Just Polysubstance Use and the Importance of Data Trends.mp3

Introduction [00:00:05] Now this is the recording, RTI International Center for Forensic Science presents Just Science.

Voiceover [00:00:19] Welcome to Just Science, a podcast for justice professionals and anyone interested in learning more about forensic science, innovative technology, current research, and actionable strategies to improve the criminal justice system. In episode ten, Just Science interviews Josh Yohannan, a forensic chemist and expert in emerging drug trends, about polysubstance use in the opioid overdose epidemic. Polysubstance use dramatically increases the potential for overdose or negative side effects of drug use. While there is no "one-size-fits-all" description of a person who uses drugs, there is one common thread linking them all together - the danger they face when multiple substances are at play in their system. Josh Yohannan's experience in expanding the use of forensic analysis and intelligence for law enforcement has helped communities better understand polysubstance use, ultimately making it easier to identify emerging drug threats during the opioid epidemic. Listen along as he discusses polysubstance abuse, the complexities of identifying new drug trends, and the value of quality and timely data in this episode of Just Science. This season is in collaboration with the Bureau of Justice Assistance Comprehensive Opioid, Stimulant, and Substance Abuse Program funding to respond to illicit substance use and misuse in order to reduce overdose deaths, promote public safety, and support access to services. This season is funded by the National Institute of Justice's Forensic Technology Center of Excellence. Here is your host, Paige Presler-Jur.

Paige Presler-Jur [00:01:52] Hello and welcome to Just Science. I'm your host, Paige Presler-Jur with the Forensic Technology Center of Excellence, a program of the National Institute of Justice. Our topic today is a discussion on the importance of understanding the increasingly pivotal role that polysubstance use plays in the opioid overdose epidemic that our nation is facing. We hope this discussion will provide ideas and guidance for communities such as those with the Bureau of Justice Assistance Comprehensive Opioid, Stimulant, and Substance Abuse Program funding to enhance their efforts to increase the use of linked data sets to improve knowledge of trends, respond rapidly to emerging drug trends, and focus resources on high risk populations. Today, our guest is Josh Yohannan, an expert in expanding the use of forensic analysis and intelligence for law enforcement. Josh has specialized in analyzing novel psychoactive substances, or NPS, and the connection between investigations and polysubstance use resulting in drug overdoses. Welcome, Josh.

Josh Yohannan [00:02:57] Thanks,Paige. I'm excited to be here today.

Paige Presler-Jur [00:02:59] You began your career as a crime scene technician at the Baltimore Police Department. Can you tell listeners a little more about what led you from crime scenes to focus on forensic analysis?

Josh Yohannan [00:03:11] When I started my career, the first job I could get honestly was as a crime scene technician. However, I had the opportunity to get into drug analysis. I have a background in chemistry, and so I was really excited about that opportunity and did everything I could to get into a drug chemistry unit and learn as much as I could and really put my chemical background to task.

Paige Presler-Jur [00:03:33] What are you most proud of in your career working to identify emerging drug trends?

Josh Yohannan [00:03:39] One of the things that I'm most proud of is actually from around 2017. I worked very hard at the Allegheny County Medical Examiner's Office to develop relationships with our federal partners - the FBI, the DEA, the Postal Inspection Service, and Homeland Security Investigations - and Homeland Security Investigations had a really interesting investigation going on and they brought us a package. And it was a substance that we had never seen before, and it turned out to be cyclopropylfentanyl. Now, what really turned this into one of those moments that will stick with me forever is the fact that two days later in Georgia, they had a mass overdose event with a bunch of fake tablets. And the news hit, and it said there was U-47700, which is another opioid, and an unknown fentanyl analog. And I reached out to some of my colleagues down there who I've known for years through some of the different organizations. And I said, hey, I think we might know what you have because we just got this. I've never heard of it being seen in the US before. Then let me send you our data, and you can see what you have and if it's the same thing. And within an hour I got a phone call back saying thank you - you hit it on the head. This is exactly what we have. And so here we went from something we've never ever seen before, being able to help with an overdose event and identify something in another state. And that's really what is meaningful to me is being able to help people in other areas with the information we have through sharing.

