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**Midwest 2**

**(Kansas, Iowa, Michigan, Indiana, Missouri, Illinois, Ohio)**

Opioid abuse has been on the rise and is currently a major issue in the U.S. The Midwestern region had an increase of opioid overdoses by a whopping 70% from July 2016- September 2017. In Kansas, Iowa, Michigan and Ohio the primary opioids being abused are hydrocodone, oxycodone, methadone, fentanyl, carfentanyl and heroin.

Brand names for hydrocodone, a semi synthetic hydrogenated codeine derivative, are Norco, Vicodin and Lorcet. Street names include 357’s, bananas, dro, fluff, hydro, norco, vics, vikes and watsons. A brand name for oxycodone, a semi synthetic derivative of codeine, is OxyContin. Street names include blues, oxy and ox. It is produced by the pharmaceutical company Purdue Pharma. A brand name for methadone is Dolophine and street names for methadone include dollies, junk, and metho. It is produced by multiple licensed pharmaceutical companies. Fentanyl, a synthetic opioid and carfentanyl, it’s analog, (an analog of fentanyl) are drugs that were first approved by the FDA in 1960 and became a common misused drug in the 70’s being called lollipop. Fentanyl is an opioid agonist that is used parenterally or through a transdermal patch and activates the mu receptor producing an analgesic effect, to relieve the constant pain for the terminally ill. It is usually given during or after general anesthesia. It goes to the receptors in the brain and spinal cord altering the pain perception. This is used for moderate to severe pain and can have its effects in 10 minutes through an IV, and 10-15 minutes by inhaling it. Some common used street names are fatty, fatty wrap, or fire, and brand names include Onsolins, Actiq, Abstral and Fentora. Heroin, a synthetic opioid otherwise known as smack, junk, mud, and dope is an illegal drug without any medical use. It lowers the release of neurotransmitters into the synaptic cleft and lasts for 3-5 hours.

Opioids act on the specific receptors in the body and inhibit release of the neurotransmitter into the synaptic cleft. They all have common side effects that include bradycardia, hypotension, anxiety, a lowered blood temperature, urinary retention, delirium, nausea, vomiting, constipation, and drowsiness. There are some interactions with other medications such as CNS depressants that can cause an additive effect (alcohol and anti-anxiety drugs). All the opioids listed above are schedule II narcotics that are legal for medical use with prescription only except for heroin which is a schedule I drug. All of them have a high potential for abuse. Common signs of recognizing an overdose are pinpoint pupils and lower levels of consciousness. All of these opioids that are abused in the Midwest can be reversed with the antagonist naloxone/ Narcan. It acts as an antagonist on the receptors mu, delta and kappa. It can be administered intravenously, intramuscularly and subcutaneously.

In Kansas, hydrocodone and oxycodone are obtained either through direct prescription or through friends and family that were prescribed it. Socioeconomically, White people had the highest death rates in Kansas due to opioid overdoses with people aged 35-44 having the highest mortality rate according to age, followed by those aged 25-34. Kansas has a very high prescription distribution compared to the rest of the U.S. Providers in Kansas wrote 86.2 opioid prescriptions per 100 persons and the U.S. average was at 70 per 100 persons. Prescription drug monitoring programs (PDMP) are now required and in addition to that, Kansas implemented their own system called K-TRACS. In response to this growing crisis, government funds were put forward. A grant of $3,114,402 was put into research and facilities to help Kansas solve their opioid crisis.

Iowafacesa problem with prescription opioids as well. Those 25-49 years of age make up a majority of opioid related deaths. Iowa has a lower rate than national average when it comes to opioid prescriptions. They’ve dispensed 73.6 per 100 persons as opposed to the national average of 82.6 per 100 persons. In 2016 there were 183 opioid related deaths in Iowa. That’s a rate of 6.2 deaths per 100,000 persons. The national rate was 13.3 per 100,000. Due to the opioid crisis hitting them, they have made naloxone kits accessible to the public. This is possible due to the grant they have been given of $2,728,077.

