

Division of Diabetes Treatment and Prevention

Advancements in Diabetes Seminar

Practical Management of Type 2 Diabetes – A Multidisciplinary Approach

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Dr. Elizabeth Ketner:

Hi, everyone! My name is Elizabeth Ketner. I'm going to be talking a little bit today about the practical management of type 2 diabetes. Mostly, the disciplinary or multidisciplinary approach.

So, a little bit about me, I grew up on the East Coast in Baltimore, Maryland. I'm a board certified internal medicine physician. I went to the Medical School of Johns Hopkins, School of Medicine in my hometown of Baltimore, and then decided to go up to Philadelphia, the hospital at the University of Pennsylvania for internal medicine and primary care residency there. I came out to the Indian Health Service about two years ago, and I'm practicing here at the Gallup Indian Medical Center in Gallup, New Mexico.

Here, I do both inpatient and outpatient care. So, I'm a hospitalist and an ambulatory primary care physician. It's about 50-50, the split of what we do here. I, as a disclosure, have no formal training in endocrinology or diabetes care, but about 48% of my outpatient panel has type 2 diabetes and this is sort of by chance as I inherited the panel from somebody who was very interested diabetes. And she left her outpatient practice, so that's who I got.

So, as a person who trained at Hopkins, I think a lot about William Osler when I'm thinking about teaching, so he said, observe, record, tabulate, communicate. Use your five senses, learn to see, learn to hear, learn to feel, learn to smell and know that by practice alone, you can become an expert. I think one other thing I'll say about this presentation is this is a very experiential presentation. This is case presentations of patients that I've cared for and challenges that I've faced that has been overcome not by my biochemistry degree or by my medical degree, but my ability to work with other people here at GIMC and work with other resources.

So, I will talk a little bit about, first my objectives. So, to assess and modify if necessary a medication regimen to control hyper or hypoglycemia in an adult with type 2 diabetes. Describe the importance of setting realistic treatment goals that aim to reduce or address health disparities and barriers to patient care. Implement a team approach to improve diabetes care and education. And demonstrate the power of a multidisciplinary team in treating type 2 diabetes.

So, just a little bit about the diabetes program here at Gallup Service Unit. I will give a shout out to Maria Torres who is our wonderful PhD and nurse practitioner who does a lot of this and she sent me this slide. So, there's a lot that goes on at our diabetes program including



diabetes self-management education and training, which includes individual and group classes. We also have a special case manager over there. We have a program to get people into appointments for post-hospitalization follow-up, and we have a great team of nutrition experts here that work closely with our diabetes program.

The other systems projects that we have, we have some best practices which are linked to the diabetes audit. We have inpatient diabetes education. We actually have one very dedicated educator who is sort of located on the inpatient side, works with our patients. We have outpatient rapid access scheduling. So, people who are in the clinic and who need help coming from internal medicine, family medicine, or urgent care can get in quickly with providers. We also have gestational diabetes education called "Sweet Success." And then we have an in-service series for providers. So, that actually teaches internal medicine folks, family medicine, PHNs, pharmacy, women's health and dental about things that they can do to help with diabetes management. And then lastly we have the Accu-Chek Aviva 360 program, which I don't know too many details about but basically, allows us to upload meters into patients, upload them into patient's charts so that we can have them on record.

We have a number of community projects including a wellness camp for children. We have some exercise programs. We have Dr. Suk who's actually in my department, runs sort of an obesity task force to talk about not only diabetes but the prevalence of obesity. And we have a community garden that's located not very close to the hospital but, gives people the opportunity to grow their own food. We have collaborative projects with both our PHN program with COPE, which is the Community Outreach Patient Empowerment program, which is run through sort of an arm of Partners in Health in Boston as well as the Navajo Nation. And then we also have diabetes education updates and CMEs to give the providers more information.

So, it sounds like there's just one question about the difference between individual and an ongoing daily versus nutritional education referral. So, we have individual counseling. So, our diabetes educators will actually meet individually one-on-one with patients who are struggling. And then we have group classes which are sort of self-explanatory, they have their group set. People can actually be identified as needing individual care. And then the nutrition education referral they're actually in a completely different department. So, we have nutritionists that meet on a one-on-one basis with our patients to talk specifically about their own food choices and things like that. So, that answers the question.

