Care Delivery Implementation

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Heart of the Matter: Team-based Care to Improve Quality and Outcomes in Cardiometabolic Disease

Introduction:

DR. BLAHA: So we've heard about the fundamentals that could have a theory behind team-based care. Now in the course we want to switch to more practice discussion of how team-based care could improve quality of care and outcomes specifically in cardiometabolic medicine. Really of course there's no one better to talk about this than Dr. Mikhail Kosiborod who's really the "most successful and forward thinking cardiometabolic clinic" that's become a model across the country. Let me shift Mikhail to you to talk about how we bring this to practice in the cardiometabolic center.

DR. KOSIBOROD: Oh, thanks very much Michael. It's always a pleasure to be with you. And it's my distinct pleasure to discuss this specific topic on how team-based care can improve quality in outcomes in cardiometabolic disease.

DR. KOSIBOROD: Here are my disclosures, reflecting leadership in clinical trials and multicenter registries.

Complex Cardiometabolic Patient Case & Considerations; Patient Case

DR. KOSIBOROD: I would like to start with a patient case because I think this particular case really highlights why this team-based approach to cardiometabolic care is so important and just how diverse and complex the care of these patients with the cardiometabolic disease which when we say cardiometabolic disease we typically mean confluence of metabolic conditions such as obesity and type 2 diabetes as well as cardiovascular disease including ASCVD and heart failure, kidney disease and many of the complications, the multi-organ complications of an occurrence of the patient population. This case really highlights how diverse and complex care for cardiometabolic disease has become and how care coordination effort is so critical.

This is a real patient that we evaluated in the cardiometabolic center of excellence at our institution. Some of the details have been altered for privacy reasons but it really gives the flavor of the types of issues that we deal with and complex issues that we deal with in this patient population. It's a 50-year-old female presenting for routine follow-up after being referred by one of our cardiology colleagues. This individual has had type 2 diabetes for 10 years, has a number of other comorbidities including obesity, sleep apnea, and known atherosclerotic cardiovascular disease. Specifically, this patient has no ST-elevation myocardial infarction in 2014. That's now a number of years ago and you can appreciate that the patient is 50 years old now, so it's currently premature onset of coronary disease, was diagnosed with the multi-vessel disease at the time and then ended up undergoing bypass surgery. Currently, the patient does not have symptoms of angina but does report dyspnea on exertion.

DR. KOSIBOROD: Here are the medications that the patient is currently receiving. The patient is on aspirin, a beta blocker, angiotensin receptor blocker, high intense statin, twice daily metformin, and basal-bolus insulin for diabetes management.

DR. KOSIBOROD: On the physical exam, we can appreciate that the patient's blood pressure is 145/85, clearly about the guideline-recommended targets. The weight is 91 kilograms, so 200 pounds with a BMI of 37, so clearly this patient is living with obesity. The lung fields are clear and the ultrasounds are the norm but there is evidence of a modest amount of ankle edema.

DR. KOSIBOROD: And on laboratory assessment, we can appreciate that the hemoglobin A1c is very poorly controlled at 11.4% despite the fact that the patient is receiving basal-bolus insulin therapy. The total cholesterol continues to be substantially elevated at 195 mg/dL and the LDL cholesterol continues to be very suboptimal controlled at 135 mg/dL. You can see what these numbers were prior to initiation of statin therapy clearly suggesting that this individual likely has heterozygous familial hypercholesterolemia. Triglyceride is also elevated not surprisingly due to both poor glycemic control as well as underlying obesity. In addition, the patient also has evidence of chronic kidney disease with an EGFR of 50, putting this patient in the CKD phase IIIA category. While we don't have a urine albumin creatinine ratio, it certainly looks possible that this patient may have underlying albumin in urine, probably have CKD due to diabetes has given the long-standing nature of the disease. Liver enzymes are also elevated in this individual with obesity and multiple obesity-related complications. Highly likely this is due to a non-alcoholic fatty liver disease and NASH. The result is the elevation NTproBNP of 300 pg/mL, clearly suggesting elevated filling pressures, and concomitant with that an echocardiogram shows an ejection fraction of 60% with wall motion abnormality but also enlarge left atrium and evidence of impaired diastolic filling, all of which alongside dyspnea on exertion, ankle edema and elevated NTproBNP, it points towards a likely underlying heart failure with preserved ejection fraction.