Michigan is ranked number four among the states with the drug abuse problems. The most common drugs of abuse in Michigan are marijuana, followed by heroin and opioid prescription drugs. Heroin is easily available in all of the Detroit area and other densely populated areas of Michigan. Heroin is brought into Michigan from different parts of the world from different countries like South America, Mexico and Africa (Appendix 1). Despite the fact that the number of issued prescriptions and dispensed drugs that are falling under categories Schedule II – V have been stabilizing or decreasing during 2017 fiscal year, the number of deaths from overdoses are increasing. According to the report, 59% of prescribers are primary care providers, 9% of opioid prescriptions are issued by pain management prescribers, and 15% of sedative prescriptions are written by psychiatric specialists (10% of all prescribers) (Appendix 2). The Michigan opioid-related overdose death rate in 2016 was 18.5 deaths per 100,000 people comparatively to the average states’ level 13.3 deaths per 100,000 people. 30% or more drug related overdose deaths happened in 2015 comparatively to 2013. The largest number of male overdoses occurred in people 26-35 years old and 46-55 years old and in women 46-55 years old.  The heroin overdose death rates for those in their 20s and 30s increased faster than those for other age groups since 2010.

From 1999 to 2008, the number of drug overdose deaths with opioid analgesics increased from about 4,000 to 14,800. There is a tendency in all states that the abused prescription opioids and heroin are densely populated amongst the poor. Statistics from the CDC indicates that as of 2011 the rate of overdose deaths from opioid prescription drugs, including popular pain relievers containing oxycodone (OxyContin, Percocet), hydrocodone (Vicodin, Norco), and hydromorphone (Dilaudid) were highest in states with higher poverty levels. Michigan and Indiana are ranked 34th and 36th by median household income. Illinois is 19th in line with a similar level of poverty. Detroit is the region with the highest death rate. Although there is a connection between poverty and opioid abuse, addiction to prescription opioids and illegal drugs like heroin, affects people with different socioeconomic status and income level as well.

The Michigan Department of Licensing and Regulatory Affairs (LARA) is one of the first state government agencies in USA to use a new tool recently developed by Appriss Health in effort to defeat the opioid crisis. Elaborated tools allow public health officials, state administrators, and policy makers to understand drug trends and allow healthcare providers to quickly assess a patient’s electronic prescription history in order to predict a risk of overdose death. According to the report “Statewide Opioid Assessment: Michigan. Identify, Prevent, and Manage Substance Use Disorders” by Appriss Health dated March 29, 2018, more than 7.5 million patients who were prescribed 103.2 million prescriptions over the five years of prescription drug monitoring program history were linked to 5,261 overdose deaths. This program is already in use in Connecticut, Ohio, Indiana, Virginia, South Carolina, Michigan, Arizona, Colorado, Nevada, Idaho, West Virginia, & New Jersey. Soon it will be implemented in Texas and Pennsylvania.

The Michigan Automated Prescription System (MAPS) serves as the State’s controlled substance prescription monitoring program within the Bureau of Professional Licensing (BPL), Michigan Department of Licensing and Regulatory Affairs (LARA). They issue annual report stating the number of prescribed drugs of Schedule II-V dispensed for the particular year. For example, in 2017 total number of Schedule II drug prescriptions was 9,587,171, Schedule III, IV, V - 1,564,036; 7,821,019; 970,977 respectively, 48.49% of which were opioids. Michigan Board of Pharmacy Guidelines for the Use of Controlled Substances for the Treatment of Pain establishes minimum standards of practices for pharmacists working with the patients in need for prescription drugs of abuse (Schedule II-V). The report also contains drug utilization report data with inventory for every drug on Schedule II-V dispensed during the controlled time frame. For example, oxycodone (with the last two columns – prescription count number and prescription quantity number) (Appendix 3).