And so, our other support for diabetes care. As I mentioned, we have an inpatient consultation from the certified diabetes educator to facilitate inpatient to outpatient transition. So, this educator will see patients on inpatient side, educate them for sort of as long as they need and then also follow them for one or two appointments on the outpatient side as well, so a lot of continuity there. We have public health nurses who are nurses who actually go to the home and they don't just do diabetes care, they do all sorts of care but they're very, very, very useful and important as you'll see in the presentation in connecting with patients.

We have a Native medicine provider here on the premises. We also have a hogan, so we perform ceremonies here on the campus of our hospital. And that can be really effective in working with patients to help them find their own balance in their healthcare. Community health workers, so these are patients or CHR's community health representative. They're actually through this outside program called the COPE program which I mentioned, and they

are essentially health technicians who are able to be out in the community, who know the community very well and can make home visits as well.

We have a robust podiatry department, so we have three full-time podiatrists who help immensely with foot care and diabetic foot ulcers. We have a clinical pharmacy for diabetes clinics. So, we have pharmacists who are trained to help titrate and to counsel patients on use of medications and changes in their lifestyle that can help with diabetes management. And then as I mentioned, we have this Community Outreach and Patient Empowerment program who runs the community health workers program or community health representative.

All right! So, I guess before I go on, any questions about any of those things? All right! Well, type in your questions and we'll definitely get to them at the end. So, first case Mrs. D. So she's a 32-year old woman with a history of metabolic syndrome and prediabetes, her A1C is 6.2, who presents to me with concerns regarding her fertility. So, I think we see this a lot where young women we know who have insulin resistance who maybe don't necessarily want to start on a medication prior to this but are then diagnosed with PCOS and would like some help with fertility.

So, what I often do is clinically diagnose their PCOS and for her I use the Rotterdam criteria which I won't get into. But I did start her on low dose metformin to improve her insulin resistance. And I saw her for a couple of months after that. I think I saw her one or two more times. And then she fell out of care until June 2017. And actually, I saw her at my own OB appointment and that's how I found out she was pregnant. So, small community here. So, her glucose tolerance tests; so her pregnancy proceeded pretty well. She's actually taken off the metformin by the OB's. And at 28 weeks, was asked to do a glucose tolerance test.

So, that's when they're administered here and that's to determine the presence or absence of gestational diabetes. And so, she actually refused several times to complete the test. She was very concerned about the stigma associated with the diagnosis of gestational diabetes. She told me over and over again that the midwives did not understand that she didn't have diabetes to begin with so she didn't need to do the test. And so, she's sent back to me about 32 weeks for assistance with the glucose tolerance test.

And so, I think my questions with this patient were really where to start. So, this is a patient who is well into her OB care and I'm just an internal medicine physician. So, what role can I play in this setting to help her receive the care that she needs? So, we talk a lot about motivational interviewing. So, for this young woman, I needed to find out what her emotional barriers were to taking the test. And as I said before, she was very nervous about the diagnosis of gestational diabetes, what it meant. Did it mean that she would be on insulin, did it mean that she was going to have to take medicines forever. Her partner was very critical of her first taking the metformin in the first place, and so she was very, very worried that this was a permanent diagnosis for her.

I also needed to normalize the process for her. So, it helped that I was also undergoing OB care. So, telling her that everybody gets a gestational diabetes test, so not just her, the glucose tolerance tests are standard of care. Reassuring her of the outcome. So, one of her fears was that she, we had struggled a little bit with her metformin. She had initially been on a fast-acting metformin which she didn't like and gave her GI side effects. And so, she much

preferred that I help to manage the medication, so, which is not typical here. Typically our midwives and OBs are wonderful at managing diabetes or gestational diabetes.

So, sort of reassuring her that, if she did have gestational diabetes that I would certainly help but that the people here were very capable of caring for her. And then offering her other sources, so referral to the diabetes and pregnancy program. So, as I mentioned before, our diabetes clinic does have a special gestational diabetes clinic called Sweet Success. And they're wonderful at engaging women and connecting them with other women who have gestational diabetes and making sure that they have good support during their pregnancy.

