Good afternoon, everyone. Can I be heard okay? Good afternoon and welcome.

I will deliver the first part of this workshop it will be broken down into the first 45-minute increment, then 10 or 15 minute break, and the second 35 minutes before another break before part two. I am Lieutenant Colonel Heady, for the toxicology office we will talk briefly on forensic drug testing, the majority will be clinical. I spent most of my career in the clinical environment. I have nothing to disclose. Views expressed are solely my own. Okay.

We will start with the agenda here, first going over the primary source for the first part of the talk. Briefly touch also on resort to referrals and pain management this is an attempt to get my hands around a pain management program, going over some of the broad laboratory medicine guidelines in pain management community I will introduce you to the concept very briefly of tier testing. A consideration when you have a diverse pain management population, it is just one option. It is used, and certainly the one that is emphasized in this practice guideline from the laboratory medicine. We will talk on basic principles of urine drug tests, and I will introduce you to the different types, 2 to 3 different categories, useful for you, to organize urine drug test. So that we can ensure you don't misinterpret, one of the repeating themes of this practice guideline, poor laboratory medicine is the risk of misdiagnosing UDTs, they are not straightforward all the time, we will talk about, caught up, concentrations, misinterpretations, and the easiest way to interpret drug test. We will talk about different categories of UDTs we are doing that not because your laboratory is always screaming about cost, they are, in this particular guideline they take effort to connect different types of urine drug test. Those that may be in the environment connecting them with the patient outcome. Did we improve the patient out come? When have we had to use certain types of Urine Drug Test in the resource developments? Lastly no, after that we will talk about confounders of UDTs, very useful for you to be aware of, we will talk about proven ways to reduce that misinterpretation. Of Urine Drug Test, that is one of the repeating themes for the guideline for laboratory and technicians. Last new things that can go totally wrong. Everything you need to know and will give you a good foundation.

Now I would like to ask if you bring up the poll questions one through eight -- The first question here to get a sense of the audience, just jump into answer the poll question, are we talking to primary care providers, pain management providers, you would with the less, look at that beautiful. We have an even mix between providers and primary care, and others. Fantastic. Next question.

Have you ever received formal education on the proper interpretations of urine drug test? Wow this is fantastic, then we have good experience and in some folks with less experience, perfect okay, the next question.

On average over the course of a single month, how many Urine Drug Test panel, do you have to interpret? Between one and 10 is the primary number for this population of providers and clinicians. Perfect fantastic.

Next question. How confident are you and accurately interpreting these screens? I should take this opportunity to let you know these Polls, 100% anonymous there's no way for us to go back be honest, in your answer. Let's see here. 32% are confident, that is fantastic hopefully we get good feedback, someone confident, at 17%, that is great, I'm hoping to really move both of those at the end of the talk. Next question please.

In medicine, a screening test is used to rule in the disease, is that true or false? Beautiful rocking it screening tests are used to rule out a disease, not rule in the disease, the next question should be a no-brainer. In medicine, a diagnostic test is used to rule in a disease. Fantastic.

All right next 2, a little harder, I had to reach back. The next question please, Chanley. The high specificity test, has few false positives? Beautiful great job. Great job absolutely true.

Specificity measured by the true negatives over the new true negatives over the false positives, that increases with low false positives, beautiful, next question please.

I have high sensitivity test they have few false negatives. There we go. The sensitivity is measured by the true positive, divided by the true positives divided by the false negatives, the fewer false negatives you have the higher sensitivity the test. There you go. All right. Enough of these questions. So why am I tripping down memory lane for things that maybe don't seem to be related to Urine Drug Test? They are. I wanted to use sensitivity specificity, diagnostic tests, concepts you are aware of same concept apply, the presence of a drug and the accurate presence of the drug, the take-home message, those concepts also apply in the diagnostic testing.

Primary source for part one, published in 2018, this is a bit dated. The lab medicine practice guideline entitled using clinical lab test to monitor drug therapy, in pain management patients, it may come as a surprise, to some folks here. The clinical laboratory community, they do search out areas where clinical laboratory testing, can be both effective and frustrating, and they seek ways to try to make it less frustrating. To ensure better outcomes for patients, one of the best ways to do that, to make those tests easier for our customers, or even clinicians. Multidisciplinary team of Laboratorians, also clinicians, in the pain health community, and also in guidelines, the use a strategy somewhat common in laboratory medicine, I'm not sure. I'm not sure and other fields, but they use these to frame the recommendations, and in their opinions. Let's go through what it is.

These recommendations and opinions, they are going to make a substantial part of the presentation and I want you to have confidence in those recommendations come the patient population. This group looked at acute chronic pain management patients, the, I, for intervention that change the outcome, that was a lab test. Now they looked at just a general lab test, poor the urine drug screens later the comparators, other tools, what does that mean, specifically, for the pain management providers and clinicians, those are a self-assessment prescription monitoring those

tools that you use. Those that you use to monitor adherence, to monitor diversion, dizzy how pain management happens we are comparing those with those tools, this is the outcome for both agreeing with the bottom line for these recommendations and opinions for adherence to the plan diversion, or the lack of diversion and the number of the visits to the emergency period, and the time period is, the government decided how to deal with pain and populations, the literature search, for this practice guideline ran from January 2000, through February of 2015, 15 years what patients talked about outpatient inpatients in the community setting, and exclusion and inclusion criteria, and the year had to be 2013. Literature had to be in English about humans and included all sexes and all ages. They took a total of 7,646 articles.

For me mostly, I use this and looking at the 100-page practice guideline too, to talk about and identify, what I thought repeat grouping and themes, this will help you to get perspective. Drugs tested, when we talk about UDT, adequate to detect drugs, what we are talking about over-the-counter drugs, prescribed drugs, nonprescribed drugs, and illicit drugs. The types of UDT's, we will come back to this in detail, generally to categories such as 2 categories you see and a third one of quantitative and qualitative, we will discuss that. We then talk about where to perform the testing, and where is it performed? In the clinical laboratory, or the point-of-care environment? There certainly a difference in the UDT's offered in the clinical laboratory versus your point-of-care office, the doctor's office or clinic, this environment understanding the differences, this is important to ensure the accurate interpretations of your UDT.

Here are a couple of repeating themes. Biological testing for the presence of drugs, there are just tons of science behind it. Effective at detecting drug interaction and lots of science. You kind of understand where some of these danger signs can be in some of the questions you should be asking about UDT, especially if it is new to you. Your interpreting UDT, and monitoring adherence, trying to detect diversion, as you can see in the cartoon illustration it is easy to misinterpret simplest of questions. So how does someone get into a pain management program? For this very audience is important to, for me.

I wanted to better understand this, the slide not part of the laboratory medicine practice guideline, I was just interested after the CDC guidelines, about safely prescribing pain medication, and it seems like a spectrum, the first part practical pain management, recommendations or a summary of who usually ends up in a pain management program, folks around high morphine equivalencies, 8200. Pain with coexisting conditions. Those among you such as kidney disease, and constituting complex cases, one sedatives are used in addition to pain medication, we have a lot of pain medication and providers, this is apparently a no-no, continual increase for opioid, can land you and a pain management program, or misuse of pain medication.

