Episode 17: A Word From Our Sponsors: Emory School of Nursing - Project NeLL

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Guest: Vicki Hertzberg, PhD & Andi Plotsky, MSPH

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Welcome to another edition of For Your Informatics, a podcast where we explore the limitless world of medical Informatics. Created and led by the women in AMIA, we offer insights into career paths, leadership and education. Thanks for joining us as we highlight lives to inspire greatness inclusion and diversity in the field of Informatics.

**Dr. Karmen Williams:** Hello and welcome. My name is Dr. Karmen Williams, and I'll be your host today. This is a special episode exploring nursing Informatics by highlighting the amazing work of one of our sponsors, Emery School of Nursing Project NeLL. Now we'll learn all about this exciting project in just a moment. But first with me today are the lead developers of Project now Dr. Vicky Hertzberg and Andi Plotsky. Dr. Hertzberg is an internationally recognized expert on big data and its impact on health care. She is widely known for her work measuring social contacts that enable disease transmission in emergency departments and on airplanes. Her research has been well funded and published in various high impact journals. Also with us is Andrea Plotsky, MSPH. She serves as the director of database projects for the NeLL Hodgson School of Nursing at Emory University and the lead database architect for Project NeLL. In addition to serving as the data manager with Emory UGA Center of Excellence in Influenza Research, she taught a database development for Public Health course in the Rollins School of Public Health, preaching the gospel of database standards. Also, a special thanks to Rose Hayes and Dr. Wendy Marie Ingram for countless hours ensuring this episode success. Also, you may hear a little Thunder during this episode as there was a major storm in Atlanta during the time of recording. Dr. Hertzberg, your career history is incredible. You're a biostatician, a nursing researcher, the director of the center of Data Science at Emory Nursing, the number two graduate nursing school in the US. Can you tell us about the pathway that led you to where you are today?

**Dr. Vicki Hertzberg:** Thanks for having me. And yes, certainly I have been working in biostatistics as a collaborative researcher for years. I've done a lot of different things and worked on a lot of different projects. And in 2015, I was thinking about what my next career move would be and how I might continue to make an impact on something. At the same time, I've been good friends with Dean Linda McCauley, the Dean of our School of Nursing here for a number of years, and we got to talking one day and one thing led to another, and I decided to move my appointment here to the School of Nursing and work with the Center for Data Science. Dean McCauley was really concerned about how nursing was going to confront what was then called the big data tsunami that was already on her way. And I'm grateful for the trust that she's put in me to help navigate the School of Nursing, through this. I am continually seeking innovations and helping to use data science to improve nursing and nursing research. And when I thought about coming to nursing, it was like, wow, I could really have a significant impact here. So that's what led me here today.

**Dr. Karmen Williams:** Now, Andi, in addition to your leadership and data management at Emory Center of Excellence in Influenza and your own teaching, you are the director of database projects at Emory Nursing and head architect for Project NeLL. So tell us what is Project NeLL?

**Andi Plotsky:** Well, project NeLL is a suite of apps that are used for teaching, learning, and practicing nursing data science that was developed by nurses for nurses in order to for our students primarily. But now there's quite a bit of interest in researchers as well. And just having a data set that's available that would be of interest and have the kind of data that nurses would be interested in. So it is basically the electronic health records of a million patients who have been seen through the Emory health care system. It spans the time period from 2012 to 2019, and it includes actually a little over a million patients, and it's everything that they have done within that system. So everything is de-identified. So there's no way you can identify who a patient is, but it just has the record for them. So it covers all of their demographics, their inpatient outpatient visits to the hospital, all their clinical visits, their medications that have been prescribed or any that may have been administered to them. It includes their surgeries, any diagnosis they were given on and on procedures, labs, microbiology labs, and then a plethora of outcome measures, which could be anything from vital signs to actually getting nurses notes as well. And we have a little bit of blurb on nurses notes. We'll be getting more of that, but of course, de-identified that before we can use it. And then there's also orders that we'll be implementing into the system. So, it adds up to more than 37 plus trillion data points that are available here. And then the job I was given was to not only create a database out of these, but to make a database that was easy for nurses to learn and to use without having to become computer programmers or database experts. We wanted them to be able to go in point and click to be able to find the data that they are looking for, delve down into it and then be able to output the data and then take it to another application in order to analyze it. But it could be any subject within that. So we have to be flexible and simple. Those were the two big mandates, and we've about done that. We have that. We're also developing some curricula to go along with it, because we're finding that while you can hand a data set to a professor, a professor doesn't always want to teach the data, the background on it. We do want to teach them a little bit about data science. So, we're developing some modules that can be used within the classroom as well to go along with it.