And then lastly referral to dietary, so, first line treatment for gestational diabetes is diet and exercise like every other kind of diabetes. So, going over with her things to eat in pregnancy, things not to eat in pregnancy, how to calm cravings and things like that. So, that was my approach. She ultimately did have her glucose tolerance test. She was diagnosed with gestational diabetes but was well-controlled on her metformin alone. So, at 38 weeks she was induced and delivered a healthy seven-and-a-half pound baby boy.

So, as part of thinking about this in a multidisciplinary way, I wanted to, I do take care of a lot of women who are in the within the age of child bearing but I don't take care of a lot of post-gestational diabetes women. So, I had to ask myself, "How do I manage this patient going forward as the primary care physician and what other resources are available to her?"

One of the things that I learned that I think is very important is that a delayed postpartum glucose testing should occur about 6 to 12 weeks after delivery. And that can be done by the OB or the PCP although, it's more commonly done here by the PCP because OB clinic is busy and often if patients don't make it to their six week OB appointment they will eventually come back to their PCP. So, we do these as primary care doctors. I think that we're often not good at remembering to do them. So, finding ways to remind yourself as the primary care provider. And then typically the treatment is deferred to the PCP, so we will make decisions about treatment.

Next thinking about nutrition for mom and baby. So, as I've mentioned, dietary consults as well as breastfeeding consultation are really important in assisting mom with how to ensure the baby is gaining weight in appropriate and feeding appropriately. But also making sure mom gets the correct nutrition. I think there's a lot of misinformation about not only nutrition during pregnancy you know, eating for two, things like that, but also misinformation for about nutrition afterwards. So, if the mother is breastfeeding or not that has a lot of bearing on nutritional counseling. So, I always send these postpartum moms to dietary to make sure that they can get appropriate counseling based on their choice to breastfeed or not.

Home support. So, we have both public health nurses and CHRs who routinely check in on mom and baby at home. So, postpartum visits, which is very helpful, and then long-term monitoring of mom and baby for development of diabetes. So, depending on, I know less about the pediatric side but I know that often the size of the child can have some bearing on their risk for development of diabetes. But I do know that women with gestational diabetes have an extremely high rate. So, 35 to 65% chance of developing type 2 diabetes within 10 to 20 years of the pregnancy where they did have gestational diabetes. These women while they will often be young and healthy and go back to their state of health that they were prior to the pregnancy do need to be monitored more closely. And especially in our population, in Native

Americans where the incidence of type 2 diabetes is quite high. So, that's it for Ms. D. Any questions?

All right! So, another William Osler quote, "Listen to your patient, he is telling you the diagnosis."

So, this is a case of Ms. Y. She's a 67-year old woman, Navajo-speaking only, with the history of longstanding insulin dependent diabetes which has been difficult to control. And I'll tell you I met her probably about two or three months into my starting here at Gallup. So, her A1C has been between 10.5 to 11.5 for the last nine months despite up titration of her insulin. So, she presents to me for a follow-up. Current medications, she takes metformin ER 1 gram, twice a day. She also takes insulin 70/30, 55 in the morning and 65 in the evening using vials not pens. She takes a statin, she takes losartan, she takes gabapentin for peripheral neuropathy, and I forgot to put on there that she also takes a baby aspirin. She lives alone with several involved daughters who live close but work full-time, so are not able to come to her appointments. And she doesn't drive mostly because of vision issues but she also, like many of our patients doesn't have access to a vehicle, so other family members, she relies on other family members to -- who are either coming into town or she can arrange beforehand to bring to her appointment.

So, in terms of identifying her barriers, I think this is an important thing that I learned early on of my time here is that, you never know what challenges you have to overcome until you actually figure out what those challenges are. So, I often try to make sort of a running list for patients that I'm struggling with of what their barriers are and how they impact their specific condition. So, she's got several barriers. So, she speaks Navajo-only which obviously is a problem for me but we have wonderful interpreters at our clinic. But even so, there are certain words and phrases that are lost in translation, from, especially with regards to medical procedures. So, that's a big challenge for us. She does have home support but her daughters cannot administer her meds because they don't live with her. So, we see this a lot. We have very, very independent elders. She's not elder, she's only 67, but very independent elders who live on their own and have children who can help but their children are also working to support themselves. So, not always easy to have someone else in the home do it.

