

[MUSIC PLAYING]

**GREG HORN:** Hello. Welcome to the Health Pulse, a podcast exploring how analytics in the health and life sciences industry is growing and its repercussions in all our lives. My name is Greg Horn. And I am the host for this series. And as always, we'll be joined by my expert guests to discuss a topical subject.

On this week's episode, we're going to turn our attention to public health. And I am speaking with Dana Bernson today. But before we come to Dana, let's just think about what we've been covering in the last few weeks. And as always, we're looking to get your thoughts, questions, and comments through our email, which is the [healthpulsepodcast@sas.com](mailto:healthpulsepodcast@sas.com).

We're also looking to see if people have suggestions for guests in the future and other topics you'd like to see us cover as well. So that's the [healthpulsepodcast@sas.com](mailto:healthpulsepodcast@sas.com). So without further ado, let's flip over to our guest this week, Dana. Good morning, Dana. Would you like to introduce yourself and just tell us a little bit about what you do.

**DANA BERNSON:** Good morning, Greg. And thank you for having me on this morning. My name is Dana Bernson. I am currently the director of special analytic projects at the Massachusetts Department of Public Health. I've been with the Department of Public Health for just about 8 and 1/2 years now. My background is in epidemiology. I have a master's in public health and epidemiology from Boston University. And before that, I received a B.A. in political science also from Boston University.

So my current job really puts both of those degrees to good use working as an epidemiologist in the public sector. And the special analytic projects unit is a group of epidemiologists. And we really lead the department's efforts to use big data, data linkage, complex data analytics, and data visualization techniques to guide public health planning and policy.

**GREG HORN:** Thank you, and one of the things we always like to try and do on the podcast as well is to just learn a little bit about what you do when you're not being an epidemiologist. So just tell us a bit about something that is of interest to you outside the world of work.

**DANA BERNSON:** When I am not working, I prefer to be outside. And I spend a lot of time hiking with my husband and my dog. We try to get out and experience all of the magic of New England mountains. And then also travel as much as we can to see other sites, as well. But you can usually find me out on a trail.

**GREG HORN:** That sounds fantastic. I quite agree with that one. I enjoy a lot of outdoors myself. So sounds fantastic. And a great place in the world to be doing it, as well. So let's get into this. With all the revitalized efforts across the globe to focus on improving public health IT, especially when data analytics are involved, what is the Massachusetts experience. And yeah, just explain it and tell me a little bit more about that.

**DANA BERNSON:** Sure. So, we have been lucky here at the Department. I think data analytics and data infrastructure have been a big part of our focus for quite some time now. And I think one of the key things that I have worked on really related to this dates back to 2015, when we were directed under legislative mandate, affectionately known as chapter 55-- which is the section of legislation that gave us our authority.

That legislation directed the Department of Public Health to collect data from across state government so that we can better understand the opioid overdose epidemic. We were seeing really troubling trends, really strong increases in people dying of fatal opioid overdoses. And we really didn't have a good sense of what was going on and really needed more contextual information to help us understand this crisis. And so with that legislative mandate we were directed to collect data.

We decided to take it one step further and we thought that we could not really answer the questions-- the questions that the legislature wanted us to answer and the questions that we had ourselves-- unless we individually linked the data sources that we were collecting. And so we embarked on a new and interesting project to link data from across state government. And so we created what, at the time, was just known as sort of our Chapter 55 data set-- which linked data from about a dozen state government agencies, including the Department of Public Health at the individual level-- so that we could really understand what was going on.

We often find with data that one data set gives us a tiny little piece of the puzzle. But we're really missing a lot of the other pieces. And so linking data in this way allowed us to really understand what the context was surrounding these overdoses, were people engaged in certain services before. Were they receiving treatment, were they not. Did they have connections with our criminal justice system.

So really thinking beyond just the straight health data and understanding what was going on in a bigger picture.

**GREG HORN:** And that's very interesting because social determinate data has become a really big thing for a lot of people. It seems you are ahead of the curve on this one. Can you just tell me a bit about the insights that you managed to get from this. And how do you use that data to remove things like bias and discrimination in the health care approach.