For many of you, you'll immediately realize and recognize that this is a very high-risk patient from a cardiovascular standpoint. The patient has a premature onset of coronary artery disease. The patient has numerous risk factors which are about to be controlled for ASCVD progression including poorly controlled total and LDL cholesterol, poorly controlled blood pressure, poorly controlled hemoglobin A1c, underlying kidney disease, and so on. This patient is at high risk of recurrent ASCD events but that's not where that story ends. In addition to all of this, the patient is clearly at high risk for heart failure-related otherwise outcomes including heart failure hospitalization because the patient appears to have symptomatic - - which has not to date been recognized. But again, that clearly appears to be in place. In fact, this patient would qualify for many - - trials based on a combination of symptoms, elevated NTproBNP, and structural abnormalities on echocardiogram, the risk of heart failure hospitalization in not-too-distant future. This patient is also at risk for kidney disease progression based on impaired kidney function likely due to type 2 diabetes as I mentioned before. This patient is also at risk for multiple other organ complications including progression of liver disease as the patient appears to have a component of at least an ALFD and likely NASH given the elevated AST and ALT.

There are of course enormous opportunities here for significant comprehensive risk reduction, not just ASCVD risk reduction but reduction on heart failure risk, kidney disease risk, and risk of other complications. The question is where do you start and what are the priorities here and how do you coordinate all of these things that appear to be on a first lens in the domains of different specialists. Some perhaps in the domain of endocrinologist like elevated hemoglobin A1c. Some in the domain of a preventative cardiologist or general cardiologists such as LDL perhaps and blood pressure control, some in the domain of hepatologists such as elevated liver enzymes, and some in the domain of nephrologists such as impaired eGFR and the risk of kidney disease progression, while he has other things like sleep apnea would be in the domain of a pulmonologist or a sleep specialist. And obesity could be in the domain of the obesity specialist or maybe a bariatric surgeon.

DR. KOSIBOROD: Does the patient need to be seen by seven different specialists plus a primary care physician to manage the disease or is there a better way to potentially deliver that care? In that venue, a very simple question to ask here is what is the care priority? Is it A. prevent recurrent ASCVD events, B. prevent heart failure hospitalization, C. prevent progression of kidney disease, D. address the risk factors such as LDL cholesterol, blood pressure, and hemoglobin A1c or E. all of the above?

Well thank you for taking the time to answer this question and the correct answer as many of you probably guessed it's E. all of the above because this patient really has multicomorbidities or multimorbidities, all of which are really, really important in terms of this patient's survival, risk of hospitalizations, and quality of life. Really the best way to manage this patient from a cardiometabolic disease approach standpoint is to manage all of the risk factors and all of these priorities preferably if not all at the same time within the close sequence to one another. The good news is that many of the treatments that we would employ here would potentially address more than one underlying issue and more than one underlying care priority.

Cardiometabolic Disease: Goals of Care & Evolving Evidence Diabetes and Obesity Trends

DR. KOSIBOROD: Alright. Let's now shift to talking about where we are in the field and how team-based coordinated care can actually help the issue with the issue being this tsunami of cardiometabolic disease and continuing problems we've been having with implementing efficacious therapies.

As you can appreciate on this slide, there has been a substantial rise in underlying cardiometabolic conditions that lead to ultimately multi-organ complications such as cardiovascular disease including ASCVD and heart failure, chronic kidney disease, liver disease, and many other things that we already touched upon. A lot of it is certainly being driven by rising rates of obesity both in the United States and globally and concomitant with that due to obesity and insulin resistance rising other organ complications. One of which of course arguably is one of the most important ones is the increasing prevalence of type 2 diabetes.