The huge rise in unintentional overdose related deaths caused by opioid addiction in Ohio is directly related to the rise of fentanyl use. Fentanyl and its analog, carfentanyl, have replaced heroin as the most popular drug of abuse. Ohio is in the top five states with the highest death rates from drug overdoses. There are still high rates of cocaine and heroin abuse but the synthetic opioids now hold the highest death rate. In 2016, the death rate in Ohio was 3,613, double the national rate since 2010. The number of overall drug overdose related deaths declined in 2016 for a fifth straight year and are fewest since 2009. It went down 15.4% since 2015.

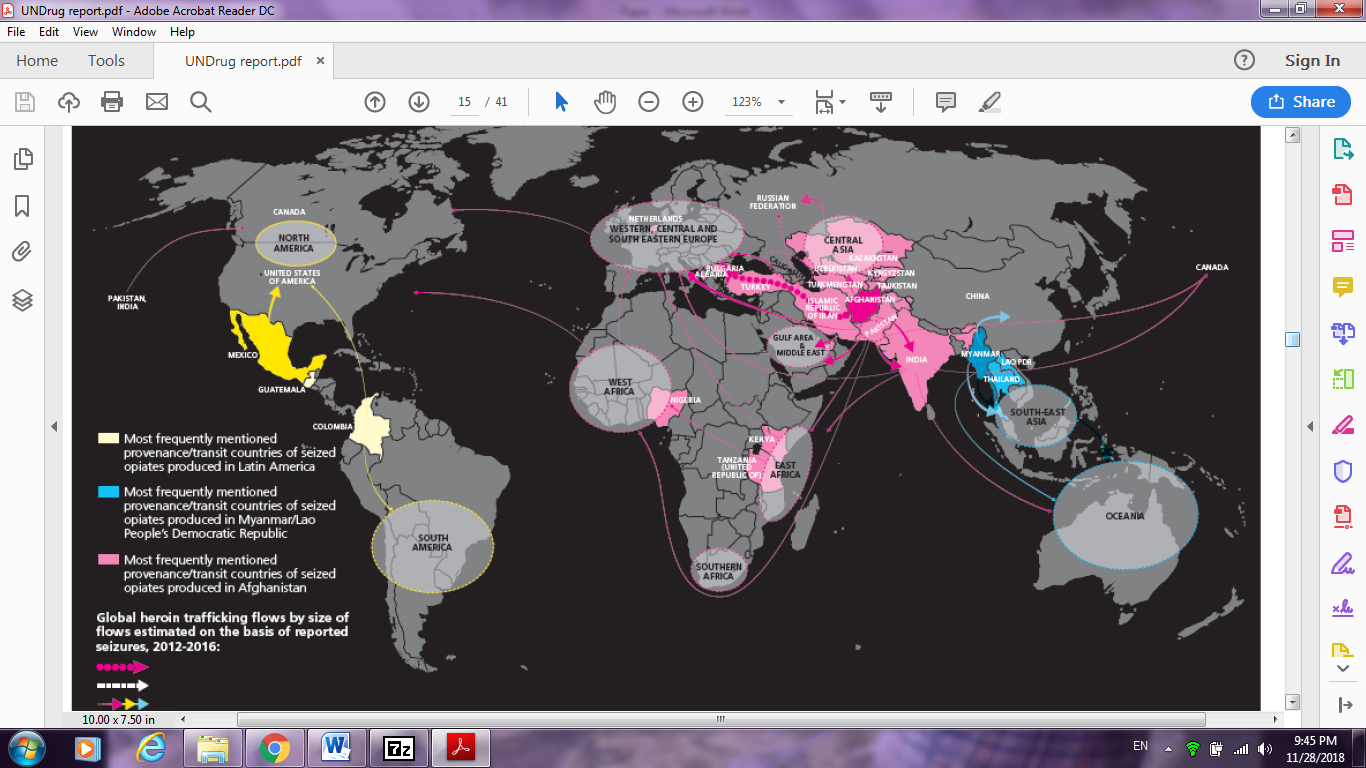
These synthetic opioids are so dangerous because they are much stronger than heroin, and derivatives such as carfentanyl are even stronger. Carfentanyl is so rampant because it is disguised to look like a common prescription such as alprazolam (Xanax). A lot of the data, reports cocaine used with fentanyl. In 2016 there was a 32.8% increase in opioid overdose related deaths since 2015 in Ohio. Of that number, 58.2% of the deaths were caused by fentanyl. This increase corresponded with the rising number of drug seizures reported by law enforcement in 2016. The number of cocaine overdoses rose significantly as well in 2016 with a total of 1,109 deaths with 685 in 2015. Of these cocaine overdoses, 55.8% of them were mixed with fentanyl. Heroin overdoses stayed relatively flat from 2015 to 2016, it went from 1,424 to 1,444. The overall deaths in 2016 were 2,357 from fentanyl, 340 from carfentanyl, and non-synthetic opioids were 1,693.

