

Using AI to Enhance the Hospital Supply Chain

With Mara Cairo

Episode 104

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Mara (00:00):

When we start looking to build machine learning solutions, we often rely heavily on historical data to be able to make those predictions about the future. So the demand forecasting problem is really ripe for innovation and for machine learning because usually there is a large amount of data, and we can start making predictions based off of what's happened in the past about what supplies will be needed and when.

Speaker (00:27):

Welcome to the Healthcare Leadership Experience Podcast, hosted by Lisa Miller and Jim Cagliostro.

Lisa is the founder of VIE Healthcare Consulting and now managing director at SpendMend. Lisa and her team has generated over \$1 billion in financial improvements for VIE's clients since 1999.

Since 2007, Jim has been a registered nurse working in critical care, perioperative services, and outpatient settings at nationally recognized medical facilities across three states.

You'll hear conversations on relevant and trending topics in healthcare and much more. Now, here's your hosts, Lisa and Jim.

Jim (01:06):

Hi, this is Jim Cagliostro and you're listening to the Healthcare Leadership Experience. Today's guest is Mara Cairo, product owner of Advanced Technology at Amii, one of Canada's national AI institutes, where she spearheads innovative applications of AI to transform supply chain management in a variety of industries including healthcare. Welcome Mara today, and thank you for joining us.

Mara (01:29):

Thanks so much for having me, James. Happy to be here.

Jim (01:33):

Great. Great. So I always like to start off with just asking you to tell us a little bit about the work you do specifically when it comes to using AI to enhance supply chain and inventory management.

Mara (01:44):

Sure. So you gave me a great introduction. I'm a product owner of the advanced technology team at Amii. Amii has a number of different products and services that are really designed to meet our industry partners where they're at on their adoption of AI. It is a journey. It's not necessarily something that happens overnight, and we often refer to our AI adoption spectrum in a way to assess where our partners are at and where they want to go. So as the advanced technology team might suggest, we're a little bit further along on that adoption spectrum. And my team works with companies who are really ready to get some hands-on support to start building out these predictive models to solve their business problems, but we have a suite of others that help earlier adopters that are just kind of looking to learn about AI and understand what it is and where to apply it.

(02:40):

My team, again, we focus on the companies that have been through those initial stages and are really ready to get that hands-on support. So we're a bit of a capacity builder. We want our industry partners to learn what we're doing, learn with us, come along for the ride. We're really, really collaborative

in our interactions with our industry partners, because ultimately we want to give them the tools to continue to do the work after the Amii engagement is finished. So we're, again, have a number of different service offerings really designed to help build our partners internal capacity in that adoption of AI.

Jim (03:22):

So building capacity. Well, I want to focus on two words. You mentioned adoption and you mentioned that it really is a journey and especially because AI, or at least the hype around AI is fairly new, and so you might have clients come to you who are at different points in that. And you actually answered my question that came to mind is, well, what about people who just have no experience with AI at all and you work with them as well?

Mara (03:48):

For sure. Really the most important thing is that AI literacy. It's just like learning what AI is, what it isn't, the types of problems it's really great at, the types of problems you shouldn't use it for. On the earlier side of the spectrum, we have lots of training and education really meant to get industry partners, but also the general public. We're working even with K-12 teachers and students now-

Jim (04:20):

I didn't realize that.

Mara (04:21):

... to make sure that everyone has that literacy because it's just becoming more and more important I think to kind of arm yourself with the information because we're sort of being inundated with information and news articles and scary stories. So it starts with literacy, that's the first part, and then kind of evolves from there hopefully.

Jim (04:44):

Great. Great. Thank you for breaking that down. So I'd like to ask, are there any challenges that you would say are unique specifically to healthcare compared to other industries that you work with?

Mara (04:54):

For sure. And maybe I didn't even quite answer your initial question about specific supply chain and inventory management.

Jim (05:01):

It's okay.