Paige Presler-Jur [00:05:09] We began this Just Science season on Illicit Substance Use Response with Dr. Jon Zibbell of RTI International, who described for us the intersection of opioid and stimulant use among people who use drugs and how this is impacting communities. We are looking forward to diving further into the topic of polysubstance use with you, Josh. First, I think it would be helpful to orient our conversation by having you define polysubstance or polydrug use for our listeners.

Josh Yohannan [00:05:39] I think the big key is that polysubstance use is really using different types of substances. It's not just using opioids and the difference between oxycodone and say, heroin, where it's all the same type of drugs that you are using. The polydrug use and polysubstance use that I'm more involved in is someone who might be using an opioid and the benzodiazepine - like Xanax, or alprazolam is the chemical name of the active ingredient - and a stimulant such as methamphetamine or cocaine. I think it's important to really understand that there's also different types of polysubstance abusers. You have some people who are really - they're in an experimental stage. They're trying every different type of drug that they can. As part of their process, they're exploring every different type of drug. Then you have some people who are really, they have their drug of choice, and they're just trying not to go through withdrawal or they're trying to get through the day. And so maybe they're taking something to prevent opioid withdrawal symptoms. So maybe they're taking a benzodiazepine to get through their workday in between their fixes of an opioid. Still, you have another group where they're trying to almost self medicate and self regulate their moods, where maybe they're taking downers and opioids when they really have time to party and disconnect from the world. And then maybe they're taking stimulants to get through the workweek, and they're going kind of back and forth. And then there's also one other class that I'd like to mention, and that's the people who don't know that they're using multiple different types of drugs. And that's something that we're going to get into when we go through some of these other things that we've talked about with these people who, they get something and they're going to take it, but they might not know what it is. And that's really an important class to understand, it exists.

Paige Presler-Jur [00:07:28] And how does polysubstance use impact the overdose epidemic facing communities today?

Josh Yohannan [00:07:33] Well, I think that one of the toughest things is that people don't always realize the effects that the different drugs have. So when you take a benzodiazepine, you take a tablet, you don't know necessarily how long that's going to stay in your system. And people don't think about the fact that, oh, a benzodiazepine can cause respiratory depression, and then they go and take an opioid, and now an opioid can cause respiratory depression. So now you actually have two things on board that cause respiratory depression, which then increases that chance of an overdose event. It also is, again, bringing this back to points where people are really abusing prescription drugs, you know, things that people don't necessarily think are high risk, like the benzos where they're a scheduled IV substance. They're prescribed at very high rates. They're readily available. And people don't think of that as a dangerous drug. And yet what we're seeing is that people are abusing these in addition to other things, and nobody's really looked at it or thought of it from the perspective of that's making your situation more risky, more dangerous, because you don't know the effects of when things start to add on top of each other. And you also don't know how long the effects may last.

Paige Presler-Jur [00:08:43] Are there specific trends you would highlight to illustrate the impact that polysubstance use is having on communities?

Josh Yohannan [00:08:50] You know, I think that one of the most important trends that I've seen, especially during the opioid epidemic, we really spent a lot of time really trying to educate opioid users about what could be in their sample, their dope - whether it's fentanyl, whether it's carfentanil. We taught people how to deploy naloxone. We spent a lot of time teaching people the signs of an overdose. Here in Pittsburgh, there's actually a group that has a mannequin that actually shows you the symptoms of an overdose and actually walks people through so that they can really, not only understand what it is, but they can see it happening with a mannequin that has vitals and all of those things, the lips turning blue, the breathing depression, all of those things. But what we didn't do is we didn't pay much attention to the other groups. Right. We didn't pay much attention to the stimulant abusers. Now we're running into an issue, and it's been seen multiple times, people who think they're getting cocaine because it's a nice white, free flowing powder, and they end up with fentanyl because fentanyl is a nice white, free flowing powder or it can be a nice white, free flowing powder. And so you get a bag of white powder and the question becomes, OK, what is it? And we didn't spend a lot of time educating these other groups of drug users about what the signs of an opioid overdose are. And so people are really struggling with understanding when it's really necessary to do a medical intervention because, hey, this person's not responding the way I expect them to. Normally, when they take, even going to benzodiazepines, we've seen some fake benzodiazepine tablets, especially the Xanax 2 bars that have had fentanyl in them or that have had other benzodiazepines in them that are really, really strong. And people aren't responding to those drugs the way that they normally would. And instead of saying, wow, that person is acting differently on this drug and saying maybe I need to do some sort of medical help or call somebody, people are really just letting it go and not realizing how dangerous the situation is.