And then access to the clinic. So, here on the Navajo reservation, we have a lot of transportation issues. I think less so in Gallup than some of the reservation sites like Shiprock and some of the more rural areas, but transportation is always a challenge. So, whether or not people have transportation, whether or not the conditions of the roads are appropriate, whether or not people have gas money, those are all things that factor into the ability to come to appointments, the ability to pickup medications. And so, often people will have to make priority decisions about when and where they can go and coming to appointments sometimes is not the highest priority.

So, how do we overcome some of these barriers? As I mentioned, we have interpreters who are specially trained here. We have interpreters in the clinic, in pharmacy and on the phone, and our interpreters have actually taken a medical Navajo class so that they can help to translate some of the complicated concepts into Navajo. We have some home support, so, does she need home health aides? So, there are things that we have access to. So, we have access to home health aides depending on her resources. We have CHRs and PHNs who can

go out to the home to support the family, but these aren't permanent solutions to medication administration issues.

And then access. So, most people here don't have mail boxes but they do have P.O. boxes, so they will come into town or to their chapter house to pick up their mail. So, we do have a mail delivery of medications although we can't actually deliver a refrigerated insulin vial, so that's a challenge. And then we have resources for getting to and from appointments and that can be arranged through our social work department. So, if a patient doesn't have Medicaid or Medicare to use, medical transport often we can use some funds from our hospital to help people get here.

So, these are sort of her social barriers. And then, I wanted to talk briefly about the eight clinical HPI of diabetes because I think it does differ from a typical HPI. I think they are certain to ways ask questions to get at some of the things that we're worried about. So, I typically open with, how are you doing with your diabetes or how do you think it's going with your diabetes. And let patient's talk about things that they're concerned about, things that are happening in relation to their disease. I ask them if they have any questions or concerns about the specific medications. So, this is often a time when people will tell me, "Oh, I'm getting diarrhea from my metformin" or "I'm getting these hard spots under my skin where I inject my insulin." So, that's a nice way to identify what barriers there are to people taking their medicines.

Asking how often they check their blood sugars and when they check, what numbers do they get. What I find this I usually get just the most recent number like, "Oh, this morning my sugar was 150" and so, sometimes it takes a little bit of delving into it. And what I find is that patient's will often check their blood sugars on the morning of their appointment and that's about it but that can be a helpful question. And then, asking when they actually take their blood sugar, before they've eaten, after they've eaten, first thing in the morning. I always ask sort of to quiz, not to quiz people but to ask what diabetes medicines are you taking. And it's a pretty good indication if someone can rattle off the names of glimepiride, metformin and pioglitazone that if they know what they're taking, they're probably taking them.

And so, and then I always ask about the timing of their medication. If they are taking insulin, I ask, "how much insulin do you take?" And the answer is usually, "Well, it's right there in the computer." But what I like to emphasize with them is just that I want to make sure that what I have is right in the computer. So, how many units do you take just to make sure I have what's right in the computer. And how many times per week do you miss your morning dose of insulin. So, this is a little bit of a trick I learned actually in an HIV clinic where rather than saying, "When do you, do you skip your medicines, do you forget your medicines?" Just asking how many times do you miss them and it's a little bit less, I think less judgmental. And often what I'll have to do is split this into morning and evening doses. I'm sure, this a common finding in people that are usually better taking one or one of the doses than another. So, I find that my patients are much better taking their morning dose and often miss their second dose.

And then, "Do you draw up your own insulin?" and "Do you inject the insulin yourself?" I think those are important questions in terms of support. So, if you have a grandma who's giving herself insulin, does she draw it up for herself, does she really able to see how much insulin she's drawing up into the syringe" and "do you inject the insulin yourself?" I find it a surprising number of people actually have their kids do it for them and grandma's will talk about their

granddaughter's and grandson's doing it for them and they're often not very old, so that's a useful thing to know. And then always asking about hypoglycemia, how many times per week do you get low blood sugars. And each of these questions will often lead to their own line of questioning but this is sort of my basic approach.