DR. KOSIBOROD: Now in cardiometabolic disease like in any other chronic disease, it's very,

very important to keep in mind what the key goals of care are. These are to prolong life, make our patients live longer, prevent hospitalization, try to keep our patients out of a hospital and emergency department. And third and as importantly to improve the quality of life, make our patients feel better and be able to do more. Now how do we do that in managing chronic cardiometabolic conditions? The way to do it is to prevent morbid complications, things that we already touched upon like myocardial infarction and stroke. That's from cardiovascular disease, heart failure hospitalizations, kidney disease progression, liver disease progression, and so on.

In cardiometabolic disease, the two most common and morbid complications of type 2 diabetes are cardiovascular and kidney complications. And so by far, the biggest impact that one could make is by addressing the risk of developing those types of complications, now that doesn't mean we ignore the things but certainly the lowest hanging fruit if you will, the biggest impact to make is by addressing cardiovascular and kidney disease complications. Now not surprisingly, cardio-renal complications of type 2 diabetes and cardiometabolic disease, in general, are very common. In this particular study of cohorts of patients with type 2 diabetes, free of cardio-renal disease at baseline in five countries in Europe and in Japan with a follow-up of those patients extending for as long as 10 years, you can appreciate just how common these complications are. Cardio-renal disease which here was defined as the combination of heart failure and kidney disease progression that occurs in the very substantial proportion of these patients over a follow up of just a few years even those patients that didn't have those issues at baseline and it's closely followed by atherosclerotic cardiovascular disease complications such as myocardial infarction trial compared to arterial disease.

Now one of the good news that we've had in the cardiometabolic field over the past 10 years and I would say not just good news but probably the transformational change that we had on the field is the emergence of cardiovascular outcome trials specifically looking at various anti-diabetic or glucose-lowering agents and the effects on cardiovascular outcomes. This was driven by FDA guidance at the end of 2008 which required large cardiovascular outcome trials that had the safety of these agents. But because of the huge amount of accumulated evidence of the past decades with tens of thousands of patients being enrolled in many, many different trials, we've learned some valuable lessons. Probably the most valuable of these lessons for us in cardiometabolic medicine is that while there are many medications that can lower blood glucose, they're not also saying what it comes to the effects of cardiovascular outcomes.

A good example of that for us is the emergence of SGLT-2, sodium-glucose transporter 2 inhibitors, which were initially developed for type 2 diabetes to lower blood glucose and hemoglobin A1c. But in this meta-analysis of cardiovascular outcome trials and one kidney outcome trial can clearly be appreciated, it's as a strong signal emerged with these agents - - adoption from heart failure. Majority of patients in these trials, well, all of them had diabetes. Majority of these patients did not have heart failure at baseline, so this is mostly heart failure prevention signal. But we can see that it's very robust with more than 30% - - risk reduction. We can see that it's very consistent across different agents in the class. It's also very consistent across different patient populations both from a cardiovascular and kidney risk standpoint.

The next step in that sequence was to try to understand whether these agents can effectively prevent heart failure, whether they can actually treat heart failure as well. And that question was answered with a resounding yes in a number of trials now including the first one, landmark trial called - - that showed the significant reduction in the risk of cardiovascular death or worsening heart failure with SGLT-2 inhibitor adapting - - compared to placebo. This was followed by EMPEROR-reduced trial in a similar patient population with heart failure and reduced ejection fraction now firmly embedding SGLT-2 inhibitors as one of the fundamental disease-modifying therapies in heart failure with reduced ejection fraction. The European set of cardiology guidelines just recently gave class of SGLT-2 inhibitors at class 1A indication in heart failure with reduced ejection fraction. The highest recommendation in international guidelines is available.

