Transcript

October 10, 2024, 5:00PM

Alvarez, Marta 3:39
Everyone welcome.
Here we're at 1:04.
That's the one thing. If anybody knew on the call had anything before.
And I don't think there's any other topics at this point to bring up other than the.
OK, for today's office hours.
Unless you have anything you'd like to add that we haven't discussed.

Houghtaling, Jared 4:07
I.
I don't believe so.
I think I can kind of dive in if I don't know if I don't see Andrew, I know Andrew's bouncing around today, but I guess maybe he'll not join this one.
OK.
Then I can already go ahead and give a brief some brief context to the the talk or the kind of topic I should say today back in March.
It's amazing.
That's now already.
What, like 7-7 months ago?
I gave a session on drugs.
And how to map them?
Some kind of tricky things about drugs, how they fit in the general.
Structure of OMA and what the vocabulary looks like.
And in that talk, I used epic as the example, and so that that recording, unfortunately not we could not share the recording because there were epic tables referenced and and proprietary pieces of information, which was a pity.
So and especially we've we've in the in the weeks prior to this, we've gotten questions from multiple sites or at least I have about drugs and how to map drugs and and kind of best practices there.
So I thought it would be prudent to revisit the topic and do so in a way that we can actually share the content after this.
So for those of you who are on the call, you can ask questions and those who are not able to make it today can review.
Kind of brief view onto handling drugs within OMA.
So I see Andrew has joined.
I don't know Andrew if if you have any other topics before I jump into the main event today.
To discuss, but all right, cool.

Williams, Andrew E 5:53
No, I don't.
Ounds great.
Thanks tart.