Mara (05:01):

So we do work with industry partners from across the board. So we're very industry agnostic, but it's great because we work with all industries and all different sizes of companies, small to large. So we get to see the different challenges in the individual industries. And certainly healthcare is no exception. They have their own set of circumstances. I do have a list of a couple challenges that we've seen. I guess just from even those initial discovery conversations with healthcare companies, what we start seeing maybe for one, and again this ties to supply chain as well, that human resource supply is complex in healthcare.

Jim (05:45):

Sure.

Mara (05:46):

There's different disciplines. Each maybe has their own labor agreements, regulation and whatnot. So when we think of human resources as a piece of inventory, that gets quite complicated quickly. Another thing, supply level. Inventory levels are complex. We kind of all saw it in COVID. The demand can spike really, really quickly. And you don't necessarily know when that's going to happen, right? So these surges can catch everyone off guard. And maybe traditionally it's been harder to anticipate when these surges might appear.

Luckily, maybe machine learning is a tool that can help us with that. Also, just I think the shelf life of different supplies is unique to healthcare. You have to be really, really careful about storage and transportation requirements. And all of that is compounded by distance and transportation costs. Especially in Canada, in the far north, those care locations, they're really dependent on certain supplies, but if there's a road closure or a snowstorm or something, it's further complicated. The inventory supplies and healthcare are potentially life changing, right?

Jim (07:11):

Right.

Mara (07:11):

So it's just so much more important that that is managed properly. And that complicates things. I think overall, in general, we've just seen that healthcare systems can struggle with system integration. So just kind of managing all of the information that's spread across different platforms, that can be really difficult to pull together and start understanding the bigger picture in real time. And I think that that understanding is really important, and it leads us to solutions, but bringing all of that information together, so we've seen it being a bit of a challenging project to take on.

Jim (07:56):

Yeah. Well, it's definitely something we talk about at SpendMend, but everyone knows the healthcare system in any country is complex. And you also touched on the fact that it's unpredictable where you could have a surge in whatever, a demand for certain equipment, certain supplies, whatever it might be.

So I guess my natural follow-up question would be, can you provide an example of how AI applications have proven successful in streamlining supply chain processes? Even outside of healthcare if you'd like, but where does AI come in and help find those solutions that you referenced?

Mara (08:30):

Yeah, so I can speak specifically to a couple of supply chain projects we've worked on. They weren't necessarily in the healthcare space, but they're definitely relevant. What's really great about this technology is you can apply it across a multitude of different industries because there are similarities even in those differences.

So some of the really cool projects we've worked on with our industry partners in the supply chain space, but more in the kind of consumer goods area are things like demand forecasting. So helping them better predict what items they're going to need and when. What's really great again about working with our supply chain partners is they have a ton of data, historical data. And that's really, really important. When we start looking to build machine learning solutions, we often rely heavily on that historical data to be able to make those predictions about the future. So the demand forecasting problem is really ripe for innovation and for machine learning because usually there is a large amount of data, and we can start making predictions based off of what's happened in the past about what supplies will be needed and when.

(09:47):

Another cool thing we worked on with one of our warehousing companies was pick route optimization. So when you're picking items from an order, what's the most efficient way to pick the items to start fulfilling orders? And then to that even more so is how do you build your warehouse up from nothing? How do you make sure that the space is optimized the best way that it can be so that you're optimizing your pick route, but also so that maybe commonly used supplies aren't blocked in. So we're able to, again, use some really cool machine learning techniques and historical data to help just those ground level initial planning things to make sure that we're setting up these warehouses to be really, really efficient.

(10:41):

And then maybe speaking more specifically about healthcare, one project we worked on was really cool. It was about managing staff inventory and patient load. So healthcare patient no-shows are a bit of a problem sometimes. My dad is a retired dentist, and that would just pain him every time there was a

no-show. I know firsthand how frustrating that can be. And that can also lead to an oversupply of clinicians, right? It throws the whole system off. So we worked with one of our partners to develop a model that actually predicts the likelihood of the patient being a no-show. And if the model is saying, "This patient is likely to not show up," maybe we send them an additional notification. Maybe there's a bit of an overload of bookings in that anticipation that no shows are coming. So that is a really cool application of machine learning to hopefully alleviate a little bit of the load and the stress of the healthcare system.