The demographic for these drugs used is significantly more male dominant, with 525 males and 225 females overdosing. The predominant age of overdose is between 25-34, and still some deaths until age 44. A lot of the fentanyl has been traced back to a lab in Mexico and some of it is coming from Canada and China. In May 2018, there was a news report that found ties with fentanyl being smuggled and the Mexican Sinaloa drug cartel, being crossed over the border in hidden traps in cars driving along the Ohio state highway. These cartel members were also sneaking in cocaine and heroin as well as synthetic opioids into the state of Ohio. The state of Ohio has given their drug overdose problem a lot of attention through new legislation, media coverage, and initiatives to solve the issues that relate to the crisis. In May 2018, Governor John Kasich announced new rules that will act as checkpoints for doctors prescribing opioids when a patient’s prescription increases to the morphine equivalent dose (MED) of 50, 80, and 120. The total number of opioids dispensed to Ohio patients has decreased by 162 million doses between 2012 and 2016. This is due to the Ohio state efforts to reduce prescription supply, the enacting opioid prescribing guidelines, and using the drug monitoring program, Ohio Automated Rx Reporting System (OARRS). Governor Kasich also sued pharmaceutical companies because he claimed they are misleading doctors about the dangers of pain medications in order to increase their sales and in turn harming many, many Ohioans. As of 2018, the legislation in Ohio has expanded in trying to prevent and work with the opioid crisis. Firstly, they enacted Common Sense reforms that will be put into effect as of November 2018. These will be a set of new rules regarding state regulatory boards enacting prescribing opioids to manage or prevent usage of illegal opioids. New stronger regulations for pharmaceutical wholesalers that sell to companies in Ohio (over 500) are also being put into effect. New regulations by Ohio state board of pharmacy is demanding the pharmacies have to uniformly and electronically report all orders, report any suspicious orders to the FDA and not to ship these orders without reviewing the risk first. There are also higher penalties for trafficking and possession of fentanyl and carfentanyl due to 71% of overdose deaths from it in 2017. A four-year grant of 8.2 million dollars was given for prevention initiatives in high risk counties. More funds are being given to purchase naloxone and other reversal drugs, for first responders like EMS, law enforcement and project DAWN- Deaths Avoided With Naloxone. Scientific breakthroughs to battle addiction, for example in September the Ohio third frontier commission offered 2.4 million dollars to 12 innovative projects that offered to diagnose and help prevent the opioid abuse and overdose crisis. Connecting people to resources and protecting first responders. The Opioid Workplace Safety Program will provide 5 million dollars over 2 years to hire, manage and retain workers recovering from an opioid addiction. The Ohio Department of Health received a 5.1 million dollar federal grant to address the state and local response to the Ohio opioid crisis. The media has been really good with regard to catching people's attention about the opioid crisis. The news is constantly recording the different events and problems that have arisen as a result to the growing fentanyl problem. With catchy headlines and unfortunate stories of overdose from within the community pulling at people's emotions to spring them into action.