Houghtaling, Jared 5:58
Correct. All right then I will dive in and I'll share my screen. I can get this coordinated here.
See.
Right. You should all see a big PowerPoint screen that says drugs on it.
Awesome. OK, so.
I think there's a couple things that that are gonna be important today that I wanna make sure I emphasize, one of which is.
First, how?
Widespread drug concepts are within the vocabulary, and I'll get. I have a slide on this but but they are the most.
Terms of proportion they they represent the largest proportion of any domain within the omop vocabularies the vocabulary tables.
And there's multiple mapping elements to to capturing a drug and.
The kind of deriving things like dose arrrow, which I'll get to in a little bit.
Are not always so evident.
There's some guidelines on on the Omop overall website.
That's dose in particular is a lot of times site or data source specific and I'll kind of get into why that is the case.
So in broad strokes, how drugs fit into kind of omop and particularly how they represented the vocabularies?
What these derived elements from drugs mean and how you can get arrive at them appropriately?
And then kind of high level views on on some challenges to mapping drugs. And I'll do this specifically with mimic demo data.
So this is a demo data set from Visual net that is publicly available so I can show the data from it and we can walk through it. So it's not the full mimic set I guess if Brian is on he is, it is just a small subset and.
I'll use specifically just the drug tables.
From that set to showcase.
OK.
So drugs 4 tables are relevant for the discussion today in particular.
So we have drug exposure as you probably presumed, but drug strength which is sitting down here at the bottom and the not discussed too much actually in the context of the standardized vocabularies.
But it is the pivotal table when you're looking at calculating something like drug dose arrow and you'll see why in a little bit.
And then the last two tables which are derived so drug error.
And that's more or less describing.
If you have exposure to an ingredients across multiple drugs, it captures that exposure.
Across, let's say, different types of drugs and different occurrences.
So let's say you take acetaminophen.
For three weeks and you have at different dose levels in all this?
It'll it'll capture that kind of multiple exposure chain of of events into a single era of an exposure to that ingredient.
More or less it's it's consolidating into independent drug exposures at the level of ingredients and then dose era which is taking that a step further and looking at how much of A given ingredient you are actually exposed to over a given time period. And the latter is is.
Very critical for for quite a few analytical use cases, especially those looking at drug.
Drugs, I think within this consortium is in particular it's it's critical for looking at.
Kind of pharmacokinetics and on the very short time scales, how drugs impact patient outcomes in a critical care setting, so.
Those are the four drug tables that we're gonna talk about with the last two getting probably most of the focus today. But I do wanna make you all aware of drug strength if you haven't used it. It is a very useful table and hopefully I can show why.
I think most of you are familiar with this, so I'm gonna kind of gloss over a little bit, but at a high level, the structure of the omop vocabularies.
It's centered on the concept table, so we have these concept of these which are the primary keys that are driving pretty much every other relationship throughout the vocabularies.
This case, it's atrial fibrillation.
It's a condition and it's in the snow Med vocab.
It's a standard concept.
It's got its snow Med concept code and when it's valid to and from, and that single concept then is related in this kind of broader hierarchy.
So it has concepts that are.
Less granular than it going all the way up to just cardiovascular disease.
And it has concepts that are more granular than it, like persistent atrial fibrillation.
And this.
Element or this idea of being able to link concepts in this hierarchical or lateral fashion is is one of the main, let's say, analytical powers of representing things within the vocabularies, because you can use these relationships to help define very precise sets of concepts based on a A.
Case of interest or to be able to actually generate kind of a web of of different medical events that are in some way related in a way that you want.
And this is a relatively simple case. In this condition where you have some parents, you have some children, and maybe there's a few lateral relationships involved as well.
Drugs, I will say just to preface this are are much more complex.
They have lots of different relationship types.
I think most of the relationship entities in the relationship table this this table right here.
Are actually related to drugs.
Things like has branded drug or has packet or has dose form and all of these lovely relationships with their reciprocals, and I'll get to that in a second. But so just to say this is a a simplistic case and it.
The relationships get more complex and and more detailed as we as we go into the drug domain, OK.
So when we talk, even stepping back further than than we are now.
When we talk about the the Omop vocabulary with a capital V, we're really talking about.
A.
Agglomeration a set of different terminologies, a set of of standard and non standard terminologies that are all kind of brought in together into this.
Single organizational structure and they're all assigned concept ID values. All of their terms in this case are assigned concept ID values and all of them in this that we're talking about here are have concept ID values under 2 billion.
So when we talk about the the, the, say chorus or bridge to AI specific concepts, those are the 2 billion plus.
That's the range that you can create your own custom terminology.
Here we're talking about those concepts that have kind of.
Asked the thread David achieved the integration into the general over vocabulary.
And so there's 140 or more than 140 now. I think this is even out of dates. Vocabularies in the the OMOP overall vocab with 40 different domains.
You have more than 10 million concepts or around 10 million concepts, let's say of which about half are standard.
We also have classification concepts which you might have run into.
If you're looking at.
Some things in the ICD system, or or otherwise that are not defining a medical event, but actually a class of medical events, a grouping of of other concepts.
Within close to 100 million, both relationships and ancestral like hierarchical or lateral really.
So these are concept relationships. Can be oops, sorry hierarchical or lateral. Whereas ancestral concept ancestor table is only defining.
Degrees of separation from either children or parents.
And then you have concept synonyms and for those of you on the call who I have worked with one-on-one to integrate the mimic vocab. You'll know that the synonyms we're using heavily in our approach, where we actually define.
Explicit.
flow sheet descriptions in the synth table, and we use those to then map our flow sheets to the the bridge to AI ontology. OK. But one thing that should stand out across all these statistics is this massive green box which accounts for more than half of all of.
The drugs.
Or all of the the sorry, the the concept terms in the Omo vocabulary and that is this, this drug box and that's been further stratified into standards. The upper quadrant here I guess upper half of the screen.
And then lower half is non standard and what you'll notice is that there's really only like 3 and a few small or minor vocab.
Ularies in the standard group of which RX norm and RX norm extension are are the kind of carrying the bulk.
Brief rationales to wise RX norm is is US centric. RX Norm Extension captures more international drug representations.
And then what you see here mostly in the non standard blocks are international codification schemes or terminologies that then have typically relational linkages into RX norm extension terms.
And so you'll see this one out of France.
You have NBC, which we're gonna talk about with mimic.
You actually have snow Med representing drugs in some ways that are considered not standard.
So a lot of stuff happening here, but that's kind of an overview of of your different vocabularies.
And within the drug domain.
Again, please stop me.
I'm going through a lot of this quickly 'cause we have covered it before, but if you have questions or this is all new to you please.
Raise your hand and I can.
I can. I can pause.
OK. And so kind of what I was talking about with linking to RX norm, these are this is kind of an overview of how these other.
Other terminologies and vocabularies are related into the RX norm.
Kind of core set of drugs.
Umm. And so within those you have and I'll. I'll get to this also in a second. But you have different kind of levels of representing a drug from the ingredient level.
So something like acetaminophen all the way up to.
Like a branded drug pack.