**Dr. Karmen Williams:** So right away, Andi, I can hear important elements in there that really suggests NeLL isn't the typical data repository. But in your view, what makes NeLL new and special?

**Andi Plotsky:** I think the main thing is the user friendliness of it. Also, it's a lot of data. So the people that we've piloted this for have been like, Whoa, there's a lot of data there. You can get to a lot of stuff. And so people will ask us questions like, do you have the Morse Fall Risk scale? And we can go in and say, yes, we do. We've got 100,000 of them. How many do you want? So we have a lot of data points within there. So the breadth of the data is one thing. But I think the key the biggest thing is that it's easy to use. So I've had researchers come to me and say, we want to use this. Can you give me a demo and I show it to them and they say, Gee, I was going to have hire a TA to do this for me or research assistant to do this for me. But I'm realizing now I could probably do that, I could handle that part of it. So it's really very simple to use. And I think that's the main thing, the facility of it and being able to just jump in and grab data, find it. And it's always been a problem. Apparently, when I moved over to the School of Nursing with Dr. Hertzberg, I was told over and over again from professors. We try to download some data for our students to work with, but they never spend three quarters of the semester trying to find an appropriate data set. And then sometimes it's expensive and they can afford it. Or it's hard to understand once they get it. We're also trying to clean the data, too. We have a nice data dictionary that goes with it. So you know what is and what there is. Every element is defined. So you know what you're getting when you download a particular field.

**Dr. Karmen Williams:** Dr. Hertzberg, you came up with the idea for NeLL, correct? So how exactly did the idea come about?

**Dr. Vicki Hertzberg:** A few months after I started here in October of 2015, there was a piece on NPR about medical students and big data. And there was curriculum at the NYU School of Medicine to teach medical students how to work with big data. And I got to thinking, well, medical students can do this then certainly nursing students could do this, right? Well, yes. But you have to get them a source of big data. And that's when I thought about getting data from the clinical data warehouse here from Emery Healthcare and developing it into a resource for students and faculty to use here. We started off with thinking, Well, we should get the records for 20,000 patients, and we did that. And that was so easy that then I said, okay, well, let's make it really big. Let's go for 100,000 patients. And of course, then that meant that we had to totally change the database structure, the kind of the back end that was supporting it. But we did it. And then we were basically challenged to go to a million patients, and we've done that, of course, that necessitated another change to our back-end structure, as well as where we're maintaining the data. But we've done that. I think now we can start pursuing other options, like adding in data from other organizations, which Andi threatened to kill me before when I suggested maybe we go to other Atlanta hospitals. That's good. Also, we've talked about getting all of the COVID data. So right now, our data set is a randomly selected range of a million patients. But we thought it would be nice to see do a deep dive into COVID and be able to have all the data on the COVID patients that we've seen. And if we get other hospitals, too, that would be even better. But it's a process to get the data in. It's big data. And I've learned that big data takes time. So I'll upload something and it'll take 26 hours to upload one little single little thing. I'll be like, oh, great. So now we get to go on and sync two. It's really been quite a challenge, and we're fairly new to the Amazon Web Service, so we've had to learn that platform and get on to that. There's a lot of challenges, but it's so far, so good. So far, so good. It's working. And everyone has seen it seem very pleased to see what it could do for them, what it could provide them with and really pretty easily.

**Dr. Karmen Williams:** Andi, you spent an extraordinary number of hours over the last five years developing this resource. You've overcome crazy hurdles to bring NeLL to life, and you've really dedicated so much time and heart to building it. What has kept you going?

**Andi Plotsky:** Well, it's kind of like giving birth. I mean, it's a project, and it actually started out as kind of like a side item that I was working on. I missed my other projects that I work with. Now it's kind of taken over my life. But everyone, I have to say, we have an amazing team, everyone that's on this team, from the people who help with the administrative tasks to it. We have students all along. We've had students, of course, after COVID, we've had a freeze on hiring, just getting ready to hire some extra hands to help. So we've had a lot of student helpers all along. And, of course, the problem with students as they come and they go. But we've had some really talented ones that have really helped us quite a bit. So that motivates me. And I think the excitement of everyone about it because once everyone starts working on it, they're like, oh, my goodness, this is really cool. And they're really pleased to be part of the project. We have an amazing programmer to actually deferred medical school for a year in order to be able to finish the project and get it ready. He was so invested in this project. So he just came to take on this little job for a while as a job in between grad school and medical school and really bang up job for us.