And so from Ms. Y, her diabetes HPI, so when I ask her, "How is it going with your diabetes?" She said, "Oh, not really sure. I think it's okay." And how often does she check her sugars? A common phrase here is "Once in a great while" which basically means, I can't really tell you how often, but sometimes." And she does check it when she feels her sugars are low and when she does check when they're low, the finger sticks are usually in the 150 range. So, that's what she identifies as a low blood sugar. She's not sure which pill she's taking for diabetes, but she insists that she never, never, never misses her insulin. She takes her shot twice per day, every day before she eats dinner and breakfast.

So, I started asking her about who draws up her insulin and she said, "Oh no, no, nobody draws up my insulin, I use a prefilled syringes that are given to me here in clinic." To which I responded, "We don't actually give any prefilled insulin here, so where are you getting your insulin?" And she insisted that she gets them here and we went back and forth with the interpreter and I was worried that I was sort of missing something that had been lost in translation. But she insisted that she was receiving prefilled syringes from our clinic here and that she was injecting one of those in the morning and one of those in the evening.

So, there was clearly something we were missing. So, I like this quote "Life is a long lesson in humility." So, this brings me to medication reconciliation. So, how do we figure out what people are actually taking in our clinic, and it can be really challenging as I mentioned some of the social barriers from before. You can't just ask people to run buzz home and grab their meds when they've come two hours just to see you for a 20-minute appointment. So, we do ask that when our health techs and people in the clinic call to remind patients of their appointments that they are reminded to bring both their medications and their meters. Sort of amazing how often that still doesn't happen, but I think it's in part a cultural thing here at GIMC that we're trying to change.

So, my favorite kind of medication reconciliation is what we called "pill bottle med rec." So, this can be done and this is actually physically having the pill bottles in front of you. I also like being able to see the pill bottles because I like being able to see the expiration dates and the last fill. So, just as an aside, I do do some home visits with patients and it's amazing how many medications you find that are expired or that are still full and have been filled since 2014, things like that.

So, a pill bottle med rec. So, we can do this with pharmacy, asking pharmacy to set up an appointment and they'll go through the meds with them. You can also, pharmacy is always great because they have a little bit more time than providers and they can really delve deeply into side effects and questions that people have about administration of the meds. And then the PCP, so in our clinic, I am known for appointments going over and that's often because I'm sort of trying to sort this stuff out myself. So, in a 20-minute appointment, it's often difficult to do a pill bottle med rec. And then, a home med rec, so public health nursing and the community helps representative, if we request it specifically to go to the home and see what medications are there and sort of do what I was talking about in the home. They're looking at what pill bottles are there, helping to dispose of medicines if they're expired or unnecessary.

So, Miss Y, so, I thought this was urgent enough to do it myself, so I asked the patient to come the following day with all of her medications and diabetes supplies. So, I have this image of a huge basically a Tupperware which is what she brought in. It was full of full medication bottles. It was full of syringes and diabetic supplies and about 10 vials of insulin. So, all of which had been under refrigerated for quite some time.

So, when she showed me what she had been doing, it turned out that she was unwrapping the empty syringes and essentially just putting the empty needle under her skin and that was it, and then she was getting rid of the needle. So, she was not drawing up the insulin. She was unaware of how to even use the very basic medication that she was on. So, this was a huge lesson for me to really, a reminder to really assume nothing when it comes to how patients are educated with taking their medication. And as I said this was about two months into my tenure here and you can imagine how frightened I was about managing diabetes after this.

So, starting from scratch in terms of insulin teaching, so we have a lot of resources for insulin teaching. We've got a diabetes clinic that does both a group and individual teaching in how to draw up insulin and administer. And in fact, we have old vials and syringes that people can actually use. The vials are filled with water so it's not a safety issue. But people actually are taught how to draw this up and clearly are not injecting themselves with these things, but then are sort of taught and show it on model how to inject. So, really hands on teaching with the diabetes clinic which is something that certainly I as the provider either both don't have time to and don't necessarily know how to do. And so, they have lots of time and they can use this teach back methods where they teach them and then make sure that the patients can show them how to do it themselves.

