



Clinical Education Initiative
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HIV MEDICATION ERRORS

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[video transcript]

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fourth, Dr. Dan fourth is currently the clinical pharmacy manager at Trillium Health in Rochester, New York. And Dr. Jenn fourth is an expert in many areas, including HIV prevention and treatment and has recently accepted the role of Western champion for the New York State Department of Health AIDS Institute clinical education initiative. We're delighted to have Alex join us today. So without further ado, I will now turn the presentation over to you, Alex.

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Thanks, Mark. And thank you for having me today. So again, my name is Alex Danforth. I am a clinical pharmacist, I work at Trillium in Rochester, New York, and I wear a lot of different hats at work. So I am heavily involved in our HIV treatment and prevention programs, as well as our Hepatitis C care and treatment program. These are my disclosures. And then for learning objectives, today, we're going to look a little bit of medication errors for HIV positive folks, as well as some different types of errors you might see. And then I hope to give you some tools and some strategies you can use to help prevent errors in the future. So an error by definition is anytime there's somewhere along the chain of the provider coming to the table to write a medication to all the way to when it's suspense to the patient, and anything that happens along that journey that disrupts things, whether it's at the order entry stage, or when the pharmacist is verifying or when a nurse or is administering or the patient is getting a prescription at an outpatient pharmacy. And an adverse drug event is just any harm. It's always like to start off thinking about what's going on with HIV in the US and in the country as a whole. And so what we know is from CDC data from 2020, younger folks actually account for more than half of new diagnoses. So if you look here, you can see that the highest proportion of patients newly diagnosed with HIV was actually in the 25 to 34 year old age bracket. You can see the other ones there. When you look geographically, there are definitely differences across the country. So on this map, what it shows you is the states that are lighter blue, have fewer eight new HIV diagnoses in 2020 compared to the states that are darker color. So you can see us New York is up there and we're sort of this like medium, only dark blue. But you see that most of the new diagnoses in the country actually come from the southern states with Georgia being the darkest blue or the highest rate of new diagnoses. Okay, so this looks specifically at some racial and ethnic differences among diagnoses, particularly among gay and bisexual men in the US. So again, you can see that black or African American, gay and bisexual MSM have a higher rate of diagnoses than Hispanics, which is even greater than white MSF. So our goals for HIV therapy, and these are just straight from the guidelines is really to suppress viral load. So when we get someone virally suppressed and undetectable, we have a couple other things that happen first is their immune function stays strong so they don't lose their CD four cells. They are also not able to transmit to other people so we know you equals you are undetectable equals on transmissible, and then the individual will live a longer, healthier life. So most of the time, when I talk to people about HIV medications, they find it super overwhelming. Because if you look here, what we have that's FDA approved, there's a lot of them. And there's been a lot of changes, even in the last 10 years as far as approvals. But what I like to remind people is we have kind of

a handful of medications we use pretty commonly. So if you work on knowing what those combinations are even just a few of them more common single tablet regimens, you can really help to prevent errors, because you'll know what a regimen is supposed to look like, or what is a commonly prescribed medication. So for example, one time when I was working, there was this was at a hospital and there was a pharmacist running around trying to find this really weird strength of protease inhibitor. And we couldn't he couldn't find that anywhere in the pharmacy. And it's one of those things we're like, well, if something seems really strange, it might be just an error. And it turned out it was just like a data entry error. That's a clinician when they had put in the order had picked like a pediatric strength and picked an incorrect protease inhibitor. So if you there's something that looks kind of off or it's really hard to find, it's might just be an error. So, I'm gonna go through a couple of the common regimens just to make sure we kind of have a baseline knowledge of things you might see commonly. So I'm a visual person, so I like to kind of see the pictures. These are not to scale necessarily. So just because something looks kind of bigger, but the shapes and the colors and the markings are all accurate. So for initial regimen, so these are going to be ones you're probably going to see commonly in patients who are newly diagnosed and even some of our long term survivor patients have been able to streamline to some of these newer single tablet regimens. So all the way on the left is big Tegra Vir, I'm twice I've been turned off of your L Acetamide, which is branded as picked Harvey. So this again is a one pill once a day regimen. Then in the center, you have trying Mac which is Dalia Tegra, Veer, Ibaka Veer, limited eating. And then divano is Dolly Tegra, Veer and Libby and so those again are three single tablet regimens like you might commonly see is in the bottom half of the screen is a multi tablet regimen, but it's only two tablets once a day. So again, this is another recommended initial regimen, which is W Tegrity, or a tilde k with either de SCOPY or Truvada and the only difference between disco V and Truvada they both have anti cytidine but the form of Tanaka Vir is different. So desko vs Tanaka Vir Alfetta mide were Truvada has tenofovir disoproxil fumarate. And another difference is the Truvada is also available generically now. So you might not see this characteristic blue pill if you're dispensing Truvada. So some other starting options. So you can see these ones the reason why they're not sort of this top line preferred initial regimen is they have either more tablets or more drug interactions, or more kind of dosing restrictions compared to those regimens I just went over. So up here kind of in what would be the top left, you have Raul Tegra Vir with either disco V or Truvada. So that's gonna be three tablets because the Raul Tiger V or the Isentress is two tablets on its own either once or twice a day, if you're kind of using that dark peachy one, which is regular Isentress or if you're doing the high dose, you can take both tablets which is the yellow one together. But so that's more tablets. Then down at the bottom right under that is LV Tegra, Vir single tablet regimens. So either Gen Voya or stripe I based on again, just the type of tenofovir and the reason these are kind of down here is they have a Kobe says that which is a boosters that kind of gives you more drug drug interactions, compared to say, the valuetype revere or the big Tiger beer based regimens on the right half of the screen. On the top you have a favourite or Sustiva based regimen. So Atripla sin phi and sin Philo are all a favourite ones, with basically what equates to generic Truvada mixed in. And the difference between the three is just sort of the doses of the favour ins that's in them. And then you could also do Sustiva with the scoby, which is what the favour ins with the scoby. And then down here at the bottom of death, see and compare our real peppering single tablets, again that just the differences the form of tenofovir and then sort of the newest drug in this class is derived marine which is branded as PEP filtro. So you can take that