Also I want to look a closer to home to see what folks here in the DHA, and MHS might be experiencing so I looked at data coming from the slide two years old, the DHA Step care model, and more likely they were ended up in the management program, and other concerning psychological behaviors would end you, and could provide a way to a plane management, and talking to the pain management community you may not have it dedicate program or dedicated clinician, you should be aware of changes occurring right now that make this possible. What the Laboratorians sees here, not only a spectrum of patients, but providers who will be expected to deliver a safe and effect pain management plan. That could be difficult, and in a limited resource environment where you would have really different experiences among some providers, me I'm starting to see how misinterpreting UDT the likelihood of that will increase.

Here is a consensus statement, UDT's are not biological specimens, but the urine itself the drug testing for urine, absolutely needed in order to deliver a safe treatment plan for folks in pain. Especially when prescribing opioids. Strongly suggesting that you get a baseline, a Urine Drug Test before you start opioid therapy. Test at least annually after that. They may this statement and say UDT's must indicate polysubstance use, and abuse, addiction, and possible diversion. So, I've never seen UDT that said polysubstance use indicated or suggested, addiction, no doubt about it, how is that going to help indicate these conditions? Well what they say, in this practice guideline, it is that they can, UDT is most effective it indicating polysubstance use and abuse and diversion in conjunction with risk assessment survey, and the persons medical history, and so forth, if you don't have those and you actually compare the two, UDT is actually a better indicator of these things, and the survey tools, in and of themselves, and the takeover message is combined UDT with those tools, to deliver the most effective and safe pen part in the pain management program. UDT's are important of safe treating of pain management, what should we be testing?

A baseline urine drug testing for folks who will start pain management program, beyond that, most adopted and annual testing what should you test? A great question really reflects situation where you have a diverse population patient, in the pain management population, and you have low risk, medium risk, and high risk, or unusual cases right? The thing I want to start out by telling you, all of the drugs, all of the drug categories you see, these are measurable, so driving this home, is great, routine risk, not high or elevated, including your common stimulants, and amphetamines, your barbiturates, your cycle lock, stimulants such as cocaine, narcotic for pain. This is a low-risk tear of patients. Higher risk patients, these are folks who are on warm medications, for chronic pain, may have additional conditions that caused them to be on numerous medications, and higher risk population. With medications, and even areas endemic to drug abuse, and there could be a multiple number of reasons why you want to adopt Tier 2, including everything in Tier 1, and add the following. You will test for alcohol, with if the glue can only bummer with anti-depressions, your synthetic cannot than the knowns such as known Bath salts , Muscle relaxants, pain relievers, then Tier 3 addressing areas where it is clinically indicated, something causing

you to suspect OTC, and energetics for local pain, acetaminophen, folks that are taking antihistamines, antipsychotics, or dabbling in the synthetic.

Understanding why these are also useful. We talk why about urine, the frequently of testing, initial certainly, we want to establish baseline, the initial testing we discussed may be different depending on the risk category your patients are in, lower risk folks once a year, this is suggested or referenced in the preference, for the practice guideline, more frequent testing and high-risk populations. Very little concern regarding the frequency.

In terms of random versus schedule, this question does come up in the guidelines, whether the frequency should be frequently scheduled, frequent and random, they didn't feel they had good evidence to suggest one or the other. Increasing frequency for increased risk was a good take home. If you use like we discussed earlier, if you use your tool in conjunction with your urine drug screening it increases adherence to your pain management plan, things like physicians' interviews, medical record reviews, monitoring and screens and surveys. Taking these together if you use them together, this accumulative effect for patient outcome, and a large body of data for drugs in urine, the science is nice and robust. Many other tools there to assess compliance, and the biological matrix of choice, relatively to the blood, it will have a longer detection window, and minutes to months, where the blood is minutes to hours. The volume is sufficient for testing, particularly if you are testing in Tier 2, and a whole laundry list of things to look at you will need more volume. You can be helped particularly if you are looking for buprenorphine. The patient gets to provide this to the care of laboratory.

And your urine can be adulterated, and the laboratory medicine guidelines here strong encouragement of urine testing for every single UDT. To determine what was substituted, why they may have had repeated negatives, belatedly. This testing done through measuring the create and, the pH, specific gravity, and one or all of those. Three general places that you have UDT's in. Qualitative or semi quantitative, some clinical utility. For these types of tests to determine presence for the certain drugs. You have to use these with caution you need to use them with caution, that is the first bucket. The second bucket, much more useful. Definitive these are just a way of saying quantitative test. Prep this guidelines consider these the first line testing, for relevant drugs, we know a whole slew of things, for detecting the drugs in your pain management patients, and when you get point-of-care results, or even immunoassay results that don't meet your clinical dictations, if you're going to get UDT, and it doesn't make sense, think quantitative essay, or think in this third Category mashing together qualitative and quantitative tests I want touch on it now, but a better slide for this later. You want to ask, is it quantitative or qualitative?

Here is why that matters. Here I just want to give a visual of exactly what you are asking that to do. I can grab my pointer here we go. Let's take a look here. One of my favorites, one of the D methamphetamines. Here are the isomers. I wonder how long it would take to put the

difference between the amphetamine and the methamphetamine? Here is the difference right here. A small difference to our eyes. To immunoassay, or a qualitative, it can also be difficult to tell. Hydrocodone here, two seconds to tell me how these are different? Here. Really small chemical changes. Depending on the test you are using. They simply may not be able to tell you this is hydrocodone, or this is hydromorphone, some test can tell some cannot. Benzos are my favorite; they are only different right here where the R's are. Understanding the metabolism and what you expect to see in the urine drug screening, this will take legwork on your part, it is not straightforward. Okay. Quantitative tests, these measure the presence of the substance, they can suggest the absence of a substance. Notice I'm saying substance, not compound. The results typically reported descriptively not numerically, they can start all the way down to what you think is a pregnancy test, lateral flow, negative sign, and then cups that can have of array of colors coordinating with different drug categories all the way down to little disturbing, immunoassay, they may sit in your clinical laboratories, and all the way down to the immunoassay, to the large chemical instrument in the clinical laboratory, what will make the difference, how many calibration points does that have? One or multiple? What is the cutoff that they are using? At the end of the day, sometimes for some drugs. The clinician is not getting any better answers. Down at the lab, then they would get at the point of care, and right there at their own office.

Let's talk a little more about quantitative tests, why do they give a yes or no, positive maybe one of these that you use in the ED into a psych hospital, and into a bed and a lateral flow, and there's not a lot of dynamic range. This is one of the reasons, it is just a qualitative test. If you could see this. If you happen to be looking for the drug right, it is I think 30, 30 nanograms will give you a negative. With that qualitative test, the negative doesn't mean it's not there, it just means this technology could not pick it up. Where does it start to affect you? Examples of where this can be affecting you in your product does. These lateral flows, sometimes IA, these IA's, one Opioid, and cannot detect others. Certainly, they will not detect signal from examples, if you have a good memory and you can look back at the function. I will do it for you. If you look at sentinel here. Comparing fentanyl to morphine, very different structure. It will not surprise you necessarily, that your lateral flow or very simple IA assets they will not pick up your fentanyl or methadone, it will pick up your morphine. The qualitative text and take-home message are a lower cost for sure. The quantitative test, and certainly you can implement them in the clinic, and beware, they have cross activity, and they can result depending on what your result, and the false positives or negatives. I want to go back really quickly. I want to simply just talk about quantitative.