**DANA BERNSON:** Yes, a focus on social determinants of health has always been one of the key tenants around this project, which has evolved over time. One of the unique things is that we do have access to data from our state government agency partners and often that is social contextual data. We gained some really important insights, especially at the beginning of this work just by linking a few data sets together.

And I think one great example is that we found that the risk of overdose after release from incarceration was 120 times higher than in the general population. And that was a number that really got people's attention. It's a very big number. It's one of those things where we had anecdotal evidence. I think a lot of people thought that this was a high risk period. But being able to put an actual number on it and that number being true in our commonwealth really got people to pay attention and to think about how we could shift policies to change that.

**GREG HORN:** That's really interesting. For something like an opiate crisis, we really see the focus being in the US and Canada and to a point in Australia, as well. So do you think other jurisdictions can learn from what your approach has been in this space.

**DANA**  
**BERNISON:** I absolutely think that other jurisdictions could learn a lot from what we've done. I think we did some foundational work to really identify what we think are some high risk populations. And we believe that those populations are likely at a higher risk in other jurisdictions as well. It's not necessarily unique to Massachusetts.

And I also think that other jurisdictions can learn from the data infrastructure that we set up. And setting up similar systems in other jurisdictions would be really helpful for us to validate some of the work that we've done to see if others are seeing the same trends that we're seeing here. We're a little bit ahead of the pack in this regard right now. And so often we're asked, well, is this finding generalizable outside of Massachusetts. And it's often hard for us to say that because there are no other data systems that are quite as robust as the one that we've built and have linked so many data sources together.

So I think both some of our insights and some of just the technical infrastructure of what we've been able to put together could be useful for I think both local, state, and federal jurisdictions.

**GREG HORN:** And from my understanding, you haven't done this on your own. You've got a public private partnership model in place. Can you tell me a little bit about that. And why that's delivered advantage to your program.

**DANA**  
**BERNISON:** Yes, absolutely. So when we started down this path and started working on this project and linking this data, we understood that there was more information available to us than we at the Department could possibly analyze in any sort of timely fashion. There is just so much information. And so many good things that we could be doing.

And so we developed pretty unique public private partnership model. We use an opportunity in state government called a notice of opportunity, which is a mechanism for us to solicit proposals for external groups to come and partner with us to answer the questions that the Department wants answered. And we've had a really good experience with this engaging with our partners. Massachusetts is obviously a hub for health care and academia. So we work closely with our partners in our colleges and universities, academic medical centers. We've partnered with think tanks and non-profits.

And so we're looking for groups whose interests overlap with what the commonwealth is trying to achieve. And we're able to get really great analytic talent to help us tackle these questions that we have. And these external teams are getting access to a data resource that would really not be available in any other context. And so we work very closely with these teams.

People from my group become part of those project teams. So it's a really close partnership. And so the Department is getting out of it really advanced analytic capacity. We're able to do a lot more projects at one time than we could have done by ourselves. And we're really able to drive data to action. And really create these projects that have a real policy driven focus. And that's both good for us and it's good for these analytic teams, too, who are able to use their work to advance their goals, as well. So it's a really nice partnership model that we've created.

**GREG HORN:** And just think about COVID as well. So you've talked a bit about the population you identified as being most at risk in the opiate space. Are there any translations to that population in the COVID space. Because we hear a lot that there are populations who are much more risk for the implication of COVID. Can you talk to me a little bit about how that segmentation might compare in your population you have.

**DANA**  
**BERNISON:** Yes, absolutely. And the populations that sort of rose to the top as being at high risk for opioid related outcomes are populations that we are seeing at high risk for other health outcomes as well. And so we're really thinking about not just the health outcomes, but putting this lens at the population level and understanding all of the different places in which we are seeing disparate outcomes.

And so I can walk through those populations really quickly. And I think you and listeners will be able to see pretty quickly that these are also populations that are starting to show up as high risk for COVID-19 as well. And so I do think there are a lot of intersections there. Our first population are Black, Indigenous, and people of color. And I think there's been a lot of focus on inequitable and disparate outcomes among communities of color as it relates to COVID-19 as well.