with the scoby or it comes co formulated in the single tablet regimen called del Striegel which is derived marine limit eating and the older form of tenofovir TD. So then we kind of move into protease based regimens. So these are all have protease inhibitors. There's only one single tablet here which is some tuzo like that one is darunavir Cobicistat. Taff anti cytidine. And then you have kind of the multi tablet regimens that either are going to need a SCOPY or Truvada or epsa COMM With Norvir or CO formulated press COVID x and then you have your atazanavir based regimens, which are going to be Reyataz or eco tests based. So again, you can see here you just get more tablets, and because protease inhibitors have more drug drug interactions, they sort of fall out of favor. They're really nice though, if you have patients who may be have some protease needs Patients or have some drug resistance to protease inhibitors or can't take integrase inhibitors for some reason. These are a nice kind of option.

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And then here are some sort of starting options that you might see if you're trying to avoid a baka veer or tenofovir for whatever reason, whether it's because of renal function or resistance or different things like that. One caveat that is kind of over there in the left is that these wouldn't be great if you have somebody who's co infected with Hepatitis B, because none of these regimens would really be treating the Hepatitis B apart appropriately, so you would need to add something on for that. So you can see it's avato again, comes up here, that's the W Tiger Vir eliminating single tablet regimen. And then you have a protease with an integrase. So you have Isentress and resistance with the Norvir booster, or three TC which is limited at EPA, Vir, again with resistant oracare. So a lot of times we'll find that in these preferred initial regimens, there's two NRTIs that are the backbone. So that's why a lot of them come and fix those combinations habits just makes it easier for patients. So the most common ones you see are typically tenofovir FTC. So that's either going to be the scoby or Truvada branded, or epsa. Calm which is a block of Erlinda VD. There also is available some do to mixes. Those are similar to Truvada but not quite the same. So you see that it's the TDF for the older form of Tanaka Vir with limb of eating. And then still available, but I don't see used very commonly is Trizivir or Combivir. And those are zidovudine or AZT based regimens. So typically, I only see those if there's patients coming from perhaps other places in the world to the US, but not very commonly used here. And then again, this is just more for your reference when you get the slides. So there's some fixed dose combination tablets that have integrase inhibitors again, the nice thing about fixed dose is one pill once a day, it's more difficult to make a mistake giving somebody a regimen. If everything is CO formulated all together. There's only the one with a protease inhibitor, which is the darunavir based single tablet regimens and tussah. And then the non nucleoside reverse transcriptase inhibitors, there's a whole bunch of them. Again, you'll see the top two cumplir. An ode FC are both real pivoting the differences that tenofovir I kind of went over earlier a triplet sin phi and some phylo were all very similar. And then Dell straight Oh is the directory one. Then in this class, you also have some two drugs, single tablet regimens. And that's juluca, which I haven't mentioned. But yet, but that's real pivoting and NNRTI with an integrase inhibitor, and then devata, which is the directory, I have a typo. It's not your average etc. It's tell you Tegra veer three TC, so apologies for the typo. And then sometimes there might be some other unique regimens, particularly, if you have patients who are treatment experience, sometimes they end up on more than three drugs, so to overcome maybe some resistance. So these are just some examples of things I've seen used in the past. So the first one is Gen boys, so your elvitegravir