Like a 50 milligram tablet of Tylenol.
And everything in between.
And so, of course, within the EU you have different different brands and also even different ingredients classifications for some of these things.
And so you have then these relationships that tie those non-us based drug representations into your core drugs and within the context of bridge to AI, the linkages between these other international drugs are not as critical or relevant.
So I'm not going to spend a lot of time on it, but also because all the sites are are us based, but just to know when you look at your drug domain in the concept table, you will see stuff that's coming from outside of the US and it.
Will be related.
And into these kind of standard sets of of drug representations.
OK.
So this is a very complex relational diagram.
Which shows the relationships for Zyrtec so.
This allergy medication.
Also, is is known here, at least where I am as setra Xena Cetirizine.
I don't know how to be pronounced but.
That then Zyrtec drug has in particular ingredients it has.
Dose forms it has?
Trade names it has.
Lots of different components and all of these kind of properties of. let's say Zyrtec. If we're talking at the highest level.
Arc, also captured in the the concept table and they're related to Zyrtec through these different relationships, some of which are direct and some of which are kind of via another property.
But this is one example and actually a relatively simple example of.
One of these relational diagrams, but each drug that you will represent an omop has some type of.
Diagram like this that could be created and this is based off of the RX norm. Kind of relational structure architecture. So has kind of inherited that that structure and it relates then its drugs in a in a similar fashion as kind of was was done originally within R.
Bar.
OK. And so?
When we talk about, you know, maybe I'll, I'll pause here and I'll go.
I'll switch over to a demo quickly because I think this is nice to show, so I'm gonna show a query where I'm gonna pull all of the concepts that are like this tirizena or cetirizine.
In my concept table and I'm gonna group it by the concept class and in the case of drugs concept class is representing kind of this what level the the drug is in this kind of overall drug class hierarchy.
And so we're gonna do that.
We're gonna collect our set so we're aggregating or grouping by our concept class, and then we're gonna take a look and see.
We have 12 different classes.
And within those classes we have like lots of different lots of different.
Concepts and I'm not excluding non standards or anything so this is pulling in a lot of different.
Equivalent things, but it's just it goes to show that for this one ingredient or this one search term, I mean you have 30 different representations of that at the clinical drug level.
With difference dose amounts and different dose forms and there's a lot of things. And then you have ingredient level things.
So all that to say, there's a lot of complexity, let's say. in how these are represented.
Then they're all related to each other.
Through like I said this diagram.
So that's that's the case of this allergy medication. When we go to something like nicotine, we have the same story where we have an ingredient which is nicotine and then we have the component itself which has a strength.
We have the the drug, which then has a dose associated with the brand of that drug or the branded drug which is the nicot.
And then we have the quantified branded drug. the quantified box all the way up to the marketed products, which has its own supplier.
And so as you see, I mean each each level you go here, you get additional information about the.
About the drug in question and if we go back to the kind of the omop view on this, what you'll see in this ETL convention column of the drug exposure table is that you should follow when you're when you're looking at the drug. your EHR system, you should.
follow an order that goes from the bottom of this pyramid, which.
Like has has the most detailed information up to the top.
So however close to this marketed product you can get in your data set is where you should try to map your.
Your drugs too.
Uh, and because of these relationships that are already built into the omop vocabulary.
Everything upward of this. So like if I were to, for instance, only be able to map to the quantified branded drug, I would have all of this other information of course captured in that entity through the relationships.
So the further down this line further kind of down this pyramid, you can get the better because you're capturing all of those additional relationships at you as you get to this marketed product level.
That is a question that we get a lot.
Hey, can I just map to ingredient?
Can I just like I I have other representations that I don't wanna map to something higher and there are many studies that look at the ingredient level. I know specifically within within the Darwin EU project, a lot of their focus in analytics has been at the level of.
Ingredients.
But I think when you look at doing more.
Let's say intricate or complex pharmacokinetic studies, especially when you're looking across sites and looking you kind of adding these other confounders in.
Becomes very useful the more information you can have about the drug that was being administered to the patient beyond just whatever ingredient was given.
So yeah, bottom line, get as much as, as, as, as granular as you can of a mapping toward this marketing marketed product.
OK. And I can show I have a very quick demo on that as well, which is more or less the same query that I'm running here with.
I can do it on nicotine and again, you see even more classes of this drug from precise ingredients, all the way up to a branded drug, which where you see the chewing gum and the oral lozenge, and then spray and.
And everything like that so.
And again, I will share all of the sequel code with you at the end of this this call, so you'll be able to run those queries as well should you choose.
So where I'm gonna head now is is to show how this is done for mimic.
So what the logic is for actually representing or converting, let's say drug exposures and mimic over to omop.
And then once we do that, how we actually achieve kind of a dose or or calculate the dose error that's derived table from those those omob exposures?
It's all about if I come back here again, I can't emphasize enough how useful it is to have this resource and then to to review it a lot.
So I please bookmark it if you don't have it already and you're involved in the ETL.
But I've already talked a little bit about drug exposure and I've mentioned on prior calls that the length of this ETL convention column is typically directly related to the complexity of the logic in your ETL for that particular field.
And you'll see. Indeed, drug constantly long and you have this whole order of precedence, which is.
As I was saying before, you wanna get the marketed product or like the bottom of that, that kind of structure that I showed and if no other information is available mapped to ingredients.
So that's for drug concept ID, but within drugs you have a lot of other things that you need to map.
So you have things like the the number of refills prescribed, you have the quantity which we've talked about in other contexts, especially related to.
Infusions and I'll get to that in a little bit.
I have some things to say about drug infusions and how that might be covered here.
You have day supply.
And again, there's descriptions on the conventions on how to capture these roots are very important, especially in as when we talk about the the critical care setting. And these are things that you will need to map.
So I think, Heidi, you've raised some questions about mapping of values to values concept ID.
Root is a similar process where you have like intravenous as a root or you have oral tablet or something like this and that needs to be then represented by a concept in omop as well, like a standard concept.
And it's specifically in the root domain.
And then, yeah, so yeah, this is deprecated.
I think that those are probably going to be your main elements. A quantity is of course is key and it there are examples of of what you need to do for quantity and then they even have an additional.
Kind of walk through on calculating drug dose depending on what type of drug you are talking about, like whether it's a tablet or an inhaler or an IV.
Drip or whatever it entered.
So there's there's different ways to use the drug strength table for that and I'll I'll show that in a second.
OK. But take a look at this site if you haven't already.
And hopefully it will give you some some insights into what to do with your source drug data and and what that means in the context of an opop mapping.
All right. Let me come back here.
So.
I'm gonna go into a lot of detail on how drugs are represented in mimic. Other than showing you we have in this case, I'm starting at least with a source prescription in a source pharmacy table that are joined and I'm pulling from those tables a set of of.