Paige Presler-Jur [00:10:55] Wow. You can really tell how for us to understand these trends, we need available data. So can you tell us what data is needed by communities to understand in real time what drugs are being used?

Josh Yohannan [00:11:09] Absolutely. So when we talk about data, there's really two different types of data that we're talking about. There's toxicology data that's going to be

what's actually found in somebody's system - what's found in their drug or their urine when they go through a drug test. And then there's also the forensic side of things where we're testing the actual drugs or samples that were seized from an individual. And those two things combined are really what we need to get to. Right now, unfortunately, one of the big things that we're missing is living toxicology data. So people who have survived an overdose event, and we just don't have that much toxicological data to say, hey, you know what, this person had these three things in their system or these people had just one or two things in their system. But it's really the combination of data that we need to get to, because what happens a lot of times is we'll have an event where somebody overdoses - and most of my examples are going to be from post-mortem samples, after somebody passed away from a drug overdose - but where they'll have cocaine and fentanyl in their system. And the question becomes, did they have a sample, were they using both at the same time, or did they use one and then the other? And that's why it's important to have both pieces of data, because the toxicology doesn't tell you when different things were taken. You might be able to, based off of the metabolites, say that one was taken before the other one. But you can't really say whether or not they were together because it depends on how the body metabolizes it and a whole host of other things that are going to affect that. So having that, the actual sample to test as well is really important. But again, what we miss out on a lot, especially since the start of the opioid epidemic, is living overdose events. And that's on both sides of that data because of all of the laws that were enacted, which I truly believe in the Good Samaritan Act and making sure that people who report an overdose to save a life aren't going to get in trouble, but then we're not getting any of that evidence. And that becomes an issue with really understanding what's out there because if we have a whole bunch of overdoses and we don't get any samples in, then we're not able to actually see what's causing those overdoses. And it's similar for hospital data where if somebody goes to the hospital for an overdose event, not all of them have blood or urine taken. And if they do, they may just run a simple screen because they don't necessarily need to know what opioid is causing an overdose or what benzodiazepine is causing an overdose. As long as they can treat the symptoms and ensure that that person's care is good going forward, they don't need to know specifically what's in there. And that is, unfortunately, such a huge piece of missing data right now.

Paige Presler-Jur [00:13:58] Thank you for highlighting the importance of having all of the data possible to understand this topic and the trends happening in communities. What would it take for us to be able to ensure both quality and timeliness of data?

Josh Yohannan [00:14:12] Sure. And I hate to go back to the age old adage of if there's a problem, we need to solve it by getting as many hands on deck to help work through it. When we talk about crime labs, one of the things that has been a concern for myself and one of the things that I've really fought against is that the primary customer is the court system. So as long as we're meeting court dates, then everything seems to be going OK. The problem is, is that court dates, sometimes depending on what court system it's going through and how long they have in between trials and from charging to trials, you may be talking two or three months down the road before that sample is actually needed for analysis. Even then, if somebody is not going to be charged in the court system, then we may not even work that sample whatsoever. So we've got these samples that are there that can provide us with timely information, but because we look at it as what our customer needs, we're not throwing as many people at the problem as we can to really ensure that we're getting timely data. And I think that one of the most important things that can be done to get this data that we need is to really show that forensic science, which is defined as the application of science towards the law, can be used and should be used as part of public health. And when we start to switch that mind frame of our only customer is the

court system or is the grieving families who have lost family members to overdose victims - if we look at it as an overall public health issue, then we start to say, OK, look, we want to turn around these cases a lot faster because we want to be on top of any trend that shows up. My ultimate goal in all of my work was to try and turn things around within 14 days so that we had information out. It was timely, it was accurate information, and we were able to be on top of new trends. So when something hit the streets, we would know about it. And it wasn't somebody passed away and then a couple of days later, we're finding out that they passed away - there's something in their system that we need to look at. Now I have to go and find that evidence. Then we have to go and have that evidence analyzed. And now we're three, four weeks behind and we've also missed the opportunity maybe to save more lives.