based single tablet regimen, but then you can add on darunavir or resistor. And the nice thing there is you're using the Kobo systat booster that's in the Gen Voya in order to boost the during severe in the process, so you don't have to take again another booster, sort of like to fairing using the Kobo systat booster for both the LV Tegra veer and the derivative there. Here's another one which is a real pivoting based regimens, you have like real pivoting value Tegra vejer, plus 10 off of your FTC. And so you can do that in two tablets by using Odessey plus tivity together. So again, just some unique ways to kind of move things around that might relate to people having more than two or three drugs and a regimen. And I already mentioned when do we really want to start therapy for patients. So the current guidelines say that everybody should get HIV medications as soon as possible because it's really about treatment as prevention. So u equals u. When we're able to get patients to be virally suppressed and undetectable. They do not transmit to their sexual partners. So what are some risk factors for adverse drug events or for being harmed by medications? The number one reason cited most studies is polypharmacy. So when patients have a lot of medication or seeing a lot of providers and getting scripts from different places, just the more scripts you have, the more likely you are to have some sort of adverse drug event due to prescriptions. Patients who are either at either age spectrum, so the very old or the very young are also more likely to have adverse drug events. And that's simply because they don't always process out medications the same way we do is to or middle aged adults, I guess do so they don't process medications the same and then any patients who have sort of illiterate, limited health literacy. So what is polypharmacy? So polypharmacy has been defined a bunch of different ways. But in general, most people will agree that it's anytime a patient is on five or more medications. Looking specifically at HIV patients, there is a Swiss cohort study that looked at a whole bunch of patients over time and found that as our HIV folks age, they also have an increased number of comorbidities. And you can probably think of the ones that were popping up in this study, diabetes, hypertension, high cholesterol, things like that. And all of those correlate with an increased use of CO medications and polypharmacy. And then, polypharmacy itself is associated with false increased risk of hospitalizations, increased risk of drug drug interactions, again, simply because you have more medications, there's more risk that something negative could happen. Oftentimes, we see cardiovascular drugs, whether those are your cholesterol agents, or your blood pressure agents, or antiarrhythmics, things like that. Gi drugs, so maybe there's things that affect motility or affect acid suppression, anti platelet and anticoagulants. And you can probably think, too, about how those kinds of medications put patients at increased risk for adverse drug events and are often indeed cause of polypharmacy. So what are some common types of errors we see for HIV patients first is incorrect dosing or sort of missing regimen. So for example, this came up at my job yesterday, when other providers came to me and said that a patient who had been on a two tablet regimen so they were on W Tegra, Vir with Taff FTC. So two tablets together once a day, somehow by an error stopped filling the dahlia keg revere at the pharmacy, so they had only been getting for the last few months, tenofovir emtricitabine, or de SCOPY, they hadn't been getting the tivity portion of their regimen. So disco be alone will not control HIV infection. So the virus started replicating and they had a detectable viral load. So missing a medication or sort of not having a full regimen, not catching drug drug interactions. So that happens sometimes too. And I'm going to go through a few of those later on, or you know, simply ordering a medication or regimen that's not recommended. This is a study that looked at inpatient HIV medication errors. So it was a review article looking at a whole bunch of different studies that were done in the early 2000s.

And found that overall, across these 25 studies, the error rate for HIV medications ranged quite broadly from about 6% to 86%. Most of the errors across these 25 studies occurred fell on admission. And I think if you've ever worked in an inpatient setting, we're doing those admission, med racks, med reconciliations, it can be kind of difficult. Oftentimes patients don't know what they're taking at home. And it can be hard to track down the information. So the bulk of the errors actually occurred at admission. And they were typically errors in not having the right regimen or the right dose, or drug drug interactions, things like that. Okay, so this is another study again, this was a retrospective review at a different community hospital, looking at patients who came into the hospital, not newly diagnosed, but had a diagnosis and had been on antiretroviral therapy prior to their admission, and they found that at their hospital, over two years, 60% of patients had at least one error. And the most common error was not getting their outpatient regimen soon after arrival or on time, basically. So the patients often ended up with delays and getting their meds because of confusion around what the outpatient regimen was or how to order it. And they also found that patients who were on multi tablet regimens were at an increased risk of medication errors and those who had an admission serum creatinine greater than 1.5. And I think we can sort of think about that too. If you have a patient who is having some sort of kidney issue, you're potentially not going to be able to order their outpatient regimen depending on renal dosing.

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One more example of an inpatient medication errors so this one looked at hospitalized patients at a jersey Medical Center. And again, about half of them were given the wrong ARB regimen on admission. And the bulk of those were when non ID specialists or internal medicine providers were doing the ordering. So again, it's just gonna be partially an error due to people not being as familiar with what the HIV medications should be or what the regimen should look like. And this might come up because sometimes patients change regimens as outpatients like, for example, at the clinic I'm at We're an independent clinic. So our because we don't have some sort of universal EMR system. Our records don't populate when our patients go to the hospital. So if I see, you know, Joe Smith today, and I make a change to his medication, and he goes inpatient for, you know, heart attack in two weeks, they might not be able to see what his updated regimen is, particularly if he's not able to tell them oh, yeah, two weeks ago, I switched from bit tardy to some twos or something like that. So sometimes they might not get the correct medication. For that reason. So let's flip and kind of think about what about outpatients so those were all kind of once looking at inpatient, mostly, again, regimens on admission, drug, drug interactions, things like that. So this was a retrospective review looking at medication errors in patients who were in the outpatient setting, and this group found that they had about 40 medication errors, but it took them quite some time to figure find them. So the medication errors often weren't detected for around a month. And the most common type of errors in their setting was doses and drug interactions. Okay, so this one, this is a study that looked specifically at those outpatient drug drug interactions, and looked at what would the impact be of involving a pharmacist to sort of check so they this group had to outpatient HIV clinics. And what they did is they had pharmacists, who then did a pre screening, they called it with patients before they saw provider. So they, the pharmacist sat down with the patient sort of talked about adherence, did a complete med rack and then also went through the medications, looking for drug drug interactions before the HIV provider saw them at the outpatient appointment. So in this study,