Fields.
That more or less say here's my person.
Here's the start and end of the exposure.
A root related source value.
I have a dose units and then I have this NDC source code and this is important. So if we go back.
Here you'll see that the the biggest box on the non standard side is this NDC, which is like national drug compound or something like that. I think is is that what the acronym stands for but.
Another just set of terminology. I don't know if any of you on this call are more familiar with NDC than I am.
Especially the mimic folks who might be here.
If not, no worries, I'll push forward.
But in any case, we do have a non standard representation.
Of these NDC codes in Omop and they do then have linkages to.
RX norm. So for instance, I can let this code up.
And one thing that is a bit weird with the way the data is represented here is the source code.
It it's truncated or chopped off these the leading zeros of these terms. So normally NDC codes are supposed to be 11 digits.
With front padding of zeroes. In this case I had to do that manually. just as an FYI.
I search this what I didn't find is here's my NDC drug code on on Athena.
And then I see that it has a single relationship, which is just. It's nonstandard to standard map into an RX arm code, and that then RX norm code has all of its awesome relationships that we talked about before.
And so at a high level, what my what my code will do and I'm gonna show is it takes this NDC representation with all this other information and in this case it is insulin, right?
That was the. Yeah. Yeah. Insulin list pro.
And where we're not gonna worry about this too much for now. Where it was is dispensed.
But we have then this kind of view on how much insulin it was at the source level.
Another thing to note, and and maybe Brian, you and I can touch base on this later, but the quantity at least in the demo sets the field represented quantity.
I feel like it's there seems to be an issue with that.
So we can maybe talk about offline because there's a lot of 0 quantities and I'm not.
I..
I'm not sure on the exact interpretation of that, but.
To mimic specific thing.
In any event, so you we have this quantity column and I'll focus on the ones where the quantity is one.
But that is then how these data are represented within mimicry and.
To some extent, as you're joining your your source tables, whether it be from Epic or Cerner or anything else, you're going to end up with this type of a kind of a transient view where you have a subject ID, you have their admission, you have a start and.
An end to some drug known drug exposure.
With the the way that that drug was administered, what the drug actually was and and maybe it's an NDC or maybe you have it in RX norm or some other terminology.
With the description and so in our case, for mimic, all we need to do is just like what I did with Athena. We can use that maps to relationship.
So again, this is the relationship that's being shown. If I come back here, this nonstandard to standard map, that's a maps to relationship. And so we're joining on this padded NDC code.
With our maps to relationship in order to get an RX norm.
Equivalent to that NDC.
And if I do that?
I've written the code in advance this time, so I'm not writing it for you on the fly, but.
What you'll see is exactly what I looked up in Athena, right?
We have this now concept ID of 401. Whatever it is 66274.
That's all good.
We should hopefully see some other stuff here.
Yeah. So then we have some multivitamin preparations.
We have aspirin, we have oxycodone and acetaminophen.
And So what I've then done with this this logic is is map those NDC non standard codes into RX norm.
What I haven't done though necessarily and and this is something that is worth checking when you do any sort of map maps to relationships into RX norm is to check the concept class because I can see already just from the results that these are all like at the.
Level where we have a branded drug, we have the the brand of the drug included in this.
And in most cases I should say, maybe that's not always the case, but.
Is that a fairly high level?
But I would recommend when you're anytime you're going into RX norm to take a look at your concept codes and what we can or sorry concept class and I can add that on here which is.
Just directly beside my.
Just so you're.
You understand where your mapping ended up in the.
SEC branded drugs pretty much all the way down. And sometimes you have clinical drug form in case you don't have an appropriate match.
So, but it's it's good to keep an eye on where you are in that, that broad drug class.
Kind of lineage.
OK, so and what you then also see in mimic is that it is?
We will have homogeneous or sorry heterogeneous representation of if I were to use this directly, which is currently how the logic is is written the way that we're mapping drugs is going to be mapped to different levels.
Depending on the drug in question, so it's not always going to be to a branded drug, it's gonna be sometime to a branded drug. Sometimes the clinical drug form, sometimes clinical drug things like that. And depending on the use case in the study and what you're trying to.
Do you may want to try to standardize that, or at least bring everything to the same level.
That's a bit of a discussion to have internally.
We also should.
Provide conventions for like a minimum level for chorus at some point.
That will, like we will need effectively to support some of the the pharmacokinetic, especially studies that we're looking at.
But in any in any event, definitely keep an eye on the concept class of your standard code when you're doing these mappings.
OK, now.
So that's now we've taken our representation of drugs and mimic and we've taken their NDC codes and we've combined them with.
With the OMA vocabulary relationships to get our RX norm code equivalent.
And now we can take that and and use essentially this table that I'm showing. You can be used to start to populate the drug exposure table.
I mean, there's some things missing.
You have a unit that you run want to capture.
You would have.
Roots that you would still wanna capture that were kind of skimming over here for the moments.
But all I have to say like you're you're on your way to having a drug exposure.
For drug era?
So let's say we we've gone through.
We've done this.
We've made our mappings and we've populated drug exposure, drug era.
You don't.
You get for free. Essentially you can just by running.
The drug error script.
So if you come down here.
And I'll send a link to this in the chat.
I don't know if I can.
So this script here you all haven't seen it.
You can run this pretty much out-of-the-box.
You might have to tweak it slightly to update the schema.
You know what?