Paige Presler-Jur [00:16:32] Can you tell us, as a forensic professional, what it would mean to have access to public health data to enhance your understanding of what is happening in real time?

Josh Yohannan [00:16:42] Absolutely. I think that the public health data is really something that we don't get access to and we miss some of the big picture, and that's really important. When we're talking about drug uses, trying to figure out where problem areas may exist and trying to target those areas so we make sure that we're on top of any new trends that may occur or that we spot those overdose events, especially the larger, longer overdose events where it may roll over a couple of days, that we can spot those early on and make sure that we're able to appropriately identify what's causing it and how best to respond to it. And I think that that's an all encompassing event because the public health data is going to help us identify the different areas and the different types of people who might be involved, which then allows us to really focus our evidence analysis, and then work together to provide the best result back to the community.

Paige Presler-Jur [00:17:33] I hope our listeners can hear the complexities of identifying new trends and understanding what is happening for communities in real time. So can you explain what a polydrug investigation entails, and who is involved?

Josh Yohannan [00:17:47] Some of the polydrug investigations can be really complex. Some can be pretty straightforward. But really what you're going to have first is you're going to have a police officer or a detective involved on the front end of things. Then if there's any evidence that's going to be collected, it's going to come to the lab where we will go through and we'll do our analysis. And if there's something of interest, I'll make sure to follow up with a police officer or an agent right away. Otherwise, they'll be waiting for our report, and they'll get that report back. But what I'd like to highlight is the unique feature that we had in our office, which was with overdose drug events, because that was something that when the opioid epidemic started, we were really hit hard here in Pittsburgh. And a lot of the agencies really stood up to say, you know what, we need to go after the people who are supplying these drugs to make sure that we can stop these events from happening. And they really changed their routine. So beforehand, when there was a drug overdose event, the investigators from our office would be called out. They would go to the scene. They would take pictures to document everything. They would collect any type of drug evidence, drug paraphernalia. They would collect the body and they would bring all that stuff back to the office, and they would submit the evidence. But we really had no impetus to analyze anything at that point in time unless there was something from the toxicology side. After the autopsy, the toxicology would be done. If they had a question, then we might analyze the evidence. Well, when the opioid epidemic hit, there were a lot of opioid task forces that were started. And what we saw was a really

