Well I think that all came about from a desire to get to this tobacco end-game where we could provide smokers with the satisfaction that’s provided by a cigarette with nicotine, but perhaps without the harmful part of the cigarette which comes from the tobacco ingredients.

MC: The manufacturing of medications is strictly regulated, with restrictions on what's allowed in them. When it comes to e-cigarettes and vape liquid or vape juice or e-juice, what's in those?

LP: Well for starters, that aerosol that you see is not water vapour and I think that's a common misconception that people have. It actually is theatrical smoke. Propylene glycol and vegetable glycerin are the primary ingredients in an e-cigarette and they're responsible for producing the vapour. These products also have flavouring in them, and they have something called particulate matter as well as nicotine or nicotine salts. They don't all contain nicotine, but many of them do. And nicotine salt is a little bit of a newer creature on the market and it's found in a lot of the pod vapes. Nicotine salts deliver nicotine at a lower pH and that means it's much easier to inhale, it's less harsh on the back of the throat and it was the capacity to deliver nicotine more effectively.

MC: It's funny that you mention that propylene glycol is one of the main ingredients in the e-juice because I know that propylene glycol is typically used for compounding for topical products so that's kind of interesting.

I was also curious to see what the toxic doses would be and it depends on how used to it people are. But I did find that accidental ingestion estimates that 40 to 60 mg can be lethal. And it's different if it's smoked or inhaled, but how much nicotine are people putting into these and how much do they get from it?

LP: That's a great question. Let's talk about a tobacco cigarette first just to put it in perspective. A regular tobacco cigarette contains on average, about 10 mg of nicotine. The smoker doesn't receive the full 10 mg so when you smoke it, an average smoker receives about a milligram of nicotine per cigarette. It's much harder to quantify how much nicotine a vaper would get from their device because the amount varies so much by the type of device you use, the type of e-juice that you put in it, whether it contains nicotine or nicotine salt, what the concentration of nicotine is in that product. Typically, they come in 6 mg aliquots, so it could be 6, 12, 18, 24 mg/mL is a common way in which nicotine is provided in e-liquids. The product Juul which is a nicotine salt has 50 mg/mL of nicotine in it. Also, the way and the frequency in which you use the device and the temperature at which you use it because they do have a battery that allows you to heat up the liquid to varying temperatures. So, all of those things affect the nicotine and if we were to determine how much nicotine a user would get out of their vape, we would really have to look at it from a product to product basis and that makes it very difficult to do.

CB: Yes, and I'm just thinking about when we're treating a patient or helping a patient with smoking cessation, it's easy to say if you're smoking a pack a day, it's equivalent to about 20-21 mg of nicotine a day in your typical one pack a day smoker. But when it comes to the vape products, like you said, it's a lot harder to figure out exactly how much nicotine they're getting.

And you've mentioned the particulate matter that is in these vape products. What happens when you heat those, and you turn those substances into vapour?

LP: So, let's talk about what's in that e-cigarette because there's a lot of things in there that are found in regular tobacco cigarettes. There is particulate matter as you mention Cathy, there's also a lot of heavy metals, not of the rock band variety, but things like lead, cadmium, chromium, nickel, silver, mercury, and aluminum. And there are also the hazardous creatures

that we see in tobacco cigarettes. Things like volatile organic compounds, polyaromatic hydrocarbons, as well as nicotine and it's these sorts of chemicals that we're mostly concerned about because they're the ones that have been implicated in things like cancer and causing heart disease, etc., that are associated with tobacco cigarettes. Now they are in the e-cigarette but just how much is in there is difficult to say. And how much is too much? That's also unclear.

When it comes to the particulate matter, we know that there are tiny particles in the vapes and they're so small, that they're actually able to make their way down, down, down, into the tiniest spaces in the lung and perhaps gain entry into the bloodstream as a result. And it's particles in the ear for example, that are responsible for ear pollution and certain particles we know are associated with cancers. The particles that we see from a vape are actually liquid particles, so we really don't know for sure, what the long-term effects of inhaling those particles might be.

So there's a practice that some vapers have called dripping and dripping is concerning because dripping is a practice by which individuals turn up the heat on their device and drip the e-juice directly onto the hot coil. So this superheats the e-liquid and they do that because it can produce a thicker cloud and they say it has a better taste. But when you heat up chemicals, you run the risk of changing the chemical formation of some of those products and actually creating new compounds and often times when you do that, those new compounds that are created can be hazardous to your health and for example can be carcinogens.

CB: It's interesting about the volatile organic compounds because I've read a little bit about those in the news and how that's kind of the new buzz word for all the pollutants that are in our homes. And these are all the chemicals that give you that new car smell or when you buy a new rug and that chemical smell that comes off of it. With these vape products, we're putting that straight into our lungs.

The cigarette industry or tobacco industry was pretty clever when they came up with cigarette filters and they gave us this illusion that if there was a filter on your cigarette, it actually filtered out the bad things and made them less harmful. Is there anything like that for e-cigarettes, in terms of any filters or anything they've added that make it seem safer?