Actually, maybe now is a good time to show you this if I go.
So there's a package developed by Odyssey called SQL Render and you actually have a SQL Render developer where you can take code like this that has.
These like at parameters. So at CDM schema that you can replace with your own. If you place this this script in this SQL render developer.
I was actually just on a call with folks at Emory where this got brought up so.
This is something that that could be used in this case. This will tell you.
Which parameters are included in this query?
In this case, it's only a single parameter which is your CDM schema.
Let's say it's a CDM.
And my temp emulation schema, I'm going to put this temp.
And in my case I want to put it into databricks which is not on here.
Let's say we'll. OK, but then let's say we want to do it in the snowflake.
You can select that snowflake and you end up with your query that has your.
Your CDM schema and you can copy and paste this into any sort of SQL execution.
So it's useful to know about if you didn't already know it.
It's also a way if you share if there's reusable code, epic or otherwise, that we start to share between institutions. You can use this tool to convert it between.
Flavors of SQL.
So useful thing to know about.
I'll also post this in the chat.
Those who didn't know about it.
OK.
All right.
So we we have our drug exposure we have.
Our now our our drug era.
Which again we kinda get for free here because the the.
Logic is already kind of the standard logic is made available for us.
And again, that's a derived table that's just referencing the the drug exposure entities and it's it's linking them together and kind of creating these.
Almost like an episodes of drugs, if you will.
Very high level.
And then the last step that we have to do with drugs is to to calculate our dose era.
And so I already kinda showed this. But the reason why there's not a single.
Script for dose era is because you have at least six and I've seen actually examples of things that fall outside of V6 as well.
But you have at least six different scenarios that you need to take into account when you're trying to calculate drug dose.
Luckily, the drug strength table actually gives you a lot of insight into.
How to do that?
Or at least it's a very nice resource for calculating these things, and so for those of you who didn't know, I can show you a quick view on what the drug strength table looks like.
Uh.
So it's gonna have a drug concept ID.
So, like our cetamata medicine, or let's say Tylenol is the drug and then the the ingredient concept that you would be acetaminophen and then you have an associated amount and you have an amount unit and you have a numerator and a denominator. And so you have then like.
This multiplicative view on how you would actually calculate a dose depending on.
The unit that's associated with the drug and the drug form and all of these other components.
Umm you box size?
I mean it it it can get fairly complex here and so.
In approaching this, I think that.
The most pragmatic way, the way that I would recommend doing this is kind of going from easiest to most complex.
And So what you'll see as you as you look through these?
These drug dose examples is that more or less tablets are pretty straightforward.
It's a it's a weighted tablets.
There is no denominator as it says.
And you're just multiplying the quantity, which is in this case referring to the number of tablets by the amount of value.
And it in this case 20 tablets, 500 milligrams and it's gonna be 20 * 500 in terms of total milligrams.
And then your daily dose is calculated as that particular dose divided by how long the person was on the drug.
So if they're on it from October 1st to October 7th, and they were given 10,000 milligrams, you just do a simple.
You divide those values to get your overall dose for that period of time.
And so we can do that here. If we take our.
Dose error.
So we go something like this.
And maybe I missed it.
Let's see if I didn't.
And we can do this then with the mimic data.
Where we then end up with something that is.
A drug concept
So in this case, this oral tablet drug
It has its associated ingredients and it has an amount value, which in this case is 4, and that of course corresponds to the 4 milligram tablet.
And because in the case of mimic or quantities appear to be incorrect or inaccurate otherwise we would just multiply this quantity by 4 and then we would say maybe it's just one tablet total 4 milligrams.
And then that drug that the dose is going to then be the daily dose I guess is going to be the that amounts divided by however many days a person was on this drug.
In this case, it was only a single tablet.
In most cases, your quantity should represents, especially for tablets like the number of tablets distributed.
It's also something to be aware of, but.
Like I said, as this is now combining.
That precursor to the drug exposure table with the drug strength table in order to get for a given drug what ingredients it contains and kind of it'll help you with the calculation for the the the dosage and it will do so in a way.
That's then described on this page.
All right, that's a lot of.
Technical information I've thrown at you and I see we have 15 minutes left. So we do have time for questions on this or I can dive into other examples, but I wanna maybe pause here just to give you a bit of a breather.
And also the opportunity if you do wanna director or or guide some of the rest of the discussion please please jump in.
OK, if the if that was all very clear, which I I hope that it was, I am sure that they probably were things that I I either missed or I forgot to come back to. That's great.
I'll maybe pop into the chat here.
I do see Heidi you mentioned about drug roots not represented in Athena.
That is AI.
Do believe there are roots that like maybe we can just go quickly.
I'll show you in Athena.
We can show how many roots are even available as standard.
It's not a lot.
160 only.
And so you have 160 options to choose from.
But your roots are coming out of snow Med, and they're actually fairly.
They're not, they're not so descriptive. So, like, if. If you're saying that there's a like spray.
Maybe there is no. Yeah, there is indeed no spray.
But I think that there's, like inhalants.
Also, maybe not.
OK, in any case.
In those events, and I'm sure that there will be routes that you will not be able to find in this limited set.
These are things that would go into the unmapped source terms.
That Paulina had presented on last week. So I know, at least at Tufts, we do have explicit route mappings for something like 20-5 different routes.
That like I think.
With for Epic specific codes and I see Andrew has his hands up, so maybe I'll stop with that for a second.