And then our pharmacy also reinforces insulin dosing and injection technique and while they don't have the same hands on resources, they do have a lot of graphic images that they use. And then if pens are used, pharmacy can do the teaching with these as well. Just as an aside, I'm on the National Core Formulary committee, sorry, the National Pharmacy & Therapeutics Committee which does the National Core Formulary for the Indian Health Service, and insulin pens are on our National Core Formulary. Here at GIMC, we sort of restrict them to people who have certain restrictions in their ability to use insulin from a vial so people who have arthritic disease, who have very low vision or have other cognitive and learning disabilities. So, our pharmacy does a lot of the pen teaching.

So, Miss Y, in follow up, so I again use the PHNs and CHRs to check in with her insulin usage after she had some pretty extensive teaching with how to draw up the insulin. She still struggles to make it to visits because of transportation issues and challenges with food access, so access to fruits and vegetables and fresh food continue to make her A1C difficult to control but it is improved with her ability to actually administer her own insulin now. So, any questions about that?

Okay. So, just a break, this is one of our, the pride and joys of Gallup here. This is Pyramid Rock.

One of the things I think we all struggle with or lack is exercise programs. So, I am forever telling patients that there is a lots of free exercise programs in Gallup, one of which is to hike to

the top of Pyramid Rock, and I've had a few people have some good success with once a week and working their way up.

All right! For my last case is Mrs. T. So, Mrs. T is a 52-year-old Navajo woman with a longstanding history of insulin-dependent diabetes, traumatic brain injury resulting in cognitive disability and vitiligo, and presents to the Diabetes Clinic and is found to have a blood glucose range from 47 to 429 on her meter. So, in the interview, she states that she checks her sugar regularly and when it's low, she drinks sugar water, although, she isn't sure how much sugar she mixes in but that she can never feel when her sugar is low. So, she sort of thinks that she knows when it's low but she doesn't really feel that badly, but then when she checks it, will treat herself.

In looking at her meter, she has fasting blood glucoses in the 40s and postmeal blood glucose is in the 600s. So, her current medications, she is on insulin 70/30, 15 units in the morning, 5 units in the evening which is a relatively stable dose for her for the last two years, and she is managed by one of our internal medicine physicians whose notes go back many, he has been taking care of her for about 10 years. And really there weren't a huge number of variations. She also takes vitamin B12, she takes phenytoin and she takes meloxicam.

Her social history is notable for living with her elderly mother on a family compound with many other relatives who assist with transportation. She does not drive. She does have electricity and running water in the home. Her and her mother are dependent on about 25 dollars of food stamps per month and often goes without meals. One of the things that the PHNs will often do is look in the cabinets for these patients and see and make sure that they have food, and if they don't then recommend some places that they can supplement their meals in the meantime. She does have a caregiver who comes about one hour, a few times a week to help with food prep and cleaning and there is no cellphone reception in the patient's home. So for the PHN, there is no cellphone reception on any of the family compound. They have to drive about 20 minutes to the road and actually get any service and even then it is not very reliable.

So, Miss T is visited many, many times by the PHNs and continues to have low blood sugars in the morning despite the lowering of her insulin. So, she has also made it to couple of her internal medicine appointments and was found and her physician was lowering both her evening and her morning insulin lower and lower. And so, ultimately she was admitted to the hospital here for hypoglycemia. She didn't present to the ER, but one of the PHNs went out and her sugar that morning had been 38. So, they thought that this is sort of gone long enough and we needed an intensive intervention for her.

So, her blood glucose continued to be labile in the hospital but did not have hypoglycemia to the degree she did at home. So, she did have a couple of sugars in the 60s, 70s in the mornings but we really thought that the issue was incorrect administration of her insulin at home, in addition to some food insecurity. So, counseled her on how to eat, where else she could get some regular meals. So, it turned out that the family was concerned enough and we are, I just saw the pen use that, the pen use question I'll get to. So, social work assisted in providing placement in a group home. So, her family at home was very worried about her coming back and living with her elderly mother. So, she went to a group home where her medication could be supervised and regular meals are provided.