You remember on the other slide for the intense and purpose, Semi quantitative just means more quantitation’s some of your IA's may have a one point calibration and slightly larger way, semi quantitative, and despite the fact that they are a little more dynamic range, in the clinical lab, and they still get a response, for the same reasons you see here, they can suffer from cross activity, picking up things that you are not expect is a better way to say. Poor sensitivity. You wonder what on

earth is the use of these IA's? Who uses IA's? Great segue into forensic drug testing, we will take a sharp left-hand term briefly uncover the algorithm covered by large drug testing laboratories. For healthcare providers using Urine Drug Test, this is a horse historical perspective, helpful for quantitative testing. Why use IA's? If they suffer from sensitivity issues? These foreign sick labs love them, they can help plow through specimens, coming up with the true move on presumptive positives, to a much more specific much more sensitive test, very different. They use chromatography and mass spec, topography.

Let's talk more about the second part of forensic testing, using quantitative definitive or informative UDT's. What makes it quantitative? The gold standard today, chromatography mass spectrometry, thinking back with the differences, maybe he thought maybe you didn't about the group, but also Marek compounds. They are compounds that will get you in trouble the, DA opposed to the L, they cannot distinguish between the two. The IA's work off the shape of the compound as opposed to the constituents of the compound. Amphetamines versus methamphetamine, a great example, IA can do this, LCMS certainly can.

Now we are working to this mess of chromatography. We have to figure out what drug exact we are detecting. Why does this work for LCMS, and doesn't work for IA? IA is all about shapes. LCMS, the detector for the mass spectrometer, is extremely sensitive allowing us to get at low concentrations, and to get out at how much rugged specimen. How much drug is quite important? Before we go over why concentration is important, I do want to hammer this in a little bit more. Unlike the quantitative test lateral flow, you don't have any calibration at all? With these you have multiple calibration points, beautiful thing. Calibration in itself, and assessment of and ability to deliver accurate signal response to a known standard. These are several known standards. How accurately they detect other responses that are given for these known standards. You get your dose response. This curve and equivalent. For the definitive test, you get to not only quantify clearly, but also have the option of detection, which can be useful of some of these savvy pain management folks, they will ask for limited detection cut off, or we don't see the result, quantitative UDT, and we don't see what we’re looking for, we call the lab, and see what we see below the cut off, and we can see the content and the concepts of the limited amount by which this method can definitively detect the subject above the noise, and the quantification, I could quantify it with acceptable precision.

All of these terms are not used, typically used in that point of care. The qualitative drug screen, they are therefore the quantitative. This is perfect it will allow you to certainly distinguish between things like hydromorphone, and hydrocodone, fairly difference is small. They share metabolic pathways or yes pathways, like pathways, you can distinguish volume with these benzodiazepines a lifesaver, there are so many out there. There metabolic pathways are complicated and can overlap. We're all just going to order quantitative UDT's, and call it a day? No. If only. The high sensitivity and Highsmith 50, this is outweighed by the expensive technology and how slow it could be and not the fact that everyone cannot operate this technology.

Okay let's talk about desperate cut off, before we talk about cut off, just to make sure everyone is awake, can we have the next poll question please?

You guys are fantastic. Beautiful. Next question please.

There we go great that is really the beauty, this approach to urine drug testing you get it all out across come the concentration. Absolute identity to the isomers, this will get you in trouble the D, not the L. Perfect let's talk about cut off concentrations, we talked about quantitative. Be back at the IA's then the gold standard, this chromatography mass spectrometry, you get it all.

Accurate interpretation of the UDT. Cutoff values these are above which the presence of the drug to be reported and below which it won't be reported. On the left side you have SAMHSA's cut off, right we have Quest, they share similarities, and then have some dissimilarities, let's look at cocaine forensic environment, that initial screening, this is forensic, the initial screening, then the test 150, metabolite 100 nanograms per ml.

Let's see in the clinical environment. Very small 150 less than 1/5 the. Then here it seems they are the same. Forensic and clinical are the same. Let's look at codeine. Forensic environment, the screen is 2000. They confirm at this exact same amount. What do we do in a clinical environment? Opiates less than 100. That is much less then coding confirms, it is specifically confirming the cut off 50 nanograms per ml, or more. You will get a positive result if it is this or more. If you were to confuse these two. You may have it; the patient shows up negative if your cutoffs are too high. This is the nice think about the clinical environment.

One thing I also want to note here too. For the clinicians, most of the time, the clinical laboratory test here, when they talk about confirming the gold standard given you the concentration in some of the isomers. FDA approved test, and that testing, the chromatography mass spectrometry, this giving you all the information, and is usually not FDA approved, not surprising, but it is not the wild wild West. I'm just making things up, non-FDA approved test still have to approve that accreditation, they still have to pass the accreditation requirements from the lab side of the house even though they are not FDA approved, I'm just mentioning that to show you it is complicated and expensive okay.

A little more about concentrations cutoffs. These are important, and some questions that you may have now, or may have later? Who determines the cut off value? The answer is guess what, it depends right, the manufactures allotted time will determine the value. The cut off value will be in your drug assay sheet. If they are doing the high-speed chromatography mass spectrometry, it is the instrument and where you are running it as to where your cut off will be, this is the laboratory cut

off, do you know what that is? Officials will just set it can't be like SAMHSA.

Then the question they asked him to cut off and the values change? Absolutely they can. If it is a lab developed test, the person changes the instrument changes the cut off value can also change. As you can see here. What you have here, expert manufacturing guidelines, and they state the laboratory can offer up a cut off for oxycodone, 100 nanograms, per ml, pretty impressive. Which one in use in your laboratory how do you know? This cutoff is set too high. What is the main factor? The methodology of the test.

Coming back full circle, in the manufacturing answer, it will tell you the specified city and the sensitivity of that test. What you see here, DRI is the IA essay, all that we have been checking on, and truth are gold, what you see one false positive by the IA assay, that gives them less than 100% sensitivity for this test 98.3 is not bad. What I want you to take home here, a couple of things. The first stuff cutoff values very important, it is a non-thing, the lab has to know to pass the accreditation, new information of the lab report, should always contain the cut off, they should be correct. When you get the laboratory, whether from downstairs or any of those should be notated on the report the cut off value does affect the sensitivity and specificity of your essay.

Okay. This is the third weird category; it can be a beautiful thing. They use this, and what it does taking quantitative testing. That mass spectrometry testing, giving you everything under the sun. Giving you quantitative result? They have that sort and so forth, but they will give you a qualitative result. Their reasons to do that, the biggest reason. This biggest one is, it is very tempting what they found. In a number of studies, it is very tempting for clinicians to take a number, if you give them a number for the Urine Drug Test. They may want to extrapolate to the time of the last dose, or to extrapolate the amount last taken. For spot urine, that is a no go, so this was one way, to give clinicians really good quality data, and in a way that it is easy to interpret. This may or may not be in use for your clinic.