This has now been extended to a condition of which both cardiovascular disease and cardiometabolic field have long been called a black hole because we have been able to find efficacious therapy that's heart failure with preserved ejection fraction. More than half of all patients with heart failure in the community have this condition. We have not had any efficacious disease-modifying therapies until very recently. But with the EMPEROR-preserved trial showing a significant benefit of empagliflozin and compared to placebo and reducing the composite endpoint of cardiovascular deaths and hospitalizations for heart failure, that's beginning to change. In addition, the kidney outcome trials including - - shown here and DAPA-CKD shown on this slide indicated that these agents can also address another pressing issue in this patient population which is, the aggression of kidney disease by a significant amount, nearly 40% reduction in the primary endpoint set was a composite of kidney events as well as cardiovascular death and DAPA-CKD trial and also a significant independent reduction in all across mortality of 31%, the largest mortality benefit I believe in the history of medicine with any agent in the CKD population. Can we pause here for just a second?

DR. KOSIBOROD: Now, sodium-glucose cotransporter in two inhibitors is not the only class of antidiabetic agents that has been proven to provide significant cardiovascular benefits. The second class is the GLP-1 or glucagon-like peptide 1 receptor agonist, which also have been shown in numerous trials to significantly reduce the risk of cardiovascular events. Now, the effect of GLP-1 receptor agonist is different from that of GLP-2 inhibitors as the primary action if you will is on reducing the risk of atherosclerotic or atherothrombotic events such as myocardial infarction and especially stroke as well as that from cardiovascular causes, the so-called MACE or major adverse cardiovascular event composite that incorporates those three types of events.

And this again has been seen with several agents in a class and in addition to MACE benefits, there is also an independent benefit of reducing cardiovascular deaths alone in a meta-analysis of these trials. The onset of benefit has also been different from that of the GLP-2 inhibitors. It takes a little bit longer to see the divergence that occurs which likely has to do with the effects of these medicines more on the vascular wall and vascular disease progression versus the effects of GLP-2 inhibitors, which again predominantly on the heart failure and CKD types of events.

Changing Guidelines and Evolving Treatment Landscapes

DR. KOSIBOROD: Now, as you can imagine, just very compelling data from clinical trials have now been firmly embedded in the international guidelines and that includes both diabetes guidelines including standards of care from the American Diabetes Association, which here is shown from 2022, just out of the press and clearly favor the use of these two classes of medications; SGLT2 inhibitors and GLP-1 receptor agonists in patients with the established atherosclerotic cardiovascular disease while favoring SGLT2 inhibitors in those with type 2 diabetes and established heart failure and/or CKD.

And other medications that don't have a similar track record of improving cardio-renal events are more de-emphasized as compared to what these guidelines had been in the past. It's not just diabetes guidelines but also cardiovascular guidelines that are taking this route. I hear in 2019 European set of cardiology guidelines for managing patients with diabetes, pre-diabetes, and cardiovascular disease, which were developed jointly with the European Association for the Study of Diabetes; and again, you can see a very strong emphasis on cardiac protective medicines which in drug-naïve patients with type 2 diabetes are actually here indicated or recommended as first-line therapy.

American College of Cardiology has also taken a bold step in its consensus decision pathway to recommend the use of SGLT2 inhibitors and GLP-1RAs in patients with type 2 diabetes and established cardiovascular disease including those with ASCVD, heart failure, and diabetic kidney disease or at high risk or those types of events.

And finally, the nephrology guidelines so Kidney Society Guidelines also have been taking steps forward to start emphasizing and prioritizing medications with proven kidney benefits, especially SGLT2 inhibitors.

Now, it's important to point out that significant developments in the cardiometabolic field have been made not just with antidiabetic agents or agents that were initially developed for glucose-lowering but then since has been shown to have profound cardiovascular benefits and/or kidney benefits, which are likely and related to glucose-lowering properties like SGLT2 inhibitors and GLP-1 receptor agonists but advances also have been made in lipid space as well. As in the case that we reviewed when we first started, the patients have likely have heterozygous FH and premature coronary artery disease. Management of LDL continues to be absolutely a cornerstone in reducing cardiovascular risks.