they found that about 50% of patients had a potential drug drug interaction, which was most likely to occur with protease inhibitors. And then about a quarter of those occurred with CNS medications. So mood stabilizers or things like, you know, anti psychotics, things like that things that are going to affect the central nervous system. Afterwards, they surveyed the providers and physicians involved, and about 60% of them said that they actually learned something from the pharmacist consultation, information they didn't know. So again, we all can work as a team to sort of prevent medication errors and share our knowledge. What about consequences. So what's going to happen if we don't catch these medication errors, so sometimes it can lead to patients not having the right medication, and not being adherence, efficacy, which could lead to failure, maybe it's increased risk for adverse drug events, from toxicities and things like that. And so overall, all that can lead to, again, virologic failure, resistance to drugs like so, for example, the example I talked about earlier about the patient who's only been taking Tanaka Vir M, try psi, the been for the last few months, it's entirely possible that we're going to get a resistance test back that shows that he's developed resistance to those two drugs over the last few months. So factors that contribute. So there's a bunch of different things. So we talked already about some patient factors, you know, like polypharmacy, things like that low literacy, and then different other factors involving healthcare professionals, the drugs themselves and transitions of care. So when patients come in and out of the hospital or in and out of the outpatient setting, or go to different providers in an outpatient setting that can be an opportunity for medication errors to occur. Patient factors good to keep in mind patients with renal dysfunction. So particularly since a lot of our patients are on Tanaka, Vir and try cytidine there's Different renal dosing for when you're using tenofovir disoproxil fumarate versus when you're using Taff. So it's important to keep those in mind. For patients with hepatic dysfunction. A Baka Vir is the only NRTI. That's not renally dose, but it's contraindicated in patients with severe hepatic dysfunction. So just something to keep in mind. And then if patients have drug resistance, So there for example, there's different dosing for darunavir versus NW Tegra, Vir if patients have resistant virus versus if they're treatment naive and don't have drug resistant virus. And then some of the other patient factors that put patients at risk for HIV medication errors, we talked about some of them already like polypharmacy, comorbidity, so more medical conditions, more prescriptions, more drugs, things like that can put people at risk. Non adherence of the patients are really struggling with adherence or different socio economic barriers. Some of the drugs have issues with drug interactions, particularly around assets, oppression agents, or SIP three, four cytochrome, p 450. inducers are inhibitor. So this is where a lot of the drug drug interactions with boosters and protease inhibitors come into play because they affect the cytochrome P 450. enzymes, which then affect the metabolism of other drugs. So whether the drugs need boosters, and then I'm going to talk next a little bit about drug needs and labeling. So if you don't currently read Paul Sachs has a really good blog that he posts whenever he feels like really called HIV and Id observations and he wrote this really good post a while back about it is just so dang confusing with HIV drug names, and why is it so confusing? So some of this I just stole from him. Because I find a lot of times patients are confused about drug names and providers, we're confused about drug names, too. So one reason for that is, each drug has a branded generic and then in HIV, we like to do these three letter abbreviations plus, then there's all these combination tablets, whether it's two NRTIs together as a backbone, or it's a full regimen and a single tablet to bat can be really confusing. And sometimes, they're not really related. So zymogen is not really related to a balk of year as far as the names are

concerned. Or, for example, FTC, which is anti cytidine. There's not even enough in anti cytidine. So again, this can get kind of confusing, then this goes for all drug names, in my opinion, but the name has generally sometimes has absolutely nothing to do with the what the drug treats or what's in it. So for example, just go v plus andarine is ofc. Whereas Travato plus m drehen is cumplir. So, it can get confusing. If you're not really familiar with brand and generics, what is in those single tablet regimens? So that's just an example. So I find oftentimes, when I'm talking with providers, we sort of, especially if we're talking in brand names, which happens a lot, at least at my job. Sometimes we have to pause and think okay, is that the right brand name, what's in that combination tablet? How is that going to interact with other drugs. So just thinking about it, when I threw through some new generic for generic formulations, like sin phi and sin phi lo, which are like Atripla, but not exactly the same, so that can be confusing. And then I'm a huge fan of the three letter abbreviations because I get really lazy, writing out drug names all the time, or saying out these long abbreviations and things. But of course, we're not always consistent on how we use it. For example, the darunavir slash ritonavir sort of shows that we're using the ritonavir as a booster, but sometimes people like to write it as RTV, or three letter abbreviation, or sometimes I like to do slash little r, to show that we're not really using ritonavir for antiretroviral effects, but just for boosting. And the same thing goes for the Cobicistat. Sometimes you'll see it spelled out all the way as COBie. Sometimes you'll see it as See, I've seen the whole thing spelled out there or sometimes people just say ECF TAF to distinguish from like ECF TDF. So again, we're constantly making it more complicated for ourselves. So just take a stop, take a pause, and understand that the naming can be pretty confusing and HIV. And then we have also have a look alike sound alike areas so that pop up oftentimes with our HIV drugs so I centrists and intolerance kind of sound like