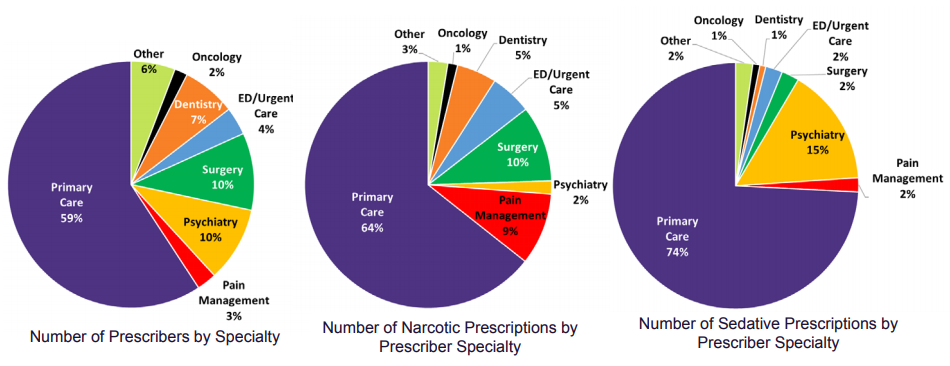
The opioid crisis in Missouri is predominantly caused by the drug abuse of synthetic opioids as well. The Missouri community is faced with many of the same problems and overdose related effects as the rest of the Midwest because of the opioid crisis.

This is a crisis that is growing and affects more than just the individual abusing the opioid. With the awareness being increased hopefully, we will see a decrease in dependence and deaths due to these substances.