Williams, Andrew E 48:28
Finish your thought.
I'll just jump in after.

Haughtaling, Jared 48:30
Oh no. I was just gonna say yeah.
And I guess the idea would be as we start to identify the gaps like you say Heidi with with drops or sprays or or things like this.
We can start to compile these and hopefully add them into some sort of common set of, of course, terms that can be referenced.
Sorry, go for Andrew.

Williams, Andrew E 48:52
This is just the area, an area where if you can find a pharmacist at your site to collaborate with, you can really get.
Clear on what might be some fairly obscure definitions for things here.
So it's it's possible that you you understand all of these very clearly and and it's it's very obviously not represented, but some of these 160 terms are are going to benefit from you know a a pharmacist working with you quickly and saying is this is this Capt.
What it is I think?
And so I would just say.
If you haven't already tried to find a pharmacist at your site to help with something like that, that's good.
Thanks.
A little bit of an aside. One of the things we probably need to do is to make sure we.
Ve.
Adequately accounted for all of the things that require flowsheets to get that our ICU specific so oppressors and.
Things that are used as sedatives and the ICU.
Often you need flow sheet data.
They're just, they're in a different part of the EHR than the rest of the medications that people are.
Are getting and all the times. It's important to understand their start and stop times which you can only get from.
Flow sheets and so.
It may be a separate section we come back to on that I think probably I I need to circle around with all the folks who kind of prioritize what we're getting. But I know those are going to be critically important exposures of interest and we have to really.
Make sure we're getting the getting them the best way, and often I think at epic sites in the ICU, certain kinds of medications are are going to require flowshe's and aren't going to live in the same.
Tables with all the rest of the medication data that are kind of assumed from here.
So that's a little bit of an aside about something.
We'll probably be getting back to.