(11:45):

And of course, that's just one of many examples. But again, I think it's those problems where you have a lot of historical data, you're trying to make predictions about a future scenario. That's how we identify what might be a really good machine learning problem. With healthcare, obviously you need to be really careful about who's making the final decision. We don't want a machine to be telling you that you have cancer, right? So whatever the solution is, we also want to make sure that there's a human in the loop maybe validating these decisions. It's a tool, right?

Jim (12:28):

Yes.

Mara (12:28):

It's a tool for clinicians or anyone to use. And it's not meant to replace anyone. It's really meant to just kind of enhance our decision-making abilities with some really data-driven insights.

Jim (12:42):

That's great. You touched on some great things there. One personal soapbox in mind is just that idea where everyone, this fear that AI and machine learning, it's going to replace the humanity of healthcare, and we have to view it as a tool. I love the fact that you mentioned that you said that we rely heavily on historical data. I mean that's SpendMend's language right there. That's our lane too, where it's like, yes, we can never predict the future

perfectly, especially when it comes to patient no-shows and things like that, but you can, at least based on historical data, have an idea of what might happen and then you can have a way to proceed to maybe prevent that or to try to tackle an issue before it becomes a major issue.

Mara (13:26):

Of course, yeah.

Jim (13:26):

I love all those points that you just shared there.

Mara (13:28):

Awesome.

Jim (13:29):

If you're just tuning in, you're listening to the Healthcare Leadership Experience, and I'm your host, Jim Cagliostro. This show is sponsored by VIE Healthcare Consulting, a SpendMend company, which provides leading edge financial and operational consulting for hospitals, healthcare institutions, and other providers of patient care.

Since 1999, VIE has been a recognized leader in healthcare costs, hospital purchased services, healthcare benchmarking, supply chain management, and performance improvement.

You can learn more about VIE Healthcare consulting at viehealthcare.com.

(14:02):

So Mara, I'd like to, again, just getting further into this impact of AI, what do you believe is the potential impact of AI on cost reduction and resource optimization in the supply chain? Obviously in healthcare, we think about the cost often. So how does it help with cost reduction and resource optimization? And again, please feel free to use examples from outside the healthcare industry because we have much to learn.

Mara (14:27):

Of course. Yeah. Well, I think it kind of ties back to the challenges that we were talking about earlier, right? Like machine learning can be really great with helping inventory management get closer to more accurate just in time delivery. So again, that sort of demand forecasting. I think currently the mitigation strategy for that is just to stockpile more supplies than you need, but then that leads to spoilage, especially if there's a shelf life and we're sort of back to square one. But machine learning is a really great tool for that demand forecasting, right?

Also, these models can help us locate supplies where they're most likely required. So instead of last-minute shuffling around supplies to an area that really needs them, which is increasing our costs, you're making sure that they're getting to the right care sites from the beginning so that it's just a more efficient flow of inventory from the very beginning.

(15:29):

And then again, on the human resources side, even forecasting the future need for skilled professionals. So if a region is anticipating some population growth, it stands to reason that there's probably a need for additional healthcare providers in that space. But post-secondary institutes take many years to generate those skilled professionals and there's only a fixed number that they can. And obviously, that is going to increase your budget too when you start training more of the specialists as you need them. So if we just had a better line of sight into the future, which again, machine learning is a great tool to make those predictions, I see that as decreasing costs across the board and just making it easier to make decisions ahead of time, again, through data, but vetted by an expert that can also bring that domain expertise and that perspective to the solution too.

Jim (16:30):

You're bringing to mind all sorts of questions. I think I have to clear my thoughts. You mentioned about rural hospitals. You mentioned maybe population growth in one area. And in the US and Canada, we have these small remote areas where it might be harder to bring supplies to or manage that. Or you might have a huge health system, and that's a whole different situation, but AI can help in each of those. So I'm trying to look from a

healthcare leader's perspective who maybe hasn't dealt with AI in the past or really hasn't worked with it much, or they know they need to do something to improve their supply chain. So this whole idea of adoption, you mentioned that at the beginning of our conversation, the advancements in and the adoption of AI, they've really led to a mindset shift for leaders, but a lot of them are either resistant to change or they just don't know where to start.