And we've now had a number of clinical trials since the space as well clearly suggesting and indicating that lower LDL is better in high-risk patients. Especially those with established ASCVD with both American Guidelines ACC/AHA guidelines, now recommending aggressive LDL lowering and potentially using intensive lipid-lowering therapies in some cases when appropriate on top of high intensity, maximal tolerance of statins, which of course remains the cornerstone of LDL lowering therapy. And also, our European colleagues, another side of the Atlantic, have taken a very bold step forward to recommend very aggressive LDL reduction targets in patients at high or very high risk.

The Need for Comprehensive Care for Cardiometabolic Patients

DR. KOSIBOROD: Now, a common question that comes up of course in this field where we've now seen the substantial amount of new exciting evidence emerging about efficacious and well-tolerated agents that can actually improve cardiovascular outcomes as well as traditional outcomes such as MACE but also heart failure and kidney disease progression and so on; advances in the lipid space and many other areas of this very diverse and vibrant field but because of the complexity that we've mentioned before where a given patient could potentially be seeing numerous specialists as well as the primary care clinicians, who has the ownership of making sure that these patients receive the right risk-reducing therapy at the right point in time?

In these studies that we published a few years ago, we looked at patients with type 2 diabetes and cardiovascular disease, we demonstrate that patients with these conditions are likely to see a number of different types of clinicians and in fact, as likely to see cardiologist for example as their primary care physicians. And considerably less likely to see an endocrinologist likely because there are simply fewer endocrinologists in this country compared to cardiologists and primary care physicians.

And so, these patients at any given time could be accessing different specialists and generalists and this has been the perennial issue of who owns quote and quote management of risk factors of this patient? And of course, you can see how very quickly the care of this patient can become increasingly complex.

Now, the unfortunate truth of the matter is that in part because of the field becoming so diverse and complex and evidence are merging so rapidly in part because of the silent and fragmented approach to care with patients seeing multiple specialists and generalists that may not always have the perfect mode of communicating with one another. Partly because of clinical inertia and partly because we don't have effective clinical care models as well as barriers to access the implementation of that really compelling data and very compelling guideline recommendations have been very poor.

So, where the rubber meets the road, where the patients actually to be receiving these medicines to reduce their risks, things tend to fall apart. In this large US-based registry of about 120 centers and specifically looking at a population of patients with type 2 diabetes and established ASCVD, we demonstrated in less than 7% of patients we're actually giving optimal guideline-directive care. Now, that of course is not an acceptable situation. We need to think of how we can do better because unfortunately if we look at the data from CDC, it appears that after a long and nearly two-decade improvement and reduction in cardiovascular complications and kidney complications in patients with type 2 diabetes, things appeared to have stalled. And then some populations of patients with type 2 diabetes, especially younger patients that will be exposed to this toxic cardiometabolic milieu of type 2 diabetes from comorbidities, the outcomes, the cardiovascular and kidney outcomes are actually getting worse. So, it's absolutely imperative and urgent that we figure out a better way to implement guidelines into clinical practice.

Now, as I briefly told you before, one of the critical reasons we believe is that the

implementation of guidelines has been quite suboptimal is that we don't have effective clinical care models currently in the US that foster prioritize and reward effective prevention. And there is very little care coordination going on as my colleague, Melissa Magwire alluded to previously. And that coordination of care is so critically important in this complex patient.

Now, at our institution, Saint Luke's Mid America Heart Institute, we took a bold step about three and a half years ago to change that. To actually develop a new care delivery model that would provide team-based coordinated care to just complex patients with cardiometabolic disease and try to improve risk factor control and ultimately patient outcomes, including all of those care goals that we've covered before.