Haughtaling, Jared 49:05
Yeah. Thank you.
Indeed, one thing just also to note, going through these I I feel like I I remember this from before but.
The roots typically do not have synonyms associated and I'm not like one thing you'll notice as you go through like this one indeed does have multiple.
But I have not seen so many synonyms on the roots concepts.
So it it can sometimes be also more difficult to search. So as Andrew said.
Would be good to talk with somebody, uh, with pharmacy or or kind of drug specific backgrounds on on mapping those routes?
OK, awesome.

Yeah. So thank you for that.
I guess the one the one topic that I I could kind of pivot to here at the ends, although I I must say I'm a little bit hesitant to do so because it's not been fully fleshed out yet.
Is this idea of capturing?
Drug infusions and what that could look like or might look like and and maybe what I'll say at least for now, is that there is an ongoing discussion on the GitHub discussions about this.
With our recommendations.
And kind of more generally, what's being discussed in the Odyssey community?
I don't think yet that we have settled on an official convention for how we will capture drug infusions within Chorus.
Unless there's been an SCP or something published that I wasn't aware of, but I don't think that we have come to a conclusion on that at the moment, nor have I don't think Odyssey as a community has not decided on a single way to do this because I.
Think there is a lot of complexity.
I don't know, Andrew, if you have anything.
Thank you.