So how do you help supply chain leaders recognize the value in implementing AI applications and ultimately adopt them in their health system or hospital or whatever it may be?

Mara (17:34):

So again, it all starts with literacy. That's the first piece, is just educating and informing yourself. Like I said, Amii does have some really great programs. We have our ML Foundations program, which is sort of a non-technical introduction to machine learning and AI. This spring we're running our executive AI Summit, which is specifically for leadership because they're probably going to want different information than maybe the general population about AI and machine learning. So really helping them understand it from their business perspective. So that's where we start education literacy.

(18:12):

Once everyone is sort of comfortable with all of the acronyms and definitions and whatnot, then we can move on to problem ideation and scoping. So again, we have services where we work with our industry partners just to help them start brainstorming ideas. "So let's learn about your business. What are all of your problems? What data have you historically been collecting, and where can we maybe tie that data into the solution of some of these problems that we've kind of helped you brainstorm?" So that's just a way to help them start feeling comfortable that they know how to identify a machine learning solution to a problem. We don't want to start with machine learning and then work backwards to find a use case. We really want to start with a solid use case just because that de-risks the eventual builds because we know that there is a very viable use case here that we feel like we've scoped out appropriately and we feel like there is actually a machine learning solution.

(19:18):

So again, those are sort of the earlier stage activities that we take on with our industry partners so that they start just getting really comfortable with the thought process and the ideation of these machine learning projects. And then again, on the other end of that is when we start putting resources onto these projects to start building out solutions. So usually the companies that my team has worked with have gone through some preliminary programs at Amii, and everyone is really, really comfortable that if we put a full-time resource on this project to build out a model, it's going to be successful, right? So we've de-risk it as much as we can and we've really taken our industry partners along for the ride, so they feel really, really comfortable throughout the journey.

(20:08):

When we start to work on the actual machine learning modeling, we do that through our internships and residencies program. So we actually put a machine learning scientist who's an early career professional, maybe just graduated or a couple of years in industry, out of a machine learning program, and they're really eager to get their foot in the door and start working on a real-world problem. So we hire them as an Amii employee but dedicate them to work full-time on our client's problem. And then during that time, Amii is providing some really robust scientific mentorship for the intern or resident. And also for the client, right? It's again, it's really collaborative and transparent throughout.

(20:53):

And then one of the hopeful goals of that is at the end of the project with Amii, because machine learning isn't necessarily something that's done after 4 or 12 months, we really encourage our industry partners to hire these intern residents into their organization to continue to progress their adoption of AI. So Amii is happy to walk away at some point, and that's kind of our goal, is to empower our partners to be able to start using this technology themselves.

Jim (21:25):

I love that you're talking about the partners and meeting them where they're at, again, because this world of AI is relatively new. And ultimately that's the goal. You want to meet people where they're at and help them along the way. And it might start with AI literacy or maybe it's building capacity, whatever that is, but I love how you explain that model. And if any of our listeners want to learn more about Amii, it's A-I-M-I-I.ca, correct?

Mara (21:50):

You bet, yes.

Jim (21:52):

So thank you, Mara, for this conversation. I always like to end our conversations with, if you could share any leadership advice, anything that you've learned throughout your career or a lesson in leadership that has really carried you through up to this point in your career.

Mara (22:07):

Yeah, so I'm really lucky. I lead a team of very technical machine learning scientists. I don't necessarily have the exact same background that they do, but what I've found when I'm building my team, I'm really focused on hiring the right people, making sure from the beginning that you're investing the time and finding the right person and then sort of getting out of their way, but being there to support them if and when they need you. So I really want to make my team's jobs as easy as they can be and not have to worry about things that they shouldn't be worrying about. I think that's what I've learned through my leadership experience. And because I'm hiring often highly technical people, those roles can be hard to hire for.