LP: No there really isn't a filter for e-cigarettes but I do want to take a minute to talk about the cigarette filter, which is really just a device with a bunch of holes in it, the idea being some of the smoke escapes out through the holes before you inhale it. The whole concept of a light cigarette was simply a cigarette filter that had more holes in it and smokers just covered it up with their fingers when they were smoking a cigarette. So there's no such thing as a light cigarette. The other interesting thing that I heard recently is that tobacco companies actually put chemicals in those filters that would make them turn a yellow brownish colour to make the smoker think that it was indeed filtering out harmful chemicals

MC: It's really interesting that you mention that because I saw a YouTube clip, where they did an experiment and they had the vape pen and a bunch of cotton balls in a closed chamber. And they said, what's going to happen if you use that for a month and they compared that to burning a cigarette. And when you burned the cigarette, all the cotton balls turned yellow and dark, kind of like your typical cigarette packaging where you see the black lung. But with the vape pen, you didn't see as much. There was still a little bit of colour there but you didn't see much and I think it has to do with the particles being so small and maybe microscopically, you'd be able to see

something there.

(Example:

https://www.youtube.com/watch?v=2adOk1wfl0U&index=4&list=PL_hl8S6b_Jc2xqCe0VLVjy-yvPtJpUKKC)

CB: I think the key is that we really don't know yet!

2 – Vape regulations

MC: From all this, it makes sense that the government of Canada is stepping in to provide some regulation on these products. We know that tobacco was regulated for over a hundred years, the first iteration preventing the sale to people under the age of 16. It wasn't until 1993, that this age was increased to 18 and with more changes, a number of packaging requirements were created. The provinces also started to ban smoking in certain public areas and indoor spaces. So what's new with the update last year?

(<https://www.cbc.ca/news/health/a-legal-history-of-smoking-in-canada-1.982213>

Supplemented by: <http://publications.gc.ca/Collection-R/LoPBdP/modules/prb98-8-tobacco/legislation.htm>

[http://www.smoke-](http://www.smoke-free.ca/pdf_1/2009/history%20of%20tobacco%20control%20in%20canada.pdf)

[free.ca/pdf_1/2009/history%20of%20tobacco%20control%20in%20canada.pdf](http://www.smoke-free.ca/pdf_1/2009/history%20of%20tobacco%20control%20in%20canada.pdf))

LP: So as you mentioned, federally the Tobacco and Vaping Products Act came into effect I think somewhere around May 2018 and proposed certain regulations regarding the manufacture, the promotion. You can't promote e-cigarettes in such a way that it would be appealing to youth. Requirements regulations around the labeling, so it has to clearly state the ingredients and if there's nicotine in it and how much nicotine and some regulations around sale of vaping products. Provincially, a number of provinces have also enacted regulation, that's more around the display of products and where they can be sold and their use in places where smoking is prohibited and sales to minors etc.

So I guess the biggest new thing about this new federal Tobacco and Vaping Products Act is the legalization of the sale of nicotine containing vaping devices. So prior this act, although I think it would come as a shock to most people, vapes that contain nicotine were illegal in Canada. And the reason why I say it would come as a shock to most people is because nicotine in these products was widely available. You could purchase products, e-liquids in convenience stores, at gas stations that clearly said on the label that they contain nicotine. And if you went into a vape store, you could certainly ask to have nicotine added to your product. And of course, let's not forget about the so-called underground economy. There are a lot of home brewers out there who are making their own e-liquid so you're trusting some dude down in his basement perhaps, to put together all these chemicals and do the calculations and dilutions and measure out the right amount of nicotine to create your e-liquid for you. So nicotine was widely available and if you look at all the surveys around the uptake of nicotine in e-liquids by youth certainly they were reporting they had no problem accessing e-liquids with nicotine.

So as far as age restrictions go, no change there. These products are not to be sold to individuals under the age of 18. As far as advertising restrictions go, again, the new act prohibits the advertising and promotion of vaping products that appeal to youth, so for example, candy flavours. I think it's important to note, it's prohibiting advertising and promotion, not the

manufacture, so these products are indeed still available. That has implications when you think about why youth in particular use e-cigarettes and the flavouring or the appeal of flavouring is probably the primary reasoning why they use e-cigarettes.

When you talk about display restrictions, a lot of that seems to come more under the provincial governments. Some of you may have heard or seen in the news more recently, that Ontario has decided, besides their buck-a-beer, they've decided to allow the display of vapes on the counters, in convenience stores and gas stations.

MC: You talk about advertising restrictions, so really we shouldn't see billboards for these products now or is that's something that's still allowed as long as it's not directed at youth.

LP: All that stuff is still allowed and in fact, for the first time in a long time, decades, we're starting to see big tobacco on the airwaves and in the media marketing their product. So you can market it, as long as it's deemed not to be appealing to youth. Really, I think, it's open season on youth and young adults as far as the availability of nicotine. They are regularly exposed to these products especially through social media. Just recently, I came from a tobacco conference which they had a panel of young men who were regular vapers and they talked about the constant ads for vaping that were coming up on their Instagram feeds. Certainly, there are a lot of YouTube videos on things like how to drip, which we talked about earlier. Something called cloud chasing competitions, where these are big conventions where you can go blow big plumes of vapour and you can get prizes if you can make the most vapour or do fancy things with your, make rings etc, with the vapour. So you know, big tobacco is back, and it's creating lifelong customers by addicting our youth to nicotine.