Williams, Andrew E 50:58
Say this is an opportunity for us to help to define what's a really exciting potential for capturing these kinds of data.
So you've mentioned pharmacokinetics studies is a few times.
This is not typically something you do in large observational data sets, and the ability to really examine questions about pharmacinetics outside of a very controlled environment at all is a very novel and important thing, and to do so requires.
Some stuff that hasn't been figured out, so the the easy to do kinds of things are.
Medication possession ratios over days for or months, and that kind of a thing.
And that's super valuable also.
But really, understanding kind of what's going into somebody's body and all the other physiological responses to the drug being in someone at a very specific point in time is is a rare.
Thing and really exciting thing.
So we, I guess I'm turning what you said, which is certainly true that there is an established conventions on his head and saying so. Really important thing we're all going to contribute to is is defining.
How this can be done at scale for the first time in a way that will be really impactful. And so it's an exciting thing. I think some of the what we're just talking about with flow sheets is similar to you know drug pumps or other information where we.
Have infusion information. There's.
There's a lot there.
One of the key elements that we haven't figured out yet is how to change the overall scale of time from a unit of a day to something that's within.
A day. And so it's getting back to things like start and stop times.
Either times of exposure or times plus amounts of exposure getting to very, you know, precise indications of of those things and so.
All the standardization work that has been that gets us pretty far, but doesn't get all the way to where we want to go.
So that's we should look at that as an exciting thing to to help you know, to figure out together. And we'll be getting back to you on that.

Houghtaling, Jared 53:08
Samia, thank you.
And indeed, just one more plug to.
Use the date time fields like. It is something that we expect to be done within Chorus. It says here it is not required from omob and it is officially from the not required. But within Horus, especially within the context of ICU settings, we do need you to fill.
In these fields.
So again, I've mentioned it on other calls.
I will continue to mention it on future calls, but the date time is critical.
For for many of the the analytics things that we wanna do. Uh, downstream.
Umm but yeah, so I I guess all that save out infusions it is a a place we have an opportunity to define the Convention or or the best practice for capturing this and the scale of time is is I think.
Where we're gonna need to to, to work, to, to transition from this typical day view into minutes and and potentially seconds level of of of detail of when these things are being administered and how long they're being administered for.
Awesome.
OK.
So that's that's mimic.
That's a very crude drug transformation also with some some dose era information and again referring you to.
This nice vignette on different scenarios for calculating drug dose. One thing I didn't really go into is if I were to do this.
In a production or like in a in an ETL where I wanted to get a final drug or dose error table.
I would establish.
A kind of a scenario or a case based logic where I would first group my drugs into.
At least these six cases.
Based on probably the a combination of their drug form.
And the drug itself, or maybe some other relationships related to it?
So I would first kind of stratify my set of drugs into tablets or inhalants or.
IV.
Drugs.
And then based on that stratification use the drug strength table to create the dosage calculation.
So and like I said, start with the easy ones first.
I think tablets are pretty straightforward.
They typically have a given weight per tablet and you have a quantity of tablets, so you can calculate the amount given over time.
And then work your way up into more complex things where you have to deal with the denominator. You have drips.
I mean you have conversions.
This is another thing we didn't even get into, but if you have units.
In your drug exposure that are different than what appears in the drug strength table, you need to convert those units because the drug strength table of course is.
A representation of some set of multipliers for a single unit and you need to make sure that your quantity refers to that unit.
So this this is, A1 would argue one of the most complex points of logic in an ETL is to do this and to do this correctly.
And I think I would be more than happy to also hop on calls or or at least discuss this in more detail and the more use cases you can bring.
I think the the the more valuable it will be because of course this mimic one is. Is it OK to see and like we have some tablets but if you have challenging examples of source drugs that you don't know how to calculate a dose for.
Maybe infusion things aside.
That would be very please. Please bring them forward and we can go through how how you might do that.
I think that would be a very nice.
Kind of question, answer topic or or future session that we could walk through some different examples of of those calculations.
All right, that was a lot.
But hopefully this is a useful view on drugs.
And I don't think it's gonna be the last time we will. We will talk about them for sure.
But we will be able to then share this content with you all together with the SQL scripts.
I should note as well the the sequel for the Mimic is already available online and I can post a link to the chat for that as well.
Its own repository within course, so I'll link that here, but I'll I'll also upload this together with the video into the Google Drive.
After this call.
So thank you all for sticking with me.
And please reach out if you have any questions on drugs or really anything else related to what we talked about today.
So thanks.

Williams, Andrew E 58:17
Great job again, Jared.
Thanks for for doing this. You know for a second time without the epic stuff was really clear exposition of really complex and important topic. And thanks so much.
Yeah. Do you have a minute to stay on afterwards?

Houghtaling, Jared 58:36
Yes, if Brian you're OK with me joining like a minute or two late.
See. maybe Brian. Joe. is it alright? Alright then.

Brian Gow 58:41
Yeah. sure.

Houghtaling, Jared 58:43
Yeah. good to go.

Alvarez, Marta stopped transcription