DR. KOSIBOROD: This model of care is really very patient-centric. It's all about patient access to therapies, the experience, and satisfaction as well as patient medication, but ultimately important outcomes including cardiovascular and kidney events and quality of life. The model of care is championed by physicians in some instances. It could be preventive cardiologists and other instances, other specialists for primary care physicians, and internal medicine specialists. So, it's really is not about your specialty as a champion. It's about the mindset of approaching the care the way that it needs to be approached from a team-based standpoint.

Majority of the care while the physician champions may be instrumental in developing protocols and starting operating procedures and how we treat patients, the majority of the care is actually delivered by non-physicians, by allied professionals including nurse coordinators, advanced practice providers, pharmacists, certified diabetes educators. And again, the critical piece here is coordinating this complex care the patient is going to actually access appropriate guideline directive care from multiple comorbidities followed at the same time.

DR. KOSIBOROD: Now, does this model of care actually work? Does this kind of one-stop-shop approach actually provide better outcomes than traditional care settings? The early data from our Cardiometabolic Care of Excellence indicates that the answer to that is yes, at least when it comes to the implementation of guidelines. Here, we see the patients that are being treated at Saint Luke's Haverty Cardiometabolic Center of excellence in blue compared to controlled patients in red. Also, the patients in the same healthcare system with similar characteristics are being cared for in more traditional care settings. And we see the dramatically higher implementation of guideline-directed medicines such as SGLT2 inhibitors and GLP-1 receptor agonists, but also medications like ACE inhibitors and high-intensity statins. And about 20 times higher adherence to optimal guidelines directed optimal medical therapy as compared to those patients in traditional care settings. And this transformational change can actually happen very quickly after implementing this model of care literally within a few months.

It's not only the use of medicines but the key risk factors that are better controlled in those patients that have access to this model of care such as a change in weight with significant weight loss, improvements in hemoglobin A1c, blood pressure, and LDL cholesterol. It's not just a short term but the longer-term outcomes that appear to improve as well as the recently presented international meeting. And this data indicating that guideline

appearance can be dramatically improved and risk factor control can be improved from our own Cardiometabolic Center of Excellence at our institution really was a catalyst for us to try to roll out this model of care to other institutions around the country. About a year and a half ago, in May 2020, we launched a not-for-profit organization called Cardiometabolic Center Alliance, the mission of which is really to take the protocols, processes of care, and standard operating procedures that we develop here to put it in a package that can make it scalable, replicable, and implementable at other healthcare organizations around the country and also contribute data to a quality improvement registry so we can track and benchmark data across different member sites and continue this as a circular process of quality improvement with the ultimate goal of transforming cardiometabolic care in patient outcomes nationally. This organization has been very successful with currently nine members, all of which are large health organizations just again a year and a half into it, and we hope that the organization will continue to grow rapidly in the coming years so that we can make a bigger and bigger impact.

DR. KOSIBOROD: To summarize, I think the key take-home points on this very importance of team-based coordinative care is that cardiometabolic disease is a huge public health threat. In fact, the confluence of these diseases is likely the most important public health threat from a noncommunicable disease standpoint that we're facing today. There has been a rapid growth in the number of efficacious, evidence-based therapies that can transform care and improve outcomes. These data have been rapidly incorporated into practice guidelines, but due to the increasing complexity and fragmentation of care, the implementation into clinical practice has been poor. Team-based coordinated care through the Cardiometabolic Center approach is a real opportunity to improve outcomes, and we do need that all-hands-on-deck approach to really make a dent in this tsunami of cardiometabolic complications that we are facing, and efforts are underway to make this novel care delivery model widely accessible. Thank you very much.

Panel Discussion

I hope you've enjoyed this series of lectures on team-based care and how we can apply this to practice. I wanted now to shift into a discussion section where we can really provide some deeper understanding of how we can accomplish this in our own practices and learn from Melissa and Mikhail and their experience.