Okay thank you here we go. In the real world, Time is money. Point-of-care UDT's totally exist, the practice guidelines we are talking about. This shows appointed carries most part used in labs, and the performance can be increased frequency of unexpected results they guidelines encourage providers to get confirmation testing, and some of that quantitative testing on all unexpected UDT results happening in this point-of-care environment. Decrease specificity, mostly felt for diazepam's, and then again, to absolutely know the cut off value, and even if you don't have a clinical lab, if you're working in a doctor’s office that gets these tests in, in the information that they must give you the information it is with that test, you will know what the cut off is. What that test can pick up in this design and what it is designed to pick up and what it can't. Even what is there, knowing that information and confirming your and expect good results. So, one of the questions the practice guidelines that we get out, is it worth the money? Ia test. This is about 25 bucks a test whereas the chromatography mass spectrometry test, $600 per test now that $600 probably reflects the

screening in addition to the confirm, the sequences of tests. Pretty big difference. The practice guideline recommendation, qualitative drug testing prior to prescribing can stroll and can be really useful, in adverse outcomes in pain management, they couldn't with all of the literature they looked at they couldn't feel confident there was real evidence to suggest that these qualitative tests were more cost-effective than the quantitative test in detecting the outcomes, why is that? Because if you are taking your unexpected result, you are running late quantitative test, a chromatography mass spectrometry, test you are paying for that in the end anyway. The bottom line for which one is best. More expensive test is always better. They just need more evidence; the studies really haven't been done to finally tune out the patient population and what environment might be just fine with the appointed care tests or the IA.

Here's a couple of examples. You may have found yourself in a small clinic where you simply can't order a confirmation test when you need, so here in 2010, all looked at 4200 specimens, their patient population where pain population, looking at 18 drugs, you can see on the right side, this table, the drugs for which were false may have amino acid, and positive when they looked at it by LCMS MS, and had you not had that available, you would not have seen your amphetamines, where they supposed to be taken it? Did you get a negative result did you think of diversion? You would have missed the cocaine very bad and the benzos, right? There are a lot of issues, did it pick up the correct benzo? We talked about how the specificity for IA, is tough, tough thing to ask for an IA in benzos. The real risk with some IA results compared to LCMS. Next to this, 2011, I can't say this person, but they looked at point-of-care tests versus LCMS, and

relevant population, and the drugs that they were looking for opioids and illicit drugs, what they found. When they compared point-of-care to the medical records that was 80% agreement. When they compared the LCMS. The MS results to the medical record, that was even better agreement, we consider LCMS the gold standard. We assume roughly 9% was a mistake. The point of care testing 44%

with the point-of-care testing, then illicit drug false positives, giving false results, bottom line, 32.9 percent required confirmation testing money peace, we thought not having to pay a lot, almost 32% of the cases we had to go back and retest by confirmation method. It probably wouldn't be $600, but over 100 I guarantee.

Okay, next poll question. Okay knowing the confirmation of the drug test is nice, but all laboratories use the same cut off. Yes beautiful.

This cut off can change. Next question. You can consistently see this over the noise, and what you can consistently quantify in a given precision. Next question please.

This is a hard one we haven't talked about. Don't be shocked. Absolutely right. Pharmacokinetics no is not. Next question.

A couple of these, one is a repeating theme, anybody want to type anything? Come on. Yes? That is one. Yes. So beautiful, that is right. There is a whole fluke. Rocking it. Lesser-known ones, allele, ATP

binding set, and the transferring enzyme. Some of the little less known. Great, good job. Then the last question.
That is a false statement correct. All right. Fantastic.

So we are in the final minute, you will get a break. You get this, we talk up a cut off, we talk about other confounders, for your urine drug test result. Particularly if you get low or no detection, detection limits? In urine, they affect all of the test you need to know your cut off, and also need to know how long you expect to see a particular drug in the window for example, fentanyl is pretty fast, in urine, we expect it for as long as one to two days. Bed those, 3-20 days, benzos, they have that high tolerance and low part here, if this doesn't not met, then ask questions. When did they take it last? You want to do the best by your patient that you can, it is confusing. In other question to ask, certainly an example with buprenorphine, should I see that metabolite in the urine? Here your talks experience, the toxicity experience, the lab may not be aware, you will be the expert for example buprenorphine, if you only see that parent, and this strongly suggests the parent, this was actually added to the urine. Another example. A patient who is on parenting, and the ratio 2.2, two 17.4. Here, you may really have to educate your lab if you are in-house. Certainly, ask the questions in terms of specimen and integrity. You definitely want to do validity testing. The practice guideline still here for the validity got regardless of the risk category, and the validity testing, the specific gravity, or the capability of the urine. Hydrolysis, so we are really getting in front of the really cool parts. These all affect a whole slew of drugs.

So, a particular lab develop test, the chromatography mass spectrometry, the you will make sure that the lab is handing you the best data they can. It's not unusual for your hydrolysis steps to be inconsistent, because it is done by an enzyme or assets, these are not all the same, they are living, and they can do what they want sometimes. They may not want to be active. So, most labs will take a measure to ensure the quality of the hydrolysis at every step, this shouldn't be an issue. Again, if you know hydrolysis can be an issue with what you're looking for, and you're getting in the result you don't expect, talk to your lab. The burden is on the lab, reiterated in the practice guideline, for once it is not on the provider to do it. This practice guideline is very strenuous about the lab’s responsibility in terms of drug testing.

The pharmacogenetics profile, few have adverse drug reactions, those are causes to consider these profiles for your patient. As we talked about these with other enzymes can be major players there. I love the slide. We do MRO work for the military. The slides come in handy. This is the certification, for metabolizing this information for controlled substances it's really great. It shows how complicated it can be. Particularly Assay working off shape the drug in this ubiquitous combination, versus something that looks at a proton, versus OH group, or a methyl group in space. You can see how complicated it can be. How easy it may be, for your assay to give you the wrong answer. So, we see here, the heroin does share a pathway with coding and morphine, hydrocodone can also share the same metabolite, few of the metabolite, still like hydromorphone, and hydrocodone is separate, this is quite nice if you're

looking at detailed and quantitative data. For urine drug screenings, or your drug test. Those results stand clear of any hydrocodone, or morphine methadone, this clearly has a separate pathway, this tends to be reflected in the fact we have to have a separate IA kit to pick up fentanyl as opposed to your recordings and your morphemes. You have to have a separate kit to pick it up compared to your coding and your morphine. All of the benzos, who doesn't love them. If you take Valium, and you pee in the cup your world is the oyster, you can have [Indiscernible - low volume], you probably won't have diazepam, but you will have a slew of other drugs the point here, it is complicated. There are tools to make it less complicated. You have the pathway here too.