30:03

there are some other ones like deer Varyag virasat, Vera mewn. So these ones all have that the the IR so you know virus, you can see where the name came from. But they're all different drug classes and they all do different things. So it can get kind of confusing for both patients and providers. So some other factors that might contribute, talks a little bit about health care knowledge. So coming and doing trainings like this and keeping up on your knowledge of HIV medications, that can be one way to help mitigate errors. And then healthcare settings. So obviously, when people are under a lot of workload when they're distracted when they're interrupted, often when there's communication barriers with the patients, those are all factors that might increase risk for errors, and then transitions of care. So those particularly medication reconciliations if they're not inpatient versus outpatient, on admission, on discharge at the follow up post hospital appointments, these are all places where errors can occur. Next, I have a little question, a little polling question. So in this case, you're working in an inpatient facility there, a patient has been admitted, and a medical student went by in the emergency room to do a medication reconciliation. So the medication reconciliation comes back and the student has said, Okay, this patient is taking darunavir 600. Once a day, tenofovir, disoproxil fumarate or TDF 300, once a day, and I'm traced it to being 200 once a day. So what would you do next? You can I wrote this as a pharmacist perspective, which is verifying the orders. So would you verify all the orders as is? Or would you contact a provider who ordered this?

32:13

Okay, so we have pretty much split. So about 40% of people are going to go ahead and verify this, everything looks great. And then 60% of you are going to contact the ordering provider. So the correct answer. Oh, my goodness. Okay, maybe we can go forward. Okay, there we go. Got that going. So in this case, we want to contact the ordering provider. And why is that? So that has to do with the fact that there was the Runa Vir and there which is a protease inhibitor. So all protease inhibitors need to be boosted except for nelfinavir. And if you see nelfinavir ordered, that itself is probably an error, because that is a really old protease inhibitor that hopefully none of your patients are on. So there are some times that we don't use ritonavir as a booster, but that is again, super, super rare and itself is probably an error. One time so one example of where boosters can get confusing is I've spelled out some of the CO formulations here. So you might be ordering the darunavir or the resistor. But if it comes co formulated as press qubix the boosters already in it. So from an inpatient setting, you might not have all these co formulations on your formulary. So it's important to realize that if patients are on something that's co formulated as an outpatient, if you don't have all those co formulated tablets on your hospital formulary, you might have to stop and break into the components. But so Kalita EVO tears and PrEP kopecks are all the protease inhibitor with the booster co formulated and then Jen Boyden struggled again have the Cobicistat booster and the single tablet regimen. But so in this case, the darunavir didn't have the booster ordered along with it. So that would either need to be a cohesive set order or return of your order. Okay, so you call the ordering provider and you talk to the medical student. And so now what they're gonna do is they're going to add the booster in. So now we have to run a dir 600 a day with the ritonavir because you don't have the CO formulated press COVID at your hospital, you're going to do to ruin a beer with Return of the or separately but we're going to order them to be taken together and then the TDF and the emphasize to be the same as they were before. So now is everything good to go or should you be contact the ordering provider again?

35:16

Okay, so we're, we're sort of split again. So we have about 60% of p of people saying, let's just go with what's up here or another 40% are saying, now we need to contact the ordering provider again. And so in this case, it's Yep. So we got to call back again. And let's talk about that. So the reason here is back to the darunavir. A couple slides back, I mentioned that darunavir is dosed differently for patients who are taking who have drug resistant virus, versus patients who are treatment naive or don't have to run with your associated mutations. So the difference is those 600 milligram tablets that the provider ordered for this patient are actually for patients who are treatment experience to have darunavir mutations and you dose those ones to twice a day. So likely this was an error, particularly if the patient says they only take it once a day, it should have been during the year 800 milligrams. So again, just wanted to highlight this example of you know, the boosters can cause medication errors, and that protease inhibitors themselves just often get a little bit confusing. So protease inhibitors and boosters are often involved in HIV medication errors. Okay, so our next case, now you're working in an outpatient pharmacy, and one of your favorite customers comes in with a new prescription for sin two tussah, which is TAF, I'm try cytidine during the year, Kobe systat. So that's going to be your co formulated single tablet regimen for a protease inhibitor. And they're going to take that one tab po every day. And there currently, the only other thing they're on right now is receive a statin or generic

crest or 10 milligrams a day. So as the pharmacist, are you going to fill the center as a prescription as is or should you contact the ordering provider?