First, I want to turn to you guys. I think any time our listeners are out there saying I want to start these clinics. They're going to think about how do I get buy-in from my institution. What's the pitch or what's the starting place to say that we need to do this. Of course, your data is going to be a big part of that showing that this works, but Mikhail and Melissa, if you could just think out loud a little bit about the starting place for you and how you got that buy-in.

DR. KOSIBOROD: Well, thank you, Michael. That's an excellent question of course, and it's always about when you have a monumental task, how do you approach that, right? Because it may seem overwhelming and like everything else, you have to kind of do it one step at a time, right? You got to start in order to finish, and I would say there are a few components that are absolutely critical for this organization to be successful.

One is that clearly you need to have clinician champions and it's really impossible to do if nobody is championing the cause. Somebody has to be cheerleader to push this forward. It's even better if there is more than one at any given institution.

Second is that you need to have some basic infrastructure, so you have to have that administrative buy-in. I think for the clinicians, physicians, nurse practitioners, nurse coordinators, and certified diabetes educators, really the drive is to improve patient outcomes, make patients live longer, and feel better. I think from an administrative standpoint it's also important to keep in mind that a specialist will transition to this value-based care environment creating effective chronic disease management programs that improve outcomes for the patients that are at the highest risk, so they're going to be the ones using healthcare resources the most in terms of their risk of hospitalizations, emergency room visits, and so on. Those are the people that have conditions like diabetes, heart disease, kidney disease. Effective chronic disease management programs can really help to reduce the utilization of those expensive procedures and hospitalizations by using effective medications with the right patient at the right point in time. There is so much emphasis on population health as well. Appropriately so, and it's obviously never been more important than in cardiometabolic disease management, and centers like this can be building blocks to then potentially scale up and extend this to population health. I think the selling points of why would you do this, I think it's a win for everybody. It's better for patient care. The patients obviously benefit the most because they live longer and feel better as a result of this approach to care. Certainly, if we translate these improvements and risk factors, we can see easily how that could happen.

I think clinicians benefit as well because they really practice in a very rewarding environment. Melissa, now, let's talk about how the fact that the last three and a half years of our careers have been some of the most rewarding in our careers because we really see the results of the care that we provide, and you don't have to wait for 10 years to see it. This actually happens quite quickly.

The healthcare systems benefit as well because, especially if they live in a value-based environment, which most systems do know this and if not, they are preparing to live in that environment, that really gives you the platform on which you can build some of these very important programs including population health. That's my take. Melissa, what are your thoughts?

MS. MAGWIRE: I think you summarized it. Fantastic. Along with those really salient points is the fact that pretty early on you start to see the efficiency and the efficacy of this type of approach, and so once you get the buy-in of upper leadership, you get the buy-in of your peers as they start to see the fruits of our labor in that center passed on to them as well and kind of taking some of that heavy lifting from some of these other care sites and really coordinating it into one central area. They really start to see that patient satisfaction, patient outcomes, but also, just the efficiency in how we deliver care really approve across the board for everyone, and I think that really helps build that momentum.

DR. KOSIBOROD: Yeah. There is also a bit of a halo effect, I would say, too, which is talking about how to scale this up ultimately. There is definitely that which is, as more and more patients are coming through and getting the benefit of this care delivery model, more and

more of your peers and colleagues actually start to see the results. They look at it and say, hey, this actually works really well. Maybe I should think about figuring out how to do it in my own practice. Now, they may be somewhat limited in terms of what they can do just based on resources, and maybe, they may need a bit more information and education about how to do these things, which is obviously part of why we do this. I think taking an interest in it and saying, hey, there is something here, is it really works, how can I adapt this the best way I can for my patients? That becomes really important as well.