dynamic change where when there was an overdose event, whether it was fatal or non-fatal, detectives were going to the scene right away, and they were talking to the victim. They were talking to the victim's family. They were working on gaining access to cell phones and permission to search the cell phone. And they were trying to identify who provided those drugs to that victim. And that happened immediately, at the scene, so that by the time the body came to us and the drugs were with us, they might already have identified who they think the dealer is and may be setting up undercover buys or maybe starting some surveillance to identify where that person might be. And they've already talked to an attorney about what charges can we proceed with, which means that from my point of view, we're already bringing that evidence up to start the analysis so that we have all of those things lined up so that we can help bring charges against that individual in a more timely manner. Now, as a forensic professional, our job is not to bring charges or aid in that type of thing. But what I see our job is, is providing the information that led to that overdose. And that's really important because that has to happen in a timely manner. And our office was set up uniquely because we have investigators going out and bringing the body and the evidence right back to the same building that I was in. And we had the toxicology lab was right next to our drug chemistry lab. So we had a very tight knit community where we were all on the same page. And I would get emails from the investigators saying, hey, we responded to an overdose and these are the stamp bags - stamp bags are commonly how we see our heroin and fentanyl up here - we found these stamps at the scene, just so you're aware. So I may wake up one morning and have five emails from our night shift and our overnight shift that all have the same stamp bag in it even before I'm in the building, just from looking at my phone before I get out the door, I'm already game planning of, OK, I'm going to go through these pictures. I'm going to identify who has the best evidence and what condition it's in. We're going to get it up. We're going to get it analyzed so that we know what's in these bags, so that we can help identify what caused these overdoses. So our situation is a bit unique in that, in that sense. And when you go to some of the other areas around us, they don't have that same setup. Even if you go to Philadelphia, their medical examiner's office is separate from the forensic laboratory. So you don't have that tight knit group that we had where I knew all of the detectives on all the task force. I knew when they had cases, they would call me and say, you know, look, we're responding out and this is what I know about it already. Do you have anything in your system already? And so we were able to really keep this as a very quick response to the overdose event. The other group that I know that did this really well was the Miami Valley Regional Crime Lab over in Ohio. They had an amazing response where they actually created a task force that had police officers, and E.R. nurses, and their crime lab, and their medical examiners. So, again, it was involving everybody right from the start. So once there was an overdose event that started, even if it's just one or two people, we were able to identify the trends and they were able to identify those trends very quickly and get the word back out.

Paige Presler-Jur [00:22:38] Are there types of evidence you would suggest that a crime lab could also analyze to provide more information for communities?

Josh Yohannan [00:22:45] I think that the most important piece of information that we're missing is things that happen where it's a medical call, where it's an overdose event and nobody's being charged with a crime. Again, this is one of the things that really needs to be brought to the forefront is the fact that forensic laboratories have really been focused just on the criminal justice system. And nowadays we can provide so much information on the public health side that there almost needs to be a outside the box view of what a crime lab can handle. And if you can give enough resources to the crime lab, then you can really expand that mission to include all of those non-fatal overdoses where you have evidence

on the scene where somebody hasn't cleaned up. It's the same thing for- that some of the needle exchanges are starting to do where they're testing items for drug users, but they're doing it using tools that are not the same as what we have in the crime lab. And we can provide great information and we have the ability to do it as long as we have the resources, and the majority of time, that's the personnel just to handle that increased workload. But I think that including those things really would help us understand a lot of the, especially the polysubstance abuse issues because it will help us answer the question of did they take something that they didn't expect? Did they take something that had cocaine and fentanyl in it? Did they take something that had meth and fentanyl together or did they take fentanyl to push them over the edge because they took cocaine earlier? And those two drugs when they were in the system together, the body just started to shut down. And that type of evidence is just missing right now from so many crime labs.

Paige Presler-Jur [00:24:24] And how can hospitals be more engaged in this data collection to help our understanding of polysubstance use?

Josh Yohannan [00:24:30] One of the things that definitely took me a while to wrap my head around was the idea that hospitals don't necessarily have to test for every drug that's present. And the majority of them are really leaning on presumptive tests that are fast and automated so they can do a huge number of tests at one time. Even if it comes back negative, they're still going to treat the symptoms that they see. So even if the opioid tests come back negative, which may indicate something like U-47700 or the new one is brorphine or isotonitazene, which won't react, as far as I know, I'm not 100 percent certain, but as far as I know, they won't react with the assay kits that you would typically see in a hospital setting. So even if that opioid kit comes back negative, they're still going to treat the symptoms of an opioid overdose as if it's an opioid. So if we can increase the testing that's available to overdose patients, it helps us identify what people have in their system when they're going into the hospital. Really, that's not as often as I think it was pre-opioid epidemic. I think pre-opioid epidemic, if there was a drug overdose, most people were going to the hospital. And nowadays people are, they're waking up from their Narcan, and they're refusing medical assistance because they know they took their dope. They know they passed out. They know it was dangerous. They got Narcan, they know it's going to be a little while before they go back to it, but they're not going to go to the hospital. So it doesn't happen as often as it used to. And so when it happens, especially when those things are negative, when those kits are negative, we need to do more to explore what's there. You know, if you have somebody who shows all the signs of an opioid overdose and every test you've done has come back negative, that shouldn't be the point at which they said, OK, we're still going to treat it like an opioid overdose. We need to take that extra step. We need to find the funding. We need to find the mechanism to say, OK, let's take this to the next level. This is not a normal case. We want to take this one to the next level and say, what's there? One of the things that I'm most proud of from the medical examiner's office was a initiative started by the University of Pittsburgh and our medical examiner here in Pittsburgh, Dr. Karl Williams, and it's overdose free PA, and the website is OverdoseFreePA - all one word, no spaces, no periods, no pythons, nothing - .pitt.edu (https://www.overdosefreepa.pitt.edu). And on that website, you will see all of the data regarding deaths in Allegheny County. And you can cut the data by age, by race, is there- it's all your overdose deaths. You can also start to narrow down by drugs that were actually found in their system and on their death certificate. So it's really a great source of information that lets you see what's causing deaths and especially those combinations of drugs that may be seen in deaths together. And that's really important for us to get a good handle on. But there's been a big, huge push in the medical examiner and coroner community to really streamline and standardize the documentation on death certificates.