37:41

Okay, so in this case, we had about a quarter of people, everything's good to go, they're going to fill them soon choose that and the other three quarters are going to contact the provider. So looking at what the answer is, this is one is actually okay. Everything is good to go. So this one we can fill this in choose a prescription as is. So I find a lot of times people get pretty confused when it comes to statins. So lots of patients have high cholesterol or have an indication to be on a statin for some reason. So it seems like everyone's on one. And certain standards interact more with HIV medications than others. Particularly protease inhibitors. So protease inhibitors as a class are Cytochrome P 453. Four inhibitors. So because they inhibit three form a taboo metabolism, that's generally for most of our stands, what metabolizes them. So you can't use always a high dose of a statin with a protease inhibitor or even some stands at all. So send the statin and low the statin have very high three, four metabolism. So if you were to give them with a protease inhibitor, the level goes really, really high and then you put the patient at risk for rhabdomyolysis. So those two are contra indicated to be used with protease inhibitors, I torva statin and receive a statin, a torva statin has a little more than three for metabolism, you can still use it with protease inhibitors, but you should limit the dose to 14 or 20 milligrams, excuse me, based on the guidelines and so you can kind of think that it gives you like three to four times the level. So again, keep the torva statin doses at 20 or less, and then receive a statin which and those are the two we use the most often right because if you think about the cholesterol guidelines, most patients need a moderate or high intensity statin so torva statin and receive a statin are the ones we use the most. So receive a statin again, that one has more or less three for metabolism so you can get away with using more Standard doses of receive is 10. So the 10 milligram dose is totally fine with us and tussah. And then private statin has the least. So sometimes I find patients still on private statin because perhaps a provider's like, okay, that's the one that's safe to use with HIV medications, but it's really simply protease inhibitors or other boosters. Or it's an it's not as public, it's an added torva statin or super statin. So you're not going to get the same bang for your buck with private statin that you will from a torva statin or receive a statin so you probably in this case, would want to just option one switch the standard. So in general, if there's a drug drug interaction with a statin, I try to switch over to a torva statin or receive a statin. Your other option would be to leave them on something like Simba statin and then switch the HIV regimen, which there's lots of reasons to do switches at times, but I would consider statins, not one of them. So other medications that can often interact with HIV meds. So we talked about statins, certain cardiovascular medications. So this is really more about rate and rhythm control agents, steroids, so corticosteroids. The reason why this one can come up is because Fluticasone in particular, is available over the counter Filoni, so nasal spray, or other inhaled intranasal corticosteroids are available over the counter and their metabolism is often three four dependent so the levels can get really high and that can lead to Cushing's Syndrome. So you need to be very careful if you have patients who are on boosters or protease inhibitors, if they need inhalers so you know your ad their flu, take his own inhaler slogan things like that. Or if they need nasal steroids, certain psychotropic so again, things that have three for metabolism. For example, La Raza donor Latuda or Seroquel co typing. Those ones all interact with boosters or protease inhibitors. Certain narcotics like methadone, methadone itself has really funky

metabolism. So again, it's gonna get affected anti gout medications, BPH and eating medication so like you're still Denna Phil, things like that PDE five inhibitors. They can be boosted up by protease inhibitors or boosters. Then there's some proton pump inhibitors. So you're like, Oh, Matt Rizal, again, which is available over the counter or h2 blockers, like Ranitidine or famotidine. Again, over the counter can interact with real pivoting or famotidine if there are real pivar and atazanavir if they're being taken orally. And then rifampin Rifabutin have lots of drug interactions. So they also get implicated with HIV meds. So these medications, this is all protease inhibitors that are contraindicated so you can see some of the ones that I already talked about La Raza down, we talked about statins already. there things that you might see drawn out around, that is going to have a ton of drug interactions. And then St. John's wort, so that's an over the counter herbal supplement that has a million drug interactions, probably every pharmacists, least favorite herbal supplement. So usually what I tell patients as far as herbals are concerned is like just don't go there. Or if you are going to take one please like go up to the counter and talk to the pharmacist first. Kobe systat is the booster that's found in those co formulated tablets, Jen Voya strive belled press Kobe X and EVO TAs. So it itself has added some tussah. So it has like protease inhibitors has some contraindicated meds, so you'll see that they're almost all very similar to the last list. And that's because again, Kobe systat works as a booster because it inhibits three for metabolism. Looking at assets, depression medication, so PPIs you cannot if you're going to use them with atazanavir you have to kind of do a dose reduction and I'd usually try to help patients space or something like that, with real peppering if you're taking it orally proton pump inhibitors are contraindicated and that's because those two drugs need an acid stomach environment for absorption. So that's the reason for that one. Now patients can also be on injectable real peppery, and if they're on kava Nuva, which is an injectable regimen, so then that wouldn't be an issue. So it really only has to do with stomach absorption. And then h2 blockers again, there's some spacing and dosing recommendations. Okay, so one thing I I'd like to point out and I just copied this table out of the guidelines as an exhibit some examples is TAF versus TDs, even though they're both tenacity, or they're both pro drugs, and they don't have the same drug drug interactions. So for example, carbon is a pain ox carb, I see oftentimes maybe used by psychiatry for mood stabilization or by a psych nurse practitioner. With Taff it actually the levels get lower and you cannot co administer. Whereas with TDF, there's really no problem. So this can come up for if you have patients who are taking desko V for PrEP, and on one of these for either seizure disorder, or mood stabilizing, they should not be on the scoby for PEP Ben, or you have to change the carbon Mesa pain or ox carb to something else. And then here's just another example again, of like TAF, and TDF, not the same of riffa pentene. So again, even though they're both tenofovir, I think it's important to point out that they have different, some different drug drug interactions with them. So they're not entirely interchangeable. As far as that's concerned, I already mentioned herbal therapy. A lot of times, I just tell patients don't go there. But again, it's really hard to figure out exactly what's in a lot of these mixes. And I let patients know they're really not regulated. So you, to some extent, don't fully know what's in them, it's not the same as taking, you know, something that's a prescription. So now I want to talk a little bit about some tools. And some strategies we can do first off, when in doubt, like stick to the guidelines. So if you're seeing a regimen that's coming in on an order admission, or on a med rack, and it looks really funky, and it looks really off the guidelines, just make a call do a double check, because oftentimes that might be maybe there was a transcription error there. Watch for drug drug interactions, if you see one, just do a

double check phone call. And then particularly providers that have less experience in HIV medications, or working with HIV patients are more likely to make errors. So if you're a newer provider, or you get stuck, feel free to phone a friend, and then just check for patients in renal and hepatic issues. And then I'm going to share some online resources that can be really helpful.