For evidence-based way to reduce misinterpretations of UDT's, this first and foremost the burden is on your laboratory. If you don't have a laboratory, then the burden pasts to the manufacturer, it passes onto the manufacture, for the quality you need to assess your results, laboratory results should be clear. Shouldn't say present-ish and say -1 not detective, and it should always have a cut off for measurements. So that you understand what your result means. Urine result drug test clearly understood, the incompleteness of testing, what this gets out, a place where we saw for lab core, or quest, where they scream IA, and then they will confirm something positive, by the confirmation. By this testing. If they are going to report that initial screening to you, then they will let you know the confirmation test has not been done yet. Or maybe they just don't give you the initial screening at all just to not confuse the clinician. Report out numerical results when necessary. We will talk about this in just the Next Slide. What you do and don't know, what are the cutoffs, what am I going to detect, what am I not going to see in the screen? Bottom line, no Urine Drug Test. Good ideas that can go bad. So, what we are talking about here. Let's talk about first the algorithms, themselves, these are a good idea, the bad part, the only concern, as things change the algorithm needs to change as well. Your Patient Population changes. The methodology may change a little bit. Your algorithms may need to change. Their only concern with algorithms that they stay timely with Your Patient Population and with your testing. Also, they tell you when the urine doesn't work for your DL assist, and your dialysis, you're not going to want to do a drug test on kidney failure. Not using UDT's as the time of last dose, here the practice guidelines were adamant. Unlike with blood and therapeutic drug monitoring UDT's, not recommended for approximating the time of the last dose, the practice still stems from normalizing the hormones. For the completeness of the 24-hour urine this is a spot urine. Fight the urge to use normalization to construe compliance. Kind of how much you took.

Okay there we go. The last two questions. I think we have more questions than that. We do. Okay here we go. Bingo beautiful. Nitrite is a measure It should not have any [Laughter] There you go.

Okay trick question. People do look at color, but they don't test color, everything, A, B, D.

Next question. That is actually a true statement. There is no over-the-counter product.

That is a true statement no over-the-counter product that will cause you to be positive. For those compounds, when tested by chromatography mass spectrometry. Next question. Okay I keep closing my screen okay. [Laughter] So No one got the answer, right?

The correct answer was D. A couple of clues are here. It is a positive confirmation, that is quantitative, for the amphetamine only, d-amphetamine here, the only drug that does this is the D.

Last question. The most important thing here, how confident are you? I think after the last question, you may be less confident than you were?

We will take that.

So, the takeover, this take-home. Not necessarily straightforward, if you get results that you don't understand, or don't make sense for your patient, you need to talk to the lab, you make them clear things need to be clear for you whether they do answer the question, or whether you need a different test

Okay all for me. I believe you have earned a break, thank you for your time. That is it from me. We will go ahead and take a 15-minute break. Once the timer is up, we will resume.

Hello everyone, can you hear me? Yes, we can hear you. Good. I wanted just to make sure.

So, I was looking at some of the questions in the chat box and I know there were questions from the presentation, before I start, are there any last-minute presentations, we do have time. Going once. Going twice. All right no questions, great.

So, let's jump into the next topic the title of my topic medical cannabis is it a treatment option safer? I am the chief of quality food and diagnostic lab.

And some of the DOT toxicology, I assist Carl when [Indiscernible - low volume], I spent 11 months on the clinical side total I would say, combined 13 years in toxicology. So, I am the opposite of Colonel Heady, but we complement each other.

I don't have anything to disclose, appearing here these are not my views. Really great, these are the learning object lives. Any time I do a presentation I listen to something new, and I listen to something and it happens.

I hope not to confuse you with THC and CBD, two separate things. Given the idea of what the metabolism the blood, what you can see THC typically, included in your drug testing panel, if you are in forensic or in clinical. Cannabis, this our favorite word around for many thousands of years, dated back to the Egyptians. For our presentation typically you will see DEA will refer to this as marijuana, sometimes referred to as hemp when you look at the plant itself, there are 100 cannabinoids

detected, some of these grow and get better, and some of these numbers will go up. The substance and the cannabis, the THC, it is a [Indiscernible - low volume], mostly found in leaves and flowering beds, isolated in the 1960s, by the University, Dr. Sholom, and then this group was able to isolate the CB-1 and CB2 Receptors.

In our brain or in the Army and system reproductive system and the receptors pretty much in the brain, we found, CB-1, and typically in the immune system, you are talking about CB-2 in the brain not as much as CB-1. Now other known cannabinoids are Cannabinol, cannabidiol, cannabigerol, at least we know you guys are all tracking, do you know about [Indiscernible - low volume] now you know there is a tell to this Delta 10, now we are dealing with Delta 8 and Delta 9, Delta 10 also causing issues in the forensic labs as well. This is how the CB-2, this is actually in the lymphatic system a typo there. When you're talking about CB-1, we have talked about the cannabinoid's receptors, you see it affects pretty much when it comes to the decision-making, the hypothalamus, emotions and fear, the amygdala, and when it comes to reflexes, and your brainstem, and your spinal cord, your memory, then you start looking at cerebellum, and then your hippocampus, and your vortex. Typically for the longest time, we are familiar with cannabis or THC from smoking the drug. Or the plant material. From all the studies say, it is with the national drug abuse Jon Hopkins, or other SAMHSA collaborations and universities. The consensus is that when you smoke marijuana, or cannabis, the [Indiscernible - low volume] really quick when you smoke it, and can be 5 to 10 minutes, people do develop a tolerance, and what we know as far as the studies, people actually are tighter, they know how long they deep inhale, the eating drug effects, it could even be one hour or two hours, one thing for sure, once you eat it, you go in for the ride, unless you vomit what you ate, once they eat the drug, there is no turning back, when you smoke it, you can stop.

The half-life is 30 minutes, really quick, the cannabinoids, metabolites, those all can be found in the blood, but they do undergo metabolism. You will see them more in the urine all the time. There are short-term and long-term effects, and there is an altered sense of your surroundings. Some people actually try to hallucinate, and the perception of time is slow, have you ever heard someone driving on the road, and then in the far right or the far left, they think everything is moving fast? In reality, they are the slowest cars, the slowest car on the lane. There is this perception of time it changes. It is a weird thing. You can actually go on YouTube, to find people doing a self-experiment, and watch them, we've done this also for synthetic cannabinoids, it is very interesting. Impaired body movement, that will be affected, memory loss, or learning skills, what is even more common now that we see. When people are actually trying to smoke and drink alcohol at the same time, the result for them, actually, -- I can tell you synergistic in a way, we haven't measured it. People either fail more sick, after they drink alcohol, the effects depends on the person, but more and more people driving on the road, after smoking marijuana and drinking marijuana together. Smoking marijuana and drinking, paired together. For them everything is moving fast and in reality, everything is slow. If you have someone count 1 to 30, in their mind quietly, they will be done in 10 seconds.

I just want to inquire by that one. The eye-movement, there are some, a split is in here. When you have taken the drug expert recognition training, specifically say it is not apparent for THC, but some studies say they can find it, it is possible that you can still have that, it just depends on the person. The reddening of the eyes definitely we see that often, short-term, when they smoke THC, it is measured an increase in blood pressure and heart rate, the difference, the long-term and chronic use, it is the opposite.