Unfortunately, seven days after her discharge, she returned to the emergency room with abdominal pain, was found to have diabetic ketoacidosis and was admitted to the ICU. And it turned out that she had left the group home because of some interpersonal issues. She felt like she was not being well-cared for there and she didn't have access to food when she was hungry. So, once the diabetic ketoacidosis resolved, we sort of called in the troops.

So, inpatient resources for these patients. So, the first thing and I know I have mentioned this is an inpatient diabetes consult. So, we have a diabetes educator who works with these patients initially for about two hours and then daily to review diet and insulin administration, and then also does multiple outpatient appointments for continuity. So, I think the, just like a primary care physician, diabetes care transitions are just as important. So, making sure that people do have a good continuity or good communication with their providers going from inpatient to outpatient.

For our pharmacy after challenges with labile blood glucoses in the hospital, she was switched to insulin analogs and that was actually on the recommendation of a phone consult with endocrinology, and we thought that perhaps insulin pens would be best for her. So, pharmacy actually spent several days with her doing insulin pen teaching, showing her how to dial the pen, showing her actually how to administer with the pens, including the priming and the need to sort of leave the pen and skin while the insulin is administered. And then lastly, our inpatient nurses were wonderful and allowed her to administer all of her own insulin under supervision. For safety reasons, she couldn't actually draw it up from the vial, but she was shown how to draw it up from the vial and the nurses would draw it up in front of her.

Unfortunately, shortly after discharge, about, I think it was about 10 days after she was discharged home with insulin pens, she was admitted again for diabetic ketoacidosis. And it was thought that the problem this time was that there was improper priming of the insulin pens before injection and then the pen was not left in the skin long enough to deliver all the insulin. And we thought that this was probably in relation to her cognitive dysfunction or cognitive disability. And so, it was very difficult for her to demonstrate even after we had trained her so intensively in the hospital, how to do this.

So, we called a family meeting regarding home resources for insulin administration. And so, this was a long process. She was in the hospital for about three weeks. We had public health nurses who made repeated visits to the home to help find family members who could assist with medication and meals. Unfortunately, their resources were very limited and members of the family thought they could help, but couldn't always be there at the time of insulin administration. Case managers tried to explore other options for home care, but she didn't qualify for home nursing, and so really the only thing we could get for her was this home health aide and they are not really qualified to do a lot of medication administration.

Social workers explored other options for placements. So, the patient adamantly said that she did not want to go back to the group home. And so, the only other place where we could have the same supervision were nursing homes in the area, where she could have full oversight of her medication administration. And then of course, the physicians who were caring for her were very concerned about a safe discharge after three admissions, two to the ICU for a diabetic ketoacidosis, was it safe to send the patient home?

And so, as I mentioned ultimately, she was in the hospital for three weeks. She was seen almost every day by our diabetic educator talking about diet, checking blood sugars and doing insulin teaching. The medical optimization of her insulin regimen was very, very challenging and I won't get into that here, but we do suspect that she has probably an autoimmune or type 1 diabetes which has changed over the course of about a year and become very brittle. Nursing assistance with administration of insulins are inpatient nurses who were sort of learning how to do insulin training themselves for patients. Using social work assistance with placement as well as counseling. So, our social workers made heroic efforts to find a place for her where she could have help with her administration, but they also do a lot of counseling here. We have very limited behavioral health resources, and so our social workers are often the people who meet and counsel our patients. So, she became apathetic and depressed about the recurrent admissions and our social workers were wonderful in talking with her and helping to guide, both her and her family to a decision about what was the best for her health.

And then as I mentioned, our PHNs continue to visit family in the community to keep them updated because there was no cellular service out there. So, not the happiest ending, she was eventually discharged to a nursing facility to help with medication administration and meals. After a lot of conversation, she desperately wanted to go home, but we felt it was extremely dangerous for her to go home without more support. And so, she was in clinic I think last week, to see one of our providers and she's doing pretty well over there.

So, I think for her, we have a number of barriers. So, her disease as I mentioned briefly was very complex. So, we used something called the UNM PALS line, which is a call-in line to specialists provided by the University of New Mexico, and we're very lucky to have it, to discuss the management of complex endocrine issues. So, I myself took care of this patient and multiple other people did and they really helped to guide us on how to give this patient the right care with insulin.