We have a high risk population of people experiencing housing instability and homelessness. And we know that that's a population that we've been trying really hard to target, especially now with testing and immunization, and can be challenging to reach people who don't have a stable housing situation. Our next high priority population are people with a history of incarceration. And that has a clear connection. Right now, we've seen that incarceration settings are very high risk for COVID outbreaks.

Our fourth population are people with co-occurring mental health and substance use disorders. And I think similarly, we see that people with co-occurring chronic conditions are also at high risk for contracting COVID-19. And our last priority population are pregnant and postpartum women. And that is specifically a group that's been identified as being high risk in terms of having more severe COVID outcomes if they are infected.

So running through that list, I do think that there are connections between all of these populations that we identified through our opioid work with COVID-19. And I think even further with a lot of other health outcomes that we are interested in looking at.

**GREG HORN:** So you mentioned Chapter 55, at the start of this conversation. I actually want to pick up on that one as well. So tell me how that helped you create the data warehouse. How has that effort gone so far. And how does it really link to Chapter 55. Where are you today.

**DANA**  
**BERNISON:** Absolutely. So this has been a project we've been working on now, as I mentioned, since our sort of foundation in 2015. And we have really built on our work over time. We are currently in the final stages of putting together what we are now referring to as public health data warehouse. So the project is now known as the public health data warehouse or the PHD.

And it really is a unique surveillance and research tool that provides access to timely linked multi-year data, to enable analysis of public health priorities and trends. We are still focused on the opioid overdose epidemic but we have expanded that priority a little bit further to look at substance use more broadly, thinking a little bit more upstream than just overdose as an outcome. And also focusing on other substances.

We've been seeing increases in the use of stimulants and polysubstance use. And so trying to understand some of those trends, as well. And we have an additional public health priority that we are starting to use the public health data warehouse to understand, which is around inequities in maternal and child health.

So one of the great things about the structures that we have put together is that it really is nimble enough that we can use the data system to look at many different public health priority areas. As I mentioned, we're in the final phases of putting the data system back together, which has been a pretty complex undertaking. We have now linked more than two dozen data sets at the individual level, and also include about a dozen data sets that are at a zip code or city, town level so we can overlay contextual geographic information as well.

And so we have built the system that allows us to bring together these 24 data systems. The underlying infrastructure I think is actually something that's pretty unique and interesting as well. So working very closely with our partners and SAS we did create a bit of a unique analytic environment using SAS Studio. So we use the web based version of SAS and the data system itself. All of our data sets, our SAS data sets, we have created a linkage algorithm where we bring together the data sets when they're needed for analysis.

We have a really unique situation in Massachusetts that has helped with this process a lot. We have an all payer claims database, which is all medical, pharmacy, and dental claims paid in the state. And so Massachusetts also has historically high insurance coverage rates. And so that data set serves as what we call our linkage spine. And it covers about 98% of our population.

So we have one data system that is essentially the best denominator that we can get for our state. And we individually link the data sets that we are bringing into the data warehouse to the identifiers in that data system. And so what's great about that is that usually with administrative data, we only have information on the people who were in that data. So someone who experienced that event. And we don't know very much about everyone else.

By having this population level denominator data set, we also have at least basic information on people who are not in those administrative data sets. And so we're able to do population level analysis that usually you can't do with administrative data. And so through this process, individuals are given a unique identifier. We then, when the data is stored in our system, all of the direct identifiers are removed.

And so analysts can use that direct identifier to link the data over time. So if I'm in data set A, I match to the claims. I'm in data set B, I match to the claims. I get back the same ID. You now know that I am me in A and B.

And the environment has been set up so that analysts do not have direct access to the underlying data files. So we have these limited data sets that are sitting behind the scenes. But we've set up our environment so that no one can actually look at or access the individual level data, which is really important for data privacy and security. And I know that's an issue that many other groups doing data work like we are run up against every day.