If the person actually has a history a family history of personality disorder or schizophrenia, there are some studies, that they believe smoking THC, if they started a very young age, can actually trigger or bring about schizophrenia, or exacerbate these conditions. People who are using marijuana or cannabis along with other drugs on the long-term, they will experience thoughts of depression or anxiety, drug dependence is the number one thing we have seen in the past. Basically, if you smoke it, it is the idea, all of these projects here, and all of these which can cause lung disease and articles cause, can say because of the drug, the mechanisms to it, or what you call the benefits or not,immunosuppression, depending on what you're trying to suppress. That also allows people to get sick more often. So there is a group who did a study on somebody Getting a cold, and the long-term use of marijuana. This is the classification the one we typically see. Most of them. It's true, it is hard to overdose on THC, I have even read, thousands of articles. I have not seen one, I come through it. The only thing associated with THC as far as fatalities concerned, is because someone jumped off a tall building, or from a ledge, or they were smoking, they got into a car, and because of the impairment, they got killed in a motor vehicle accident, so the fact, they are different when actually smoking cocaine, or snorting cocaine definitely that will cause fatalities if you have too much, so far we haven't seen one, however next conception for the laden food for animals it's possible to die from interjection Of the drug, but we're talking about people here.

Just for the legal status of THC here in the United States, I think this is an ongoing back and forth between dose, those legalizing cannabis for recreation use and of course the DEA and the federal government, as far as we know. THC is still scheduled one, word on the street they are trying to tweak it what part of cannabis? And the DEA, can Control substance abuse spells marijuana, and in essence it is still considered THC as a schedule one. Now CBD, I think, they were lax on that one and also before was recorded as schedule one. I will cover the next few slides at the dialects, taken off of schedule.

If you go schedule one through five, the lower the number is, the more likely it's either one, no currently accepting medical use, or a high potential for abuse, interestingly enough if you look at cocaine, it is a Schedule 2, drug methamphetamines, schedule 2 drug, and some of the opioids that are mixed with Tylenol. They start to go down to three and four categories.

Every year the DEA will publish a list. If you want to know more about which drug is considered a scheduled drug you can go to the website. It will give you a link to where you can find it. These are the categories. And a new substance is put on the schedule. This is of the actual word marijuana schedule one. That includes the [Indiscernible]. Every compound is in preparation of the plant. There is a debate what the Delta eight schedule one or not. By this definition Delta eight [Indiscernible]. I think the loophole is the preparation of the plants. Delta eight is a byproduct, but it is from the THC. I think it is open to interpretation.

In 2018 this is when they passed the hemp act or agricultural improvement act. Everybody found a loophole. You can sell hemp products. The term hemp means the plant cannabis and any part of the plan including proceeds thereof and all derivatives, extracts, cannabinoids, isomers, assets, salts and salts of isomers, whether growing or not, with the Delta nine tetrahydro cannabinoids concentration of not more than 0.3 percent on a dry weight basis. They may not disclose the percentage of the THC in the product. Keep that in mind. FDA does not regulate supplements. But FDA is accepted when it comes to THC and CBD products. This was as of June 2021, I am not sure if there will be more states. As you can see, when I look at this, it didn't take long. Almost 10 years later, we now have more legalized states. If you want to see where this map is, you can go to the website listed on your screen. Some states did criminalize cannabis.

There are some states that they have not fully made it legal but allow them to make it medical. The medical is considered CBD. Then you have states that have medical and also decriminalized the plant material. It will be interesting to see a year from now how this map will be. Most likely, I think this will be all green at some point. This is an example, if you go to the guide and click on every state, there is a list. I didn't include Alabama allows you to prescribe THC for medical use. If you actually experiencing cannabis induced work and am annoyed induced, cannabis induced [Indiscernible] it is weird to me. The state allows to prescribe it to the patient. I'm not sure if that is a typo but that is what I read. In Texas, where CBD is the only one allowed for medical use, some of these conditions include epilepsy, MS, ALS, interestingly enough autism. Most of them would be end-of-life cancer. The most common ones are pain or in detectable pain. And then you have incurable degenerative diseases. When you compare to Utah, the list gets longer. The most common one would be manageable pain. The last is chronic pain. I think it is providers who play an important role when a person gets it prescribed. Every once in a while, the [Indiscernible] for the Army we will get a call, [Indiscernible]. Is there a concentration or something I should be concerned of that I know my patient is not using anything else other than [Indiscernible].

Well, it is still a low number, however, if we are just looking at, I'm not quite sure, just looking at THC, you can't tell the source. There is another cannabinoid that you can test. It depends on whether the lab can do that or not. If you suspect anything else, you can call the lab and ask them if they can send it out and distinguish between the two. It depends on the sensitivity of the instrumentation that the laboratory is using. Overall, cannabis commercial uses flower buds and leaves, main source of THC and CBD. The seeds main source of hemp oil, and the stock

is main source of fibers and pulp. When they talk about Hampton hemp oil, seeds are the primary source. Very little THC. The stock is used for fiber and pulp. [Indiscernible]. There are a lot of them. This is just a short list.

If you look at the food industry for cannabis it keeps growing. The difficulty is that the FDA, if you mix the food on the drugs, unless there is a valid complaint about the substance, the FDA will not touch it. When you put Johnson the food that is a different thing. There are more and more labs where they do THC testing. That is now included as part of the accreditation. We are not looking at it right now but maybe in the future.

Hemp oil versus CBD oil. Cannabinoid content is low in hemp. Parts used to produce oil is the seeds. Production method is pressing. Nutritional industrial uses. CBD oil has cannabinoid content which is very high. Parts used to produce oil is the leaves, flowers and stalks. Production method is solvent extraction used in CO2. Uses are medicinal. Studies believe that because they have CBD and THC together, designed by nature that even there is no THC, people feel more relaxed. And when the next generation of people cultivating the plant, then you have the cannabinoids in the plant. We have no idea how those affect the person.

This study was designed to have the provider of the plants the same people for so many years. They kept the concentration to about 2 to 3 percent. I think we can see they are able to grow about 10 percent. If you ever find yourself doing controlled studies, you have to be careful, and the people are subjected to any of the controlled substances and have experience with previous use. Some of the controlled groups could be nonusers or less frequency. Studies are little tricky. We tried to push for cannabinoids many years ago and it took us five years with preclinical studies to even get that to be reviewed by the FDA.

CBD pharmacology. CBD originally isolated by Adam et al in 1940s and stereochemistry elucidated by Mecca along him at all and 1960s. CBD has limited to no interaction with cannabinoid receptors CB one and CB two. They have shown to potentiate THC effects and lessened its undesirable effects such as anxiety, panic, sedation, dystonia, and tachycardia. Observed to have anti-convalescent, anti-convalescent effects, decrease in the Ronald excitability through transient receptor potential channels, antagonistic to orphan receptor G PR 55, Edina's and modulation.

Well studied in reducing epilepsy episodes in children. Have been used under the open label expanded access programs for managing patients with treatment resistant epilepsy. Observed to interact with serotonin receptors in rodents proposing it has an axiomatic effect.

This article is very good. It was published in 2019. Based on the review this is a list of things that they showed that CBD had potential effects. They also say that they have seen some early studies on antipsychotic benefits. People believe they can use it for chronic pain and now they are looking at for people who have addiction problems when it comes to THC or other opioids you can use this to help them. CBD adverse effects preclinical acute. If you need a copy of the article let me know. A lot

of times the four is approved, you have to see the clinical studies. You have to show them enough studies that there is a benefit. For the most part, they study the rodents in these studies.