And I know RTI has actually been a big part of that in terms of trying to set up medical examiner groups that can report information and just getting that information, not only the same on a death certificate, but then again, also out into the public domain for public health. Knowledge is huge. And by doing so, you really relax the burden on the crime labs, on the medical examiner's office of having to go and pull the data and sort the data and cut the data this way and then cut the data that way. You just put it all up there for public health officials to use and to cut as they see fit.

Paige Presler-Jur [00:28:16] You have really highlighted the importance of criminal justice and public health partnerships around data and understanding trends. Will you tell us more about the importance of collaboration between public health initiatives and forensic laboratory analysis to address polydrug investigations?

Josh Yohannan [00:28:33] I think it's really important for both sides, both the criminal justice side and the public health side, to really get together on the same page. And I'd like to include the medical side as well, because one of the toughest things for criminal justice is the idea of de-identifying data and making sure that investigations are protected. So it's very difficult to say we found this new compound in this one stamp bag and it's killed three people when all of the police in that area are looking for who's selling that stamp. And we don't want them to all of a sudden flush all of the rest of that evidence, go into hiding, throw out their phone. We don't want to jeopardize investigations, but we need to find a way where we can get our data to public health, to the medical side as well so the E.R. doctors are aware of what's out there, and make sure that we're all sharing that information on a regular basis. And it's so hard with so many different people and so many different roles and trying to keep it small and tight knit so that you do have a good flow of information, because when things become too broad, right, it becomes difficult to share. When there's too much information, we get information overload. When there are too many meetings, we get information overload. So we need to all get together to say these are the things that are important to me, and then sit down as a group and say, OK, well, this is the information I have that you're saying is important to you. How can we make sure that we can share this in a manner that works for both of us? So I really think that just getting everybody at the same table and saying, this is the data we have, this is the information that we want to get to, how can we all share it together? It really reminds me of what they did in the Miami Valley region of Ohio. I'm very good friends with some of the people in their crime lab. And we talked at length about this because they were hammered by the fentanyl epidemic as well. So when they set up this meeting, that would happen with ER nurses, with their detectives, with their medical examiner, and with their crime lab, they were able to pass information along about where areas that were getting hit with Narcan versus what they were seeing in the crime lab and how much fentanyl they were seeing and maybe new trends or new drugs that they were seeing. And they were able to communicate that in a way so that the ERs were then able to identify issues early on, and the ERs were then able to provide feedback to the crime lab, says, hey, we're hearing that this is out on the street. And then that's helping on the medical examiner side because the drug lab is saying what things are being found in samples that are causing overdoses - the toxicology group. And so they really created a great environment for sharing all of that information. But, you know, so much of this was focused on the opioid epidemic, which a lot of people say has gone away, and what we're really finding out, especially during COVID, is that maybe the opioid-specific epidemic - where it's just people who are transitioning from pills or heroin and really those high risk users that so many of them passed away during the height of the epidemic - you know, things have slowed down and the deaths slowed down, slow down. But it's not saying that use has necessarily slowed down. And if we ignore the fact that the use is continuing, then what we're doing is setting