Her intellectual disability made it very challenging. It was very, very hard to teach her and have to retain the information, but our diabetes educators used a lot of alternative teaching methods with her. She had insufficient home support and so our community outreach workers both the PHNs and the CHRs, using them to contact and monitor the patient. Lack of access to care, very challenging for us I think, not something we can always overcome, but again we do have these community outreach folks who can get out there and get to the home pretty quickly if necessary.

And then one of her major barriers was food insecurity. So, making sure that our social workers and case managers act as connectors, so that people can have community resources for food access, so sort of a combination of knowing what the resources are and making sure that we connect social workers and case managers to our patients.

All right! So, I think in general, I've probably been doing this a lot fewer years than many people who are on the line. But the things that I sort of have to remind myself daily is, ask questions and don't forget to listen to the answers. So, often patients are telling us things and we really need to think about why they answer the way they do and how we can address that. Assume nothing, make sure that, you know I think that I, at the risk of seeming dumb myself, I will ask people all the time exactly how they inject insulin, exactly how they take medicines, what the pills they take look like if there's anything unusual. So, making sure that we're not assuming things are happening that or could not be happening.

And then, that medicine is not a food chain; it is an ecosystem. I think leaving medical school, I often thought that the doctor is the boss of the team and the team sort of works to carry out orders of the doctor. And I pretty quickly learned that a physician is a very small piece of making sure that people get appropriate care and hopefully I've demonstrated that in talking about these patients.

And then diabetes is a treatable disease, but always looking for social, economic and systemic factors when patients are struggling to control their conditions. So, knowing that access to care, language, education, all of these things will impact how well someone can or cannot control their disease.

So, that's all I have. Special thanks to Maria Torres. She is one of our wonderful diabetic educators here at GIMC. Thanks to my husband who's also an internist for feedback on the presentation and many, many, many thanks to all the team members who helped to care for these complex patients. I put my email here, my phone number, if people have questions and I'm happy to take questions from the question tracker.

The next is, are there exceptions for pens outside of physical or cognitive disabilities? I find that adherence is better with pens for working individuals due to convenience and can be used more discretely? So, I think this issue of insulin pens is really challenging and I agree, and there have been a number of studies that have shown that adherence to insulin pens is actually greater. One of the challenges that we have here is that we service, our catchment area is huge and we actually service so many patients that are outside our catchment area and so many people are on insulin that our pharmacy program probably could not afford to put everyone on pens. It is something that requires essentially the diabetes program to approve. And I think that they often will make exceptions if a patient is struggling with work or other things, but for the most part it's limited to people with physical or cognitive disability at this time, just from sort of a resource utilization standpoint.

Any recent thoughts on most recent diabetes education techniques and reaching out to patients through electronic, i.e. texting? So yes, I think this is an amazing way to get in touch with people and we are slowly, slowly letting this idea of electronic methods and technology permeate our care. So, I know that the people actually who are pioneering this at GIMC is the HIV clinic. So, they actually have ads on Grindr, which is an app for meeting up mostly for homosexual men, and we're also doing text reminders for medications through the HIV clinic.

And the pharmacy here is recently investing in a program where we can text patients when their meds are ready. So yes, I think that it's a wonderful idea to use technology to reach out to diabetic patients. There was a recent article in the New York Times sort of about these different techniques and how it doesn't actually impact adherence to medications all that much, but I think it's a great way. A lot of our patients despite not being able to get to appointments will have smartphones, so I think it's definitely the way forward. So, I think it's a great thing to bring up.

And then the last question. How would you help instruct patients to draw up insulin use of pen with a person that has arthritic hands and fingers? So, I think that's an excellent question. I don't personally do this, but we have people in our diabetes clinic who work on this. I've heard from a couple of my patients that it's actually easier to draw up insulin in a syringe than it is to

click the pens or even see the number of clicks on a pen. So, you know I think that it's challenging and I think you need to take each patient into consideration sort of individually, and make sure that when they are actually learning how to do it, that they can do it. So, I don't know if I have any specific advice for that, but just individualizing education I think it's really important.