And we've also built in automatic cell suppression to some of our major procedures. And so this effectually means that when people interact with our system, they're working with de-identified aggregate data. And so the structure that we've built is definitely a unique environment. But has allowed us to maintain these public private partnerships because we are able to protect the data in a way that we can provide access without having to worry about disclosing any sort of personal identifiable information.

**GREG HORN:** That's really interesting to hear. Because a couple of weeks ago, we had an episode where we talked to Andrew Freeman from the pharmacy company who talked a bit about the idea of data sharing being kind of the next big win for pharmaceuticals as well. It seems that for you as well, the concept of having data sharing amongst departments and bring that data together has been really key to the growth. What opposition have you met with that, and have you overcome any opposition in that space.

**DANA BERNSON:** We have been lucky, I think, in that we were very thoughtful from the beginning about how to tackle these problems. When back in 2015 when we were building this data warehouse, we spent the large chunk of the first year that we had to do this project creating a compliant solution. And I think getting by in very early and going above and beyond what you have to do legally was something that was really important for us. And so for people who might have been a little bit more wary about sharing their data, we were able to provide protections that really went above and beyond what we had to do.

And we took those extra steps to really build trust. And I think that was really important. Is not just doing the bare minimum but doing as much as you can think about to protect the data. And so we took the time to be very thoughtful about how we developed our system. And I think that has turned out to be a real big benefit for us.

**GREG HORN:** And let's just turn our attention to the future. So everybody right now is a bit of a budding epidemiologist. We've all heard about public health. We've all heard all these things about R values and the like. What do you think the future of public health looks like on the back of the coronavirus crisis. And where do you think we can see some real improvements in growth.

**DANA BERNSON:** I hope that we see sustained investment in public health. I think we often are reactionary in public health. And so we have to catch up when things become pandemic-level crises. And I think continued sustainable funding for public health is what I'm hoping we get out of this and what I hope the future looks like.

Public health is one of those things when it's working well, no one really thinks about it or knows about it. And I kind of would like it to stay that way. I want to be able to keep on top of problems so that they don't become bigger. And I think that sort of preventive lens of public health is where I really hope we're going. And I hope that this pandemic has really shown the light on that and hopefully will lead to sustained investments in public health and the underlying work that we are doing every day to keep people safe and healthy.

**GREG HORN:** So, our last question, Dana, I just wanted to understand from yourself, what do you see as the next things that you're going to tackle and the kind of timeline to get those done.

**DANA BERNSON:** Yes, it's a timely question. So we, just this month, released our notice of opportunity, which is something I talked about a little bit before, to solicit new engagements with our external partners. And that notice is really focused on building upon early work that we had done over the past few years around substance use. And so we have a lot of questions that we'd like to answer, a lot of building upon the work we did to see if trends that we were seeing when we were doing this five years ago, how those trends might have changed.

Interest in some policy evaluations to see how some of the work that has been done as a result of some of our previous analysis is actually, hopefully, impacting change right now. And internally, we are starting to look at inequities in maternal and child health. We're focused, in the short term, on maternal morbidity and mortality and hope to have some analysis done in that area.

And then we are working now to also include COVID-19 data in the public health data warehouse so we can continue to apply our social determinants of health and racial equity lens to that work as well.

**GREG HORN:** Brilliant. Thank you very much, Dana, for joining us today. That's been really informative and interesting. And I think from a listener's perspective, we're starting to see a theme emerge through here where we talk about social determinants of equity and health care. If you listen to some of the episodes in the back catalog, if you haven't heard them already, you're going to hear more of that theme.

So what I'm going to ask you as a listener to do is think about those questions you might have and send them through to email, the [healthpulsepodcst@sas.com](mailto:healthpulsepodcst@sas.com). We're really interested in getting those questions. And we are using them to help develop content for future episodes. So please keep those questions coming in.

So what's left for me to do now is, again, say thank you to Dana for joining us today. We'll be looking to bring more questions, more comments to future episodes.

Thank you very much for joining me on the Health Pulse today. I've been your host, Greg Horn. Please like and subscribe to receive future episodes. And there'll be another one in your inbox very soon. Thank you.