CB: One of the things that you mention, is the Instagram and I've seen the videos on YouTube with the kids making really cool shapes out of the shape from the vape or the Instagram videos that show athletes using the products. And we did talk about how the government certainly regulates target advertising to youth in the traditional sense, like your tv ads, your print media, the radio, etc. But what do you think the social media and the I guess, the lack of regulation of social media has on the uptake of these products in youth?

LP: Well, I mean, there's not many young people that I would say, that are watching regular tv, so I mean, what is the best way to reach youth? They live on social media and it's genius really. So I think that youth and young adults are regularly, likely daily, likely multiple times daily getting exposed to these products on social media and that has to have an impact on their uptake.

CB: In the media especially in Ontario lately, we've seen stories of how there is such an uptake in youth. One of the stories that really hit home, was a story about the high schools in Ottawa. One in particular really noticed the uptake of these vape products and actually had to remove the doors on the bathrooms of the school because the kids were going into the bathrooms and vaping in the bathrooms. So we had talked, or Mike had alluded to, how these products are banned to be smoking and vaping in certain areas, indoor spaces so that would include your schools. But we have heard, students have been using these in the classroom and obviously in the bathroom. So where are people using these products?
(<https://www.cbc.ca/news/canada/ottawa/high-school-removing-washroom-doors-to-snuff-out-vaping-1.4971232>)

LP: I think the short answer to that question is, everywhere. But certainly anecdotally, I personally have two teenage boys, so I hear lots of stories about where vapes are being used. Certainly school bathrooms are a big place in which vapes are used, but also in class. So they have the capacity to either hold in the vape until it dissolves, so instead of exhaling it, keeping it in their mouth until it dissolves. Or the other thing that they do is turn down the battery so that it produces less vape and then can just blow it out gently into their knapsack or book bag. Of course the fruity smell, smells a lot like perfume so it really could be attributed to perfume or scented products, or deodorant maybe that students are using. So it's easy to get away with it.

I know that they're vaping on school buses as well because my son asked me, "mom, are you allowed to vape on the bus?" And they're vaping outside with the regular tobacco cigarette smokers and that's kind of interesting to me because there are some longitudinal studies that show that if you vape, or youth that vape, potentially are 2 to 7 times, depending on the study more likely to take up tobacco cigarettes later in life. What is the reason for that? Is it because they're hooked on nicotine, that could be a big part of it, but they are also oftentimes vaping around people that are also smoking so they are exposed to that, so that's another concerning issue about youth and e-cigarettes.

MC: I guess, is there anything we can do about it? I mean, that school had to take down the doors in the washroom. And I know that for example, planes, they have an announcement that you're not allowed to use e-cigarettes either. So, is there anything we can do about this?

LP: Well I think it's going to be challenging because youth or people in general used e-cigarettes with nicotine before it was legal and there was just no way to regulate it because there was just too much of it and it sort of got out of control and snowballed. And it's going to be difficult again in schools to try to regulate it and I don't really know what the answer is. I know that Health Canada is certainly working on a strategy to try to address the uptake by youth. I think we have to be creative about ways that we can do that. I think we need to educate parents and teachers about the concerns of vaping in youth and particularly vaping using nicotine, what the long-term consequences of that might be. But we also have to think about how we can get to youth. Certainly, social media is going to be the best platform but how do we market that message because so far telling smokers about the hazardous effects of smoking like we do on the cigarette package hasn't seemed to work. So, I think we have a bit of work to do to try to figure out how to curb this epidemic and just taking down the washroom doors is not going to be the solution. We've got to figure out a way that we and get them to think about what they're doing before they take their first e-cigarette. We've got to try to stop the behaviour rather than control it after it starts. How do we convince youth to make wiser choices?

MC: And we mentioned that there were videos on YouTube and Instagram as well and while I was doing the research for this episode, it was nice to see that there were videos about anti-vaping. I just sometimes question that by looking at those, or being curious about it will trigger advertising that's targeted towards the actual products because clearly the manufacturers are spending a lot of money to advertise.

LP: We certainly, I think, need to go a lot further with our regulations and one of the things that's been talked about is whether or not, rather than just banning the advertising and promotion of candy flavoured products or products that appeal to youth is, do we actually ban flavours. And certainly, I think that would make them less attractive to youth because it's one of the primary

reasons why they vape. But that's kind of a double-edged sword, Mike, in the sense that if we do that, we're probably also going to reduce use by adult smokers. And the reason why that may be a problem is that there's some evidence that certain kinds of e-cigarettes when used in certain ways, may either help some smokers quit or at least be a form of harm reduction in the sense that you're switching from a product that we know is very harmful to a product that potentially is less harmful. So, if we also by banning the flavours reduce use by adults, that might not be quite as good.

CB: There's a lot of great insight in there, so thank you so much.

MC: Okay, we've got so much more to talk about, but that's our time for today, so tune in two weeks time as we continue to chat about vaping.

CB: Thanks for listening!