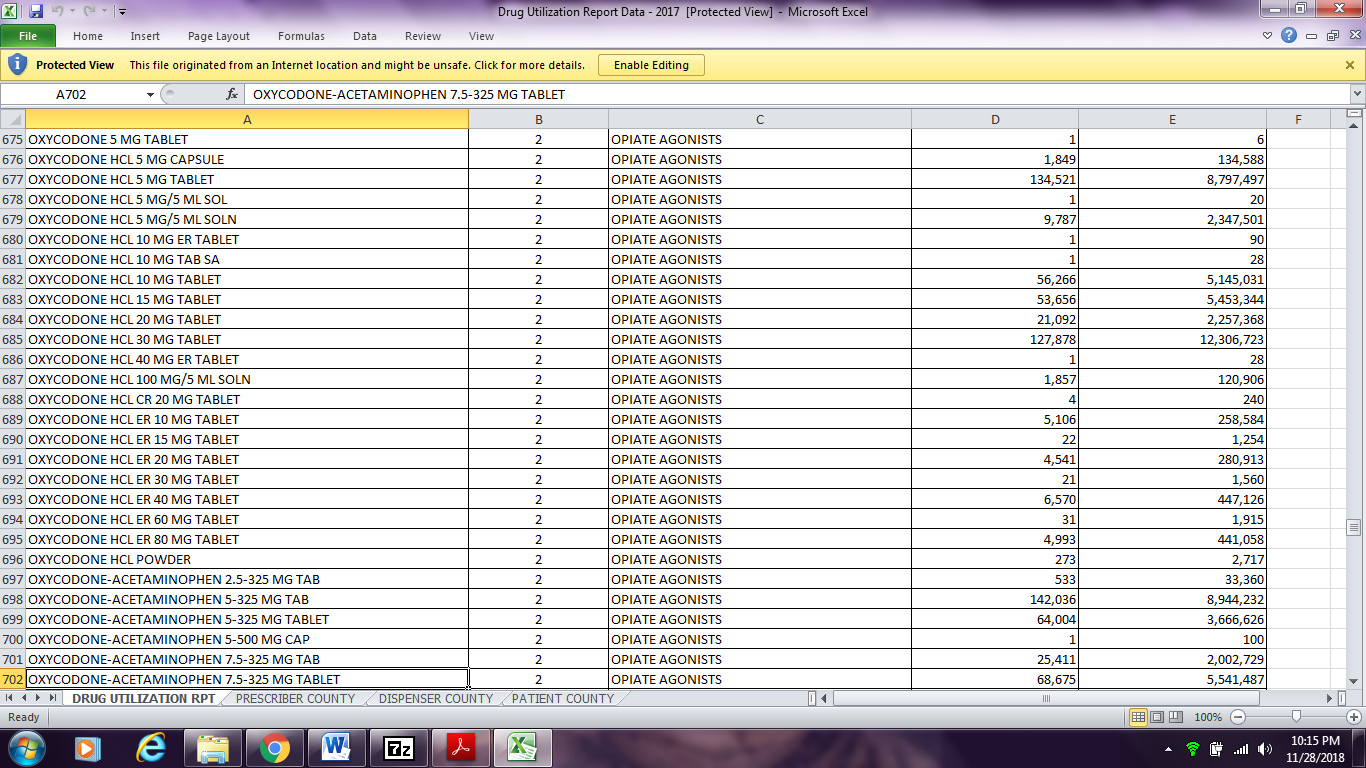
Appendix 1. Global Heroin Traffic



Appendix 2. Number of Opioids and Sedatives prescribed depending on a doctor’s specialty.



Appendix 3. An example of Drug Utilization Report Data for Michigan (Oxycodone)



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**Part B.**

The story of an opioid overdose with very far-reaching consequences and implications that I’d like to discuss happened in Ann Arbor, Michigan back in 2013 and resulted in a chain of events that finally came to some kind of conclusion in 2018.

According to an article in The Detroit News, published in August of 2018, University of Michigan Health System organization settled to pay 4.3 million dollars to satisfy a civil charge for mishandling of controlled substances. The charges were a result of an investigation by the Drug Enforcement Agency (DEA) which was started back in 2013 when two employees of the hospital – a nurse and an anesthesiologist both overdosed on illegally obtained opioids. The anesthesiologist was revived, but the nurse did not survive her overdose.

The nature of DEA’s investigation into the matter were the standards and practices of the University of Michigan Health System when it came to distributing and keeping accurate records of the control substances in their inventory. The investigation uncovered that multiple laws were broken and rules were not followed, which in turn made prescription drugs (specifically opioids) available to the hospital employees, and very easy to steal. The 4.3 million dollar settlement to be paid by UMHS is the highest, to date, in a civil case of this nature, and the organization is still open to liability on criminal charges for being in breach of the Controlled Substance Act.

The article provides more details of the investigation which are absolutely horrifying. To briefly summarize the nature of UMHS’ negligence in regards to opioid inventory – UMHS had the proper government clearance for its central facility, but drugs were distributed from that facility into 15 others owned by the company, none of which were properly registered with the DEA. The state of inventory records was so bad at these facilities that it allowed for easy unauthorized access by employees, which of course led to large quantities of drugs being “diverted” as the article refers to it (or basically stolen). In other instances uncovered by the DEA, registered nurses employed by UMHS would replace vials of fentanyl with vials of saline which was then administered to the designated (and legal) recipients of the medication.

The end result of this investigation and suit, so far, is the settlement I mentioned already, which is the highest in United States in a case of this kind (again, unfortunately, so far). UMHS admitted to 16,000 pills of hydrocodone being stolen by employees in the span of less than a year (between 2011 and 2012). Investigators allege that the quantity was actually significantly higher than that. UMHS is still open to a lot of government fines based on all instances of drug “diversion”. In fact regulatory compliance officials say that to be completely by the book, each instance of a pill gone missing, whether due to inventory negligence or pilfering, or record mismanagement is potentially a separate instance and a fine. Then 16,000 stolen pills can potentially be treated as 16,000 separate and punishable (by monetary fine) offenses. UMHS admits fault in this case and has promised to “implement a comprehensive corrective action plan to prevent, identify and address future diversions” according to the article.  
 Setting aside the basic facts of the article, the implications and impression it leaves are incredibly scary. Certainly hospitals should take much better precautions to prevent theft of drugs, and it’s absolutely correct to punish those hospitals that let thousands of pills slip through the cracks of the system to be illegally distributed to people in the community. I say this because 16,000 pills is just too high a number to be “diverted” for personal use. But even that isn’t the main issue and not the scariest part of the article. In my opinion medical personnel, or really any hospital employees should be held to a higher standard both by the organization that hires them, and by themselves. Nurses and anesthesiologists, of all medical professionals should and must know better than to introduce a dangerous, potentially lethal substance to the general population. If employees who are well educated of all opioid dangers still either steal it or use it personally (or both) despite the fact that it’s both highly illegal and highly unethical, how can we expect the general population to know better?