47:27

So some different strategies we're going to go through. So first off formulary management. I already talked about formulary management a little bit like because there's so many co formulated tablets now and you might not be able to have them all in formulary. So it would behoove you to kind of look at what are their prescribing practices in your area, try to get rid of anything that is not really being used commonly. So maybe, for example, there's probably no reason to have Crick's of an on your formulary because hopefully no one is taking Crick's van anymore. But it might be important to have, say PrEP COVID is on your formulary if you have a lot of patients in your area that are using that. If you have co formulations on formulary, sometimes that can help avoid sort of that confusion with do I need to take what's a single tablet regimen and break it up? Does it have a booster do I need to add a booster So again, just things to think about with formulary management on how you might, you know, minimize errors. There is there were some articles that suggested like, oh, maybe you could have IV approve everything. But that's just really going to delay medication access. So while I would totally recommend maybe phoning a friend to your curb citing an ID person, you probably don't want to put them on restriction. Order Entry. So this was an interesting study that was published in the last couple of years looking at one institution where they used leverage some things in their EMR to try to help with those initial orders. So for example, one thing they did was they use defaulted doses. Some of particularly the CO formulated tablets come at a pediatric dose and then like an adult dose. So what they did is they sort of had a default to the adult dose and had spelled out whether it was adult or pediatric trick, default frequencies for administration. So you don't want to be ordering say, tenofovir emtricitabine B ID it's usually dose daily. So things that had specific frequencies, they defaulted to that and then admin instructions. So for example, if it needed to be given with food or with a meal or at bedtime. So for example, a triplet is often given on an empty stomach at bedtime. So they would have that sort of defaulted when that provider went to order. And so they found a pretty good decrease here. So their error rate decreased from about 50% to 20% just by making these EMR modifica. patients, and they found that overall, the one that had the biggest impact was dosing errors. So they were able to decrease their dosing errors by 22%. So perhaps there's things you can leverage in your electronic health record that can help mitigate errors. So using pharmacist so I went over that one study earlier that showed that having on an outpatient side having a pharmacist kind of do this medication reconciliation and drug drug interaction check could help, but also at transitions of care. So perhaps you have a pharmacist that doesn't medication reconciliation, every time there's a patient who has HIV diagnosis admitted or for. In my case, since we're in an independent clinic, I have one of our local hospitals, they'll just call me anytime, like, oh, you know, we have so and so. And we can see that you guys see them as an outpatient just wanted to double check. Are they still on Victor Harvey? Yes. Okay. Great. You know, so those kinds of things. And then antiretroviral stewardship. So again, maybe having a pharmacist specifically looking at the orders and going through everything to make sure everything looks good to go.

So this was a study that looked at pharmacists doing antiretroviral stewardship. And so here, what they did is the pharmacists an order entry and verification, they made modifications to how the pharmacists were actually like sort of doing that the verifying and ordering, they did some education. And then they also had a checklist for the pharmacists to go through when they're verifying. So that was a pretty big intervention. And so here, I'm gonna show you the checklist. But you can see if you're looking at before the intervention to after the intervention, they had a significant decrease in the number of admissions with any type of error. And you can see that their most common error was either drug interactions or incorrect regimens, and they were able to take the incorrect regimens to zero or the dosing errors, which they attributed to just having this checklist involved. So might be kind of fuzzy here, but for the checklist, the pharmacist would go through and so for example, in this first one, we're looking at the regimen, so verifying the regimen looks right? And you can see that they have sort of those initial regimens, sort of spelled out, okay? Is that a protease inhibitor? Does it have that booster is there to NRTIs? Um, you know, and then down at the last one, it's regimen is not listed above. So it's kind of looks funky, did you verify it with the outpatient prescriber, or were you able to verify it based on pharmacy fills, and then again, so the pharmacist would kind of be able to go through this and then check everything, check the timing. And then step four is checking for drug interactions and other things. So this was an example of an intervention made in a hospital setting that helps them decrease medication errors, having an HIV pharmacist on staff or on board that can help out. So this again, looked at a large outpatient, sorry, a large economic Medical Center looking at medication errors, and just by having a pharmacist versus HIV, they were able to decrease their medication errors. Next up, I just want to give you some resources and then open it up to questions. So I've linked in the DHHS, so those are kind of our national guidelines. The New York State Department of Health AIDS Institute has a clinical guideline program. Theirs is also very nice. The University of Liverpool is where I go for drug interaction, checking for both HIV hep Hep C drugs and they also have a nice one for COVID-19 therapies. And then CEI is putting on this training has a lot of really good resources for training and education purposes. So again, here in the DHHS guidelines, they have tables that are particularly helpful for drug drug interactions, as well as spelling out very clearly kind of what are these preferred or typical regimens. This is the New York State doh ones. They have all kinds of things you can see at the top, PrEP, PEP, Hep C STI substance use, so again, great place to go. This is the HIV drug interaction checker on University of Liverpool. It also comes as an app for your iPhone or your Android. It has that little like swirly purple thing so look for that. But it's nice because you can punch in all the HIV drugs, all the other drugs and then on the right hand side, it will show you basically like red, yellow, green, what's going on and explain the interaction. They also have one for hep C. So in conclusion, there's a bunch of different Reasons Why HIV medications occur but things like this, you know, educating yourself doing trainings, keeping up to date, and using your resources. And using any interventions you have as far as your formulary, your EMR can all help. On CEI, if you ever get super stuck, and you need help, you can always call phone a friend. So you can phone CEI, and get expert advice on anything related to HIV, PEP PrEP, Hepatitis, seis, Drug, User Health, all those kinds of good things. And there's also, these clinical tools they're really nice are little cards that can go on your badge, I often just order a bunch of them. And then when I have a new provider start, I'm like, welcome to Trillium. Here's the door prize. And I give them all the cards that they can keep for reference, because they're really helpful. And if you get you get stuck, or you're a little unsure on like, what initial labs do I need