**Dr. Karmen Williams:** And in your mind, what does the next five years look like for project NeLL?

**Andi Plotsky:** I can see. Well, we have a lot coming up in the five years. You have lots of ideas for things. One thing, of course, is to cope with data. As I mentioned, adding other data sets from other medical systems would be wonderful. We want to make our nurses notes searchable. We need to go in. Part of our data needs to be deidentified. So these nurses know. So we have to do it's a big PHI project in order to remove the PHI from it. When we talk about data integration with other systems, we have to think about where that data came from. Was it from a Cerner record, which is where our data is from or EPIC? So depending on what system they use for the electronic health record just going to be challenges there. Also, one of my dreams that I've had from the very beginning was to give the data some consistent field tags, so that when you're searching a lot of text, you can go in there and be able to say, okay, I'm looking for everything about falls. You can pull out all the data about falls to be able to categorize data so that you can pull it out easier. When we're talking about free text, everything else is all. For the most part, I think all but about three different fields of the data are very standard. Point and click. You get a drop-down list and you can pick what you want. But there is some free text that we'll be adding to it. We want to be able to make that easier to search as well. So that's my pick list. I'm sure Dr. Hertzberg has more.

**Dr. Vicki Hertzberg:** Nursing research is increasingly concerned about social determinants of health, and so somehow being able to integrate our clinical data with how the lived environment affects health and health care will be really important. So that's kind of where I see our next contribution.

**Dr. Karmen Williams:** So we've talked a lot about big data being used to empower and propel nursing leadership. So now I know that you Dr. Hertzberg recently testified before Congress about the spread of viral pathogens on airplanes, based on your foundational research in this area. Early research, of course, preceded now. But the example of leading with data is a valuable one can you tell listeners who might not immediately see the connection there what viruses on airplanes has to do with big data. And why this example is relevant to aspiring health scientists or aspiring health leaders?

**Dr. Vicki Hertzberg:** Well, the project was initiated actually by the Boeing company, and they are in the business of selling airplanes. And during the 2003 SARS epidemic, there were actually Airlines that were going through bankruptcy proceedings. And if you're going through bankruptcy proceedings, you can't buy airplanes. So Boeing developed this initiative to better understand how diseases might spread on an airplane. And one thing led to another. And boom, I was helping out with this work. And what the study was that we flew a team of graduate students between Atlanta and the West Coast. We made ten trips. This team of graduate students were equipped with iPads, and they've been trained. And what they were doing was recording the movements and behaviors of all the passengers on those trips. There were approximately 1500 individuals on flights that averaged about four and a half hours. So that was ‘A’ lot of data. And then ‘B’, we were also looking at what the environment was with respect to viruses and bacteria. So we were testing we were getting environmental samples from air and from surfaces and quantifying that. And that led to work on the microbiome. What's the microbiome of the airplane cabin and microbiome? You start to get into really big data more than second by second partition of movements of 1500 people over 4 hours. So, it became quite a project. And I think that what the example is that to be open to the possibilities of thinking how leading with data can go. I mean, you all hear about, oh, after that airplane flight, I got sick. I get so sick when I am on airplanes. And what we found was that the air and the touch surfaces didn't have any respiratory viruses in them, and they didn't have anything that were kind of known pathogens. Some were opportunistic if you're immunocompromised, for instance. But there weren’t really any bad actors on the airplane. So it's a way of combating that traditional wisdom, if you would.

**Dr. Karmen Williams:** that is absolutely incredible. It really goes to show how versatile and far-reaching nursing research and data science both can be at the same time. That versatility can make it hard to narrow down the topic and help people understand exactly how big data is going to impact their lives. I'm sure you run into this challenge with NeLL. So Dr. Hertzberg, if you can sum it up in one sentence, how would you describe the real world implications of this tool?

**Dr. Vicki Hertzberg:** Well, I think I need more than one sentence, but here goes, what NeLL does is it empowers nurses, all nurses or, in fact, any health scientists to be an innovator, a change maker, and an entrepreneur for frontline nurses who are tired of health systems that don't work and want to do something about it. They're going to need data and NeLL becomes that data source. It gives you a place to start and the insights that you need from where you're working on the front line at the level of nursing schools, which are right now, the beta test sites now means nursing programs can catch up with the competencies and curricular standards that we've been trying to implement for decades, and that the AACN essentials once again called for this year so that now can help organizations overcome barriers to problems like time, cost and access. And we can teach the next generation as well as nurses in practice, how to lead with data.

**Dr. Karmen Williams:** That's an excellent answer. So a follow up question for either of you. Could you share some specific illustrations of what NeLL has been used for thus far?