If you can see at the acute adverse effects, it goes from either the Oregon, increasing weight. Some convulsions. Some of them are dose dependent. You have the addition of metabolism for THC. With a lower CBD concentration. While there are some, they didn't see any effect in the biotransformation of CBD. If you look at the dose, I think they go from the [Indiscernible]. Some studies go for a six. I have seen this one with four different concentrations. Depending on how they administer them, the dose can change based on the weight of the animal. Some are given orally now. And then we go to the clinical side. These are now primarily for patients with epilepsy. Take a look at your screen for the information.

Here is a continuation of the effects. If you think of how many trial studies they did to get approved, I think it was almost 10 years. I will go through these quickly. Most of you are familiar with ease. The doses I've been consulted with is typically 10 milligrams. For chronic pain I have seen 10 milligrams the most common does. It is a combination of THC and CBD. 100 milligrams milliliter CBD.

Marketing of the THC and CBD. It comes in different colors and sizes. I believe it is liquid most of them. Some people get sick with a combination of alcohol and cannabis. I think it should be studied. I'm curious if there is really a study, we gave alcohol without cannabis. I have that paper as well. Those who actually took the drug and the alcohol and then the drug alone, even at the low concentration, the person actually demonstrated impairment compared to a person with a .08. That's why we find more and more people having vehicle accidents. THC and alcohol is a bad combination in my opinion. If I can show you on the top or you have, I don't see the cursor. There we go. Right here is where we look for delta nine. Right here we have Delta eight. [Indiscernible]. Take a look at your screen for the information. If you don't hydrolyze your sample, you may not get the actual concentration.

When you go to the confirmation side, the urine, it is subjected to hydrolysis. If you compare, the only difference between the two is right here. Instead of calling it nine we call it seven. As far as we know, the assay does not react with the CBD. However, under acidic conditions can subject it to acid hydrolysis. It can convert to THC. We encountered this in the test. To prevent that from happening it is suggested to avoid acid. These are the technologies for the golden standard when talking about screening and confirmation for THC. The CBD, I am not sure if there is testing for CBD. You can chime in if there is. When we look at screening, this is antibody-based. When you look at the confirmation, there more people who like to use the high definition. People prefer confirmation compared to screening. You have a standard to begin with, you are able to separate them better.

Take a look at your screen for the information. We have to think outside the box. We are having difficulties knowing the difference between the two. Depending on the lab, for the most part, you end up sending your sample and it is best to ask the lab to see if they can separate the two.

It is kind of hard. It is possible. We have all of these questions. The first question would be our federal employees allowed to consume THC and CBD products if they are working in a state that legalized cannabis for recreational and medicinal use? All people in the military the answer is no. How about a federal employee? I think it is still no. No.

This is because THC is considered schedule one. Then you have the Executive Order, all federal employees are [Indiscernible]. If you are a federal employee, you are not allowed to use illegal drugs on or off duty. Not everybody gets this, I am talking about civilian. If you actually get hired, you will be tested. After that, [Indiscernible]. You are tested. The MRO's are different. For us, we typically handle the Army.

Every surface, every branch of service these are off-limits. Now the Air Force is tricky. They keep saying it is prohibited. I have been in a case where the judge actually did not pay attention to that. The person said it was okay. These regulations change, but that is different for the Army. The Coast Guard typically does what the Army does. The Navy is very specific. The one that gets a gray area is the Air Force. This is a problem. Are all commercial CBD products sold as THC free really free of THC?

They tested the products that are sold at CBD. They found out that not all of them are labeled properly. Some did contain THC.

Can taking CBD produce False positives, false positive job result for THC? It depends on the procedure they're using in the lab. There is a possibility you can convert CBD to metabolize into THC. The combination of THC and CBD again, it depends on how much THC is infused with the CBD. There will be some places that they say it is primarily CBD.

This study was done by [Indiscernible] with Dr. Combs. They partnered with John Hopkins. The study was at least half male and female, if you look at the demographics, looking at the BMI, fairly close. These are studies of people who do not usually use the drug. The conditions appear that we have [Indiscernible]. Experimental sessions were in randomized testing.

Can taking CBD produce false positive job result for THC? Urine samples collected at baseline and after four hours after oral dosing. Following four hours, your invoice were pooled at 2 to 4 hours increments up to 48 to 58 hours after post oral dose. Urine samples were initially analyzed via immunoassay calibrated at 50 milliliter creatinine specific gravity and pH were also acquired. Urine samples were subjected to solid phase extraction and drug confirmation via LC MS/MS confirmation method included the detection for the following analytes with corresponding limits of detection. [Indiscernible]. They have a list of different metabolites. In this group they were able to look for delta eight. If you look at this, specifically the CBD and the THC, the highest Delta nine quantitative was to only 9.9 millimeter. It was collected after four hours after vaporized cannabis with 100 milligrams CBD with 3.7 milligram THC. This was collected after four hours, so this concentration was found after four hours. [Indiscernible].

Going back to the question the answer it, the answer is yes. That's why for federal employees we should not touch the product at all. [Indiscernible].

10 multiple use, can chronic use affect the outcome? I went cold turkey in almost a month I've not done that. Is it possible to detect THC? What do you think? Yes, the answer is yes. Even though the product, there will be faces work as up-and-down. The drug itself is [Indiscernible] and it stays in your fat cells. Until it is to reach where your body gets rid of it, you are going to have the drug for 29 days. Some people have reported 30 to 60 days. Keep that in mind. It is possible you can detect the THC inpatients. Even though they said, it can be more complicated when they stop using. It will complicate things.

Here is an interesting one because I told you about the hemp oil. Can it produce a false positive? This was actually many years ago. And I did share with you one case where we have a reservist and his doctor prescribed basically [Indiscernible] to start taking hemp oil assemblages so that it could lower his cholesterol. It is actually a separation. He did test positive for THC.

He said he was using 30 milligrams at a high measure. Two tablespoons of oil and he was using that three times a day. And it is ingested orally. He was using that for two months. So it was a tricky one, and this study was done many years ago where the volunteers consumed hemp oil. And the concentration of the oil was very low. If you look at that how much somebody consumes in a day, the high they said was .60 milligrams per day. It is still very low. The average concentration of THC if you smoke it, it is less than 30 milligrams but if you eat it, it could be as much as 100 milligrams. They are getting higher and higher every day. They ingested THC for different doses in a 10-day period. .6 milligrams. What they found out was giving you an idea when the samples were collected, and they did a, they do an IRA with cannabinoids. Which is much more cumbersome than we use today. And they still use 50 milligrams per ml, for their range from 2.5 for the confirmation.

They found out that even though these guys were taking a lot of hemp oil with as much as .6 milligrams over the course of 10 days, it is still below the cut off. None of them tested above the cut off. The workplace confirmation is 15 for civilians and military. But, if you are a, it is still possible you can actually go, if you look at here, this is five so it is possible it can come back positive. If you're looking for CBD, it will almost give you the same characteristic or metabolism profile. Someone taking CBD most of them are getting much higher THC, some of the CBD are in the 200 to 2000 milligrams. Almost 2 grams a day. You will see CBD in the urine and depending on the purity Army Mac. The hemp oil back then before the hemp act of 2018, there is less than a dozen companies that were allowed to have hemp oil because they have to have the gold seal. The oil is [Indiscernible]. Most of them are coming from Canada. Maybe one or two in the United States, back then hemp oil if you have to sell it, have to prove that it is THC free. I'm sure they are not cheap.