ourselves up for failure for the next time that those deaths start to ramp up, right. We saw a lot of those high risk individuals who were experimenting, who were using very heavily pass away during the height of the opioid epidemic. We're talking about so many people that realistically it's going to take a while to replenish that population, to even see those types of deaths. And it's a scary thought that the drug use really hasn't tailed off and over the last year, especially with COVID when we're all home and we're stuck and there's money issues and there's relationship issues and there's uncertainty and there's fear. All of those things really feed into drug use. And so we need to all be aware of it and be on top of it and really be ready for that next level, which means putting those partnerships into place instead of waiting for things to happen and then scrambling to say, gee, who should we partner with?

Paige Presler-Jur [00:32:50] And what would you recommend to our listeners in how they can get involved in responding to the growing polysubstance use in their communities so that they're ready?

Josh Yohannan [00:33:00] I think that some of the most important stuff will go back to something that, that's actually really super important to me and super meaningful, which is mental health. I think that as community members, when we see people who are struggling, oftentimes we assume that they're on their own struggle, and they're on their own path, and we don't necessarily stop to say, hey, how are you? Can I help? Can I listen? Can I do anything to help? And we just kind of let people go. And it's a really tough time. And I think COVID has shown the number of suicides and the reports of drug use and abuse are really rampant right now. So some of the things is really taking the time to ask how friends are, to ask how neighbors are and to just be present for others and understand that mental health is difficult and that we're all dealing with our own concerns and fears and issues, especially during COVID. And then in terms of the drug abuse, it's understanding the signs of different types of drug abuse - knowing that there's a massive difference between somebody who is taking a hallucinogen like LSD versus somebody who is using heroin and nodding and somebody who's taking a stimulant, and maybe you've seen them constantly fidgeting and their eyes are pinpoint pupils - but just maybe learning some of those signs. And I will go all out on this one. I think that everybody who has access to it should carry naloxone. You know, I don't know anybody who is an opioid user, but I have had naloxone in my backpack every year since they started providing it to us at my office because I carry it with me because I don't know. You never know, when you see somebody who's slumped over the wheel at a park, a red light, you just never know when you're going to run into somebody. And if you see those telltale signs - the blue lips, syringes, spoons, things that are indicative of drug use - just having the right tools can save somebody's life and, you know, that's that kind of that ultimate step of really doing things for the better good.

Paige Presler-Jur [00:35:06] What are the top unanswered questions about polysubstance use that you hope researchers will work to understand?

Josh Yohannan [00:35:14] I think one of the big things is the effects of some of the common drug combinations, like when we're talking about benzodiazepines, especially alprazolam which is in Xanax, very highly prescribed in the United States, not prescribed a lot over in Europe, if at all. It's one of the lowest prescribed benzodiazepines over there because of the risk for abuse. So here we have something that is widely abused in the United States and is seen very often with our opioid addicts or with our opioid users. So what about these two drugs can we learn? The other area where I think there needs to be a lot of research is with the deployment of Narcan. So all of the studies that I've seen

previously and all of the information coming out in the beginning of the opioid epidemic was Narcan everything and everybody because it can't hurt anybody. But the thing is, is that Narcan was not meant to be given three or four times at once. We've already upped the dosage to, I think, double as to what we started at the opioid epidemic. Then we're giving two or three doses of Narcan pretty quickly. I even heard stories of people responding to the same house multiple times in one day where somebody is getting multiple doses of Narcan multiple times in one day. So I think that there's a really important area of study about what effect is Narcan and the number of doses of Narcan - what does that have long term? Because the original thought when Narcan was developed way back when, and when it was found to reverse the opioid effects, was that you were going to give it and that person was going to be off of the opioid for a while and they were going to be in the hospital and they were going to recover and they weren't going to have access to drugs again. But then when you talk to some of these EMTs who are exhausted and they're replenishing Narcan, every time they go back to the station and you find that they're going to the same people to the point where they know their names and know that, you know, as soon as the call comes out on the radio, it's like, OK, let's check our Narcan before we go. And they're giving out so many doses in a single day, that type of information is not understood. And it may be that it's fine and that all of those same trends are there that they observed with the low doses of Narcan. But I think it's really important to understand and to monitor that so that we do know going forward.