for proper things like that? So the clinical cards are super nice. So I'm gonna open it up to questions. But if you think of something and you want to email me, or you want to talk to me later, or you just want to say, you know how fabulous you thought this presentation was? Please email me. There's my email at work. Did you want to read some questions? I don't know, Mark. I know.

56:21

We have Yes, yeah, we'll try to time well like rapid fire answer. So the first question is, how does the use of injection HIV meds reduce errors and can errors because when administering the long acting injectable Ha,

56:34

okay, so the long acting injectable. So a couple things. One is, you sort of avoid, like I talked about earlier, if I recall, peppering oral absorption issue with like PPIs and h2 blocker. So that's one way it could decrease it. One space for errors, though, is there's actually two different doses, there's a monthly dose, and then there's a every other month dose. So if you have patients at your clinic who are on both, it could get confusing with the scheduling. Also, for that, I'm assuming most hospitals are not going to have that on formulary, super difficult to kind of get insurance coverage for at times. But so if you have a patient who's inpatient for a really long amount of time, like more, and they miss their injection, you're gonna have to start thinking about what's passing through with like, I had an instance with a patient who ended up incarcerated on Kevin UVA. And so I had to talk to the physician at where he was about like, Okay, well, on this date, you need to switch him back to an oral regimen because he won't be covered by the injectable anymore. So that's just something to consider if you have patients who aren't going to be able to make it in for an injection.

57:50

Great. If a patient is on one HIV Med, and for over the counter vitamins you consider that polypharmacy?

57:58

Um,

58:00

I guess technically, it would be polypharmacy. I would question if they really need a for over the counter vitamins. That would be it. But that's just me as a pharmacist being like, let's try to minimize things people are taking. But yeah, I mean, if they're on a calcium supplement and an iron supplement, those are going to have potential drug interactions. If they're on some other herbal thing, or, I mean, yeah, I consider that polypharmacy.

58:27

And what was the blog that you mentioned?

58:32

Oh, it's, um, it's a blog written by Paul Sachs that's published through New England Journal, online. So if you Google, like Paul Sachs blog, I believe it's called HIV and other ID observations. He actually just posted a really good article this week talking about, um, COVID treatments. So it's not all HIV focused, but he has a lot of good articles and reviews when studies are published.

58:58

Okay. All right.

59:03

There's another question here about sorry if I missed this earlier, but what other ICs Do you feel comfortable with boosted PIs? If patients cannot get

59:12

back back at Bliss?

59:14

Meth Azzam? Yeah, sorry. Okay. So we usually try pretty hard to get people back on methadone if they have to be on a protease inhibitor. And another option that we've done in the past, if somebody really critically they need like some sort of high dose steroid ongoing is to see if we can get them switched off a protease inhibitor. But there's bachelin matha zone and then I know we've done at least in my practice, we've done be justified in the past even though it's not really the best in the guidelines, but sometimes you can't get insurance and somebody put flu in a cyanide, which is also a great option if you can get that for inhaled. But yeah, it's tough because a lot of times the insurances don't want to cover backflow methadone and that's the one that's recommend. ended in the guidelines.

1:00:02

And then there's just one final question. What would you add to the five writes reduce medication errors? Many times nurses are blamed for medication errors. What are your thoughts on this?

1:00:11

Well

1:00:21

I'm not sure if I have anything particularly to add, I do think that nurses oftentimes get blamed for administration errors. And that's unfortunate because we shouldn't be blaming. Sometimes one thing that does come up with HIV medications because the bulk of them are not available generically. Is they look they have a distinct look. Right? They all like I can, at this point, look at medications and tell what they are right off the bad. So sometimes maybe asking patients that says look like what you take as an outpatient. Maybe that could help but typically, the errors happen at order entry, not like when the nurse is rounding and dispensing meds so I would try to fix the error earlier on in the process and not try to blame the nurse for administering. And

somebody actually had a really good suggestion about using Anticholinergics, overusing ICs and lava combos, and that's another good option for inhalers.

1:01:26

All right, well, thank you so much for that very thorough presentation, Alex. We really appreciate it.

[End Transcript]