This is just going over the study again. I don't know who else is using IA. Anybody using that? I don't know who those, I think everybody moved

away from IA. It is a mess, it is not a fun [Indiscernible]. Most of the time [Indiscernible]. Same thing, most of them tested below the 59 milliliters. And here's the thing, I think this is pretty much we are almost done but, in the end, I do have a copy of this article. If you're interested, I can give this to you.

The CBD consumption affect pain management, how do you actually carry out a compliance? I just shared the algorithm. And again I apologize this is very small. At the top you can see urine tox screen and if it is negative it goes through all of the other steps. If it is positive then you break it down to what is positive. And when we talked about the THC it is this area. We can provide this article to you if you are interested, or I can give it to our coordinator and she can disseminate that. Again, just to reiterate, the clinical lab, they are much lower than the cutoff. Even though the study showed even if somebody CBD or hemp oil should test positive for THC, if aloe Q is at one nanogram per mail it is possible they will come back with a measurable amount of the THC. Daily consumption of hemp and the BD products even a small amount you can test positive this the 0.3 percent dry weight I mentioned earlier is [Indiscernible]. We don't know if it is not, people, I have brides and it will be 2.2 percent of the five milligrams. I don't know how many people will actually do an analysis when they go to the store. If you're in the states where cannabis recreationally legal, medicinal, [Indiscernible]. Most of them don't have it. Some states are very strict and have to have that. You have labs popping up testing concentration products. Ultimately, can you as a provider, can you

[Indiscernible]. This keeps popping up in our cases. It gets complicated. What about if I go state to state. I cross into Arizona from Texas and I go to California. The thing is every state if you go to the website, every state has roles. For how they should market these products and sell them. So far the only one that I had a student that we look into all of these the one we think or believe that has the best roles and regulations when it comes to cannabis is the state of Maine. The other ones are very sketchy.

Some states allow you to actually grow as much as 12 plants. For medicinal use. Others are three. Some states will even tell you that while most of them tell you cannot use it in public, depending on the state they have regulations. If you do have patients that are not in uniform or federal employees, and you're in that state, I would recommend the rules because it can definitely give you a nightmare when it comes to interpreting their drug test. Again, the THC we know the effects of those. CBD [Indiscernible] that is been studied. And I don't know are you guys allowed to prescribe cannot be no, CBD or [Indiscernible] off label use? Yes, no? It depends. No. I don't know. The majority says no. Some say depends. Some said you have to go to the committee. Everybody has their different [Indiscernible]. I think, every state is different. I think for our warriors in San Antonio particularly for them we see more and more people getting prescribed. For pain management.

In summary, unlike THC, CBD does not induce psychotropic affects, however, more preclinical and clinical studies are needed to elucidate therapeutic properties and safety does. Even with the requirements of

less than .3 percent THC dry weight, food products containing hemp and/or CBD could still be contaminated with THC and could lead to positive urine drug testing. [Indiscernible]. If you are really strict and depending on your program, I have seen programs that moved away prescribing opioids to looking at homeopathic treatment. [Indiscernible]. Some of you said it depends and some of you know other things. Marinol and [Indiscernible] are the ones we know of and tracking them if they are FDA prepared everything outside of that, it could be anything. One thing for sure, for those of you who are living in states where cannabis is recreational use.

For the plant products or the buds to be tested with growing the plant or anything they grow the plant. Depending on the states they are required to make sure that those products are XYZ and it's not universal. It's really not pick those are the dangers of that too as well. There are some drugs that may be affected within addition or maybe induction of [Indiscernible] P 50 to C9 peer keep that in mind as well pick as far as we know 384 is a minor pathway for THC but it is there. That is all I have. I can take some questions. These are all the references but if you need copies of some of these I can provide them to you.

Someone is asking what is [Indiscernible]. Then you have the A which is the acid. They either may put in this is what confuses people. We have [Indiscernible] acid which is actually the ten or the actual acid.

Any other questions? I hope that encourages you to stop smoking. We're just talking about THC and [Indiscernible] is talking about the other one.

I think I am done. Nobody else has any questions.

Marisol Castaneto, I have a question. So the THCV I know we and the forensic testing program can have the performed [Indiscernible] but do you know if QUEST or med talks also offers the THCV testing?

Yes, I think QUEST does work although, okay, let me backtrack on that one. It is possible if you send it to QUEST they will send it to med talks. I don't know exactly who is doing that. If you send it to LabCorp they might send it to MEDTOX. To answer that question, I think one of them we do have they send to library. They go from TCD and I think they are looking at [Indiscernible] but THCV definitely does pick that is the one that came up over and over again from CBD. Over.

Dr. Jones, not sure what your title is but for LabCorp is there a way to specifically order this? I don't know. I doubt that's going to be on the drop-down menu or at MHS Genesis Rick I would just contact the laboratory, you're [Indiscernible] section the laboratory and tell them what you need to do. I believe QUEST has the contract for testing, and so, when you're talking to the person in the clinical lab for send out they are going to bring up the test menu for QUEST and they will try to find the test number for you, and so forth. You will get it ordered through [Indiscernible] or MHS Genesis with their help. Over.

Folks are busy typing. There is 36 of you guys. Appreciate all [Indiscernible - low audio]. The question is, THC can be prescribed for

pain management in the MHS. Is there [Indiscernible]? We know [Indiscernible] is in the formulary and has been there for a while now. What I can say is that part of what we do and [Indiscernible] was nice to help us out but we performed MRO review but only for service for soldiers Rick we do MRO reviews for all positive results that are eligible for MRO review. Four years THC positive or simply not eligible. That is changing very quickly. There is not a week that goes by I do not have a request to open up a THC positive for someone with [Indiscernible] Marinol prescription. That is one of the reasons I think Castaneto was asking or prescribing history for our providers. Over.

There was a question about the THC of cannabis for VA. VA is a little different. Anybody who works for VA can chime in, whether they are allowed to prescribe medicinal cannabis for V A. Please time and because I may have misspoken. Over. I guess we don't have anybody in the VA.

Another question from Christine, or the use of Marinol and place of medical marijuana? We don't know. Like I say, Marinol for active duty [Indiscernible] for a while now for probably almost six years now. Marijuana, the plant itself, as far as we know is not FDA-approved. They have to get medication field from a federal facility. They have to abide by FDA.

Thank you. Isn’t that sweet. Mahalo to you as well. I am hoping to be there in a couple of weeks. Thanks for the tip.

I have a quick question for you. Are you guys going to resume the MRO in person next year, training? We did this year, actually. [Indiscernible] went to San Antonio. Cool. He did the CC MRO course. It was great for her as she was new to the Army program. She just loved it.

Yes. This is where [Indiscernible] but you can hear if you are interested in medical review officer training or MRO training, and he has all of the information. If you are in MRO and want to review MRO she is the Point of Contact.

If there are no more questions then we can go ahead and close down the session. Thank you to both of our presenters for giving an awesome presentation. Thank you. Goodbye. Thank you. Everybody stay safe particularly for those in the eastern area. Be careful. Have a good weekend.