(22:55):

And I think, of course, technical skills are really, really important and valuable, but there's also a lot of room for growth. And when you're hiring early career professionals, they should be given the benefit of the doubt in some cases that they can continue to learn and grow in the role. So I am usually looking for those softer skills that are maybe a little bit harder to coach or teach

someone. And because we're putting our young scientists right in front of a client like their first day basically, it's the softer skills that are much, much more important. I think when you're hiring technical people, it's really important to be aware of their understanding of the business side of things and if they're able to translate their fundamental technical knowledge into something that non-technical people can understand.

Jim (23:54):

That's great. Well said. Just that ability to communicate is so important. Thank you, Mara. And thank you for being on the show today.

Thank you to our listeners who spent time with us today. If you have any questions about VIE Healthcare Consulting, a SpendMend company, or if you want to reach out to me or Lisa Miller, you can find us on LinkedIn. We at SpendMend love helping hospital leaders uncover financial leakage and improve the patient experience. And we're hoping that today's episode gave you some new insights to consider and use in your career and in your own healthcare organization. Mara, once again, thank you so much for being on the show with us today.

Mara (24:28):

Thanks so much for having me, James. This was fun.

Speaker (24:32):

Thanks for listening to the Healthcare Leadership Experience podcast, we hope you've enjoyed this episode. If you're interested in learning new strategies, best practices, and ideas to utilize in your career and healthcare organization. Check out our website at thehealthcareleadershipexperience.com.

And oh yeah, don't forget to rate and review us and be sure to join Lisa and Jim, next time on the Healthcare Leadership Experience podcast.

Thanks again for listening.



MEET LISA MILLER

"It's important for hospitals to have a clearly defined cost savings strategy with purchased services as a component to that strategy. We provide our clients with a focused roadmap to achieve those savings through our expertise since 1999."

Lisa Miller launched VIE Healthcare Consulting in 1999 to provide leading-edge financial and operational consulting for hospitals, healthcare institutions, and all providers of patient care.

She has become a recognized leader in healthcare operational performance improvement, and with her team has generated more than \$720 million in financial improvements for VIE Healthcare's clients.

Lisa is a trusted advisor to hospital leaders on operational strategies within margin improvement, process improvements, technology/ telehealth, the patient experience, and growth opportunities.

Her innovative projects include VIE Healthcare's EXCITE! Program, a performance improvement workshop that captures employee ideas and translates them into profit improvement initiatives, and Patient Journey Mapping®, an effective qualitative approach for visualizing patient experience to achieve clinical, operating, and financial improvements.

Lisa has developed patented technology for healthcare financial improvement within purchased services; in addition to a technology that increases patient satisfaction through frontline insights.

Lisa received a BS degree in Business Administration from Eastern University in Pennsylvania and a Masters in Healthcare Administration from Seton Hall University in New Jersey.

She is a member of the National Honor Society for Healthcare Administration – Upsilon Phi Delta. Her book *The Entrepreneurial Hospital* is being published by Taylor Francis.



MEET JIM CAGLIOSTRO

Jim joined VIE Healthcare Consulting in 2018 and brings to the role over a decade of critical care nursing experience at highly regarded medical facilities across three states.

During that time, he observed both the 'good and bad' of hospital operations in a number of regions, giving him a unique insight and understanding which he brings to VIE Healthcare Consulting's clients.

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MEET MARA CAIRO

Mara Cairo, passionate about leveraging AI for positive impact, leads the Advanced Technology team at the Alberta Machine Intelligence Institute (Amii). Mara holds a Bachelor of Science in Electrical Engineering, P.Eng. as well as PMP certifications. She brings expertise from her prior role in hardware development, where she guided clients in bringing micro and nano-fabricated products to market.

At Amii, Mara empowers businesses to adopt machine learning by providing expertise and leading her team to develop predictive models for clients. They collaborate with organizations committed to utilizing machine learning to tackle their most pressing business challenges, advancing them along the AI adoption journey.

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