**Andi Plotsky:** It's been used by various levels of students and faculty, and it's been kind of a real catch up game because they're ready to use the tool and the tool hasn't been ready. So, we've been like getting data for them to be able to use this. We've had several honors students who have used it that are undergrad honors students, and they've used it. We just finished a project with someone who was looking at people who were hospitalized because of falls and the medications they were on. And it was primarily looking at older people over age 55. And I'm trying to see what medication groups might be associated with a higher level of falls. We had our very first user was also an honor student who was an undergrad that was studying TAVR and TAVI the system surgical procedure. That one that was famous, made famous by Mick Jagger. And she was trying to look at how that having nurse anesthetist could help save costs in that type of procedure. And so she ran the data there and was able to pull out data in order to use for it. And then we've had a plethora of faculty who have used the data. Some of them are getting ready to write a grant and they have this gut feeling, the gut feeling we talk about nurses having well, these people have it in terms of their research that there's a situation that exists that needs some researching. And so they have gone in to explore the data to see if their hunch is true. And it's worth writing that grant. We've had several grad students that have used it. One was looking at Hep C patients and being able to bring people who are diagnosed with Hep C to a first visit to get them started on a therapy without just getting a diagnosis and walking out the door and to look at changes. Now I think that changes actually in the process of being made at Emery now based upon her research. So that's just a small example of them. Dr. Hertzberg might want to chime in with some more.

**Dr. Vicki Hertzberg:** for hospitals to have what are what's called magnet status that's built upon the nursing quality at a hospital. And so there's questions about the national data on nursing quality indicators that's the NDMQI, which I always find kind of an oxymoronic, because if you have one of these indicators occur, that means you didn't get quality care. As Andi mentioned, one of the indicators is falls and then also pressure ulcers injuries are another big area that people have been interested in. And there are many more examples

**Andi Plotsky:** actually should be mentioned this. The person who did the work on the pressure ulcers, the first person who did work on that was someone from our graduate program in Ethiopia, and she had a terrible time being able to get a data set that she could work with. And so she was taking a class. She was in our DNP program and taking a class, and she wanted to look at comorbidities that might contribute to pressure ulcers in a hospitalized patient. And so that was the first person we were able to provide data for to successfully do her class project that worked with international interest as well.

**Dr. Karmen Williams:** So project NeLL is a huge leap forward for profession of nursing, but it's only one piece, all be it a very important piece of a much bigger picture for nursing innovation coming out of Emery. So Dr. Hertzberg, can you tell us how NeLL fits into this larger vision?

**Dr. Vicki Hertzberg:** NeLL is what I would call the flagship project for the center for Data Science. And the goal of the center is to bring data driven thinking on the greatest challenges in healthcare, today. We're going to be taking NeLL into our Emery Nursing Learning Center, which is 70,000 sqft of dynamic space for interprofessional learning, discovery and innovation that's being built right as we speak, where we hope to bring together patients, providers, community partners, peers in business and engineering. And in doing so, we hope to solve problems, create new ways of thinking and doing. Our spaces include rooms for augmented and virtual reality applications, smart and connected classrooms and simulation labs, a smart home care lab, the innovation hub, and an interprofessional collision space. But what we really need for listeners to remember is that everything we're developing is made to be shared. Our models are scalable, our resources are nationally accessible, or at least they will soon be. And even our classrooms and workspaces are smart and connected spaces so that people can join in collaborations from anywhere in the world.

**Dr. Karmen Williams:** Andi, is there anything I didn't ask that you want the listeners to know about, NeLL?

**Andi Plotsky:** One thing I'd like to stress about this project is that where it started out just being this little static, 20,000 person data set. It's being updated all the time because actually one of the first people to use it wanted to know about the procedure that was brand new. And we're like, oh, my goodness. They said we don't want to know about old procedures. We want to know about new procedures and current procedures. This data set is not only limited through 2019, it will be updated annually, and so it will continue to grow and it will continue to be updated. So the most recent technologies will be available within it, and then it's grown into a much bigger project than just a data set. Now we're also adding the curriculum to it and coming up with these modules so that we can have these teaching and learning apps so that people can actually use the power of the data and understand learn how to effectively use that. And I think that's really exciting that we'll be providing those as well. So it'll be kind of a nice package that goes along with just the data set.

**Dr. Karmen Williams:** That's fantastic. And if people walk away remembering just one thing, what would you like them to take away from the conversation today?

**Andi Plotsky:** If you can dream it, you can do it.

**Dr. Vicki Hertzberg:** That's a good one. I would have to say data science is something that is doable given a system that's easy to use and easy to access. If all you have to do is have a few clicks to be able to get to some data that covers what it is that you're looking for. Even you can do data science.

**Dr. Karmen Williams:** Project NeLL will be available beginning in June. If people are interested in learning, seeing a demo, having their school subscribe to the data, or even becoming a partner with Project NeLL, how should they get a hold of you?

People who are interested can get in touch by sending an email to projectnell@emory.edu.

**Dr. Karmen Williams:** Thank you again for joining us for this episode. We also are thankful for our guest today, Dr. Hertzberg and Andi talking about Project NeLL.

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