As a completely separate point, while it goes without saying that the nurse and the anesthesiologist who overdosed, should not have been using opioids to begin with, the fact that they were both trained medical professionals and both unable to adequately determine proper dosages for themselves is scary on a whole different level. These were people that probably worked on patients during that same shift and the week before that, and the week before that. How many more addicts like that are working in hospitals across United States and the world right now putting their lives and the lives of their patients at risk? The article concludes by saying UMHS pledged to improve security and compliance regulations, but perhaps another factor to seriously consider in these circumstances are hiring practices and ethics training.

Link: <https://www.detroitnews.com/story/news/local/michigan/2018/08/30/university-michigan-3-million-settle-federal-drug-diversion-lawsuit/1145373002/>

**Part C.**

**Role of the dental hygienist**

As Joann R. Gurenlian, RDH, PhD, the president of Gurenlian & Associates, in her article “The Opioid Crisis. Through Education and Assessment, Dental Hygienists Can Make a Difference in Preventing Addiction” argues that a dental hygiene professional can play an important role in the nationwide fight with the opioid crisis. I completely agree with this opinion. Although patients with addiction can be very challenging in terms of patient management, it is a professional and ethical responsibility of a dental hygienist to deliver the best quality services with the most important core value in mind – “do no harm”.

The importance of a thorough patent’s medical history can’t be overestimated. It is always crucial to know all conditions and drugs taken in advance in order to prevent any unexpected unpleasant and, in some cases, life-threatening surprises. As it was already discussed in Part A, opioids have many side effects. They also have a lot of drug interactions. The most dangerous of those involve other CNS depressants. Their combination with opioids can be life-threatening because it causes respiratory depression.

Patients with addiction issues have a physiological and psychological dependence on a drug, which they can’t control. During a medical history interviewing they may be reluctant talking about their dependence, and may conceal the fact they’re using. The role of a dental hygiene professional is to stay nonjudgmental, communicate in kind manner, ask open-ended questions, and encourage patients to answer. A dental hygienist at the same time has to be prepared and question everything a patient says, because “doctor shoppers” are very popular among dental offices. Therefore patient admitted with acute dental pain can be a person with dependence looking for another dose. Due to multiple adverse reactions in combination with CNS depressants and antidepressants corrections to the treatment plan and patient clinical care have to be made accordingly.

Self-education on recent healthcare trends is a responsibility of a dental hygiene professional. Dental field is developing at a very fast pace; technologies and practices become obsolete very quickly. Self-education on regional drugs is also very important, as in areas with high percentage of population consuming drugs; the chances to have an addicted patient in the dental chair are quite high. It is always beneficial to know the popular drugs of abuse in the area, most vulnerable demographic groups, and common routes of addiction (many of illegal opioid users started from completely legal prescriptions issued by their healthcare providers).

And as I already mentioned, not every patient will admit their addiction, so it is very important for the dental hygiene professional to be able to recognize and identify signs and symptoms of opioid abuse. The patient may exhibit irritability, anxiety, or just the opposite – euphoria and super relaxed state. Due to high levels of histamines such patients often experience itching of their skin, they can’t sit still. Also pinpoint pupils can indicate that the patient is under opioids. Intraoral findings can include but not limited to moderate to severe xerostomia, and generalized decay.

Another important aspect of the dental hygiene profession is patient education. Educating patients on their homecare is our direct responsibility, but in the terms of nationwide opioid crisis the role of a hygienist has become wider. A dental hygienist has to be able to explain to the patient that some NSAIDs can be as effective in treatment of dental pain as opioids, that patients taking drugs decrease their pain threshold and will need larger doses for the same painkiller effect.

A dental hygienist can be a valuable member in the team of specialists uniting against the opioid crisis in the country.

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