Paige Presler-Jur [00:37:37] And how would you like to see the conversation around polysubstance use progress?

Josh Yohannan [00:37:43] You know, I'd really like to see a lot more on the treatment side to try and get people into medically assisted treatment where they actually are interacting with not only doctors who can help them with their medication, but also on the mental health aspect of it. I think that that's super important to balance those two things. We're starting to really recognize the benefits of medically assisted treatment and how it can help save lives. And I think that we need to keep going with that and then start to balance it with the idea of we don't want users to try and self medicate. We don't want them to try and make things right on their own. We're here to help. And I think that it's really important for us to understand that we're not always trying to- the "gotcha." You know, we don't want to get people in trouble. We want to help people and we want to understand what is it that makes you feel the despair that your escape is drug use. It brings me back to the differences between the United States and some of the other countries. And people bring up some of those countries like Portugal where they legalized a lot of the different drugs that are out there. And having traveled to Europe a number of times, it really struck me how different the family structure is over there and how important family time is in those areas. And so when you look at somebody who leaves their family behind, you'll find stories of mothers who and fathers who are out there on the streets with their son or their daughter. And they're spending time watching over them out on the street. You know, they're not letting them just disappear. And those drug users there, when they're ready for help, there are public health officials and mental health advocates who are there to help them when really they don't have to go, when they don't have to search for it. And so I'd really love to see us turn the discussion more towards how can we build up support systems for these users so that they're not feeling like there's no way out. Like the only way that they're going to get treatment is going to depend on the insurance that they might have. We need them to know that there's help available and that help has to be available. And that's really my biggest thing, when the opioid epidemic started and people said we just don't have the beds available. And then three years later, when they were saying we just don't have the beds available, I thought, well, how do we expect to get help

and how do we expect to overcome if we can't change one of the simplest things which is making that help available. So that's really where I'd like to see the the focus in the conversation be is how can we improve the services?

Paige Presler-Jur [00:40:22] We're running near the end of our time together. Are there any final thoughts you'd like to share with our listeners?

Josh Yohannan [00:40:30] I would like to thank you for the opportunity to talk about this. I think that it's been an interesting time to see the opioid epidemic hit and to be part of one of the responses to one of the hardest hit areas in the country. It was fascinating to see who was involved that I had never known would be involved in the opioid epidemic. But I think the most important thing that I can say is that my heart goes out to all of the people who have lost loved ones to that epidemic and to drug abuse. It breaks my heart thinking about it. And it's something that's very difficult with me as a father thinking about what could I have done to make my children not feel alone. And even in the darkness, there's light - all of those things. So the thing that I would like everybody to know is that it does mean more to me than just a case. It's not just a piece of evidence. You know, this epidemic cost us so many lives, so many young lives, so many loved ones who were lost. And that's really important.

Paige Presler-Jur [00:41:34] I'd like to thank our guest today for sitting down with Just Science to discuss the role that polysubstance use plays in the overdose crisis and the need to improve our knowledge to respond more rapidly to the drug trends that communities are experiencing. Thank you, Josh.

Josh Yohannan [00:41:50] Thank you, Paige.

Paige Presler-Jur [00:41:51] If you enjoyed today's conversation, be sure to like and follow Just Science on your podcast platform of choice. For more information on today's topic and resources in the forensic field, visit forensiccoe.org. I'm Paige Presler-Jur and this has been another episode of Just Science.

Voiceover [00:42:12] This episode concludes the Illicit Substance Use Response season of Just Science. Stay tuned for a mini season focusing on sexual assault response reform releasing this April in honor of Sexual Assault Awareness Month. Opinions or points of views expressed in this podcast represent a consensus of the authors and do not necessarily represent the official position or policies of its funding.