DR. BLAHA: I think that's such a great point. The halo effect is definitely true. Now, you brought up something else I wanted to ask you about, which I'm glad you brought up, which is scaling, of course, right? I think you could think of scaling in a couple of ways. There's scaling what we're doing to other practice settings, like rural practice settings without large healthcare systems you're in or also scaling maybe even to other countries that of course have bad cardiometabolic health problems. I'm thinking of the Middle East or India where there are a lot of cardiometabolic diseases. Mikhail, I'll start you about scaling. You've obviously achieved this if you're going to look and say I'd like to do that but Mikhail has made it work, but I'm not sure I can make it work at my center. What's the solution there to scaling, especially outside of a large healthcare system to more under-sourced healthcare system?

DR. KOSIBOROD: First, I would say is that just to make a point, I think it is important that if you're in the United States and hopefully, at some point, even outside the United States. But certainly, if you're in the United States today and you're a healthcare organization and you think this is the right step but you don't know how to do it, well, the mission of the Cardiometabolic Center Alliance is that we'll assist you and help you on how to do it.

That's our reason for existence. That's our mission. We actually help you get from point A to point B. That is available to you, and you can go to our website and connect with us if that's what you want to do. Back to your point, Michael. I think that the other piece of scaling is someone can take a look at it and say, well, this model of care sounds great. But if you're a tertiary or quaternary referral center, you're in a big city, sure. You may have the resources to do it, sure. You may have potential other resources like you can maybe start as a cardiometabolic center, but if somebody really needs a specialist, you have access to that where we live and at a rural area, for example, we don't have access to that.

So how do you do that? Well, I would say there are a few things. One is in this world of virtual and telemedicine and of course prevention, in particular, can be delivered very, very effectively through telemedicine and virtual care. Very little of it really has to be done in person. Obviously, in-person communications are great for developing relationships including clinician-patient relationships. But in terms of just bread and butter clinical care, a lot of it, if not most of it, can be delivered virtually. That gives the capability to the institutions that are situated maybe in urban areas but have large rural areas around them like our institution in Kansas City and many others. That gives you capabilities that you'll deliver it effectively regardless of where the patient lives.

So, that's more like geographic scaling. The other piece of that scaling obviously is because what we are talking about, what's a cardiometabolic center constitution handles and what many others is that an alliance with a start is really complex patients like the patient I

presented who already has numerous cardiometabolic complications, has established cardiovascular and kidney disease, and so on. That's kind of a tip of the pyramid, right? What do we do about those patients that are in the middle or at the bottom of the pyramid? They may have risk factors, but they don't have established disease yet but we could prevent that disease from happening to begin with. But then, you are talking about millions and millions of patients. Who's going to take care of them? There aren't enough cardiometabolic specialists, cardiologists, endocrinologists, primary care combined.

How do you do this with this kind of approach? I think, ultimately, from a philosophical standpoint, the beauty of this is that a lot of it, especially in the lower risk and therefore less complex patients, can be delivered by nurse coordinators that work perhaps collaboratively with a physician, but probably, 90% of the time, most of that care can be protocolized. It's just occasionally, a very small minority of the time, you're really talking about something where a physician - - actually needs to get involved. If nurse coordinators can actually deliver most of that care to the majority of those patients virtually via phone calls, patient portal communications, virtual ways whatever the electronic medium maybe, I think now you're talking about something that really could be a population health initiative.

In fact, there are some members in Alliance that has joined us that are going to look at how to deliver this model of care through primary care in the rural environment, which I think is going to be very interesting to see. Melissa?

MS. MAGWIRE: I agree. I think our model fits well for multiple settings, not just big academic institutions but those rural ones. I honestly think one of our rural sites may be one of our champions because they have such a focused approach to it and is so needed there. It's just a different way of approaching care and a one-stop shop in a collaborative way.

To Mikhail's point, within your center, you can start with your brick and mortar but you build out and you expand into primary care and you expand it to potential employers in the area and your own pop health. I think that the sky is the limit when it comes to this approach and really what the ultimate goal is just caring for as many patients as possible with these comorbid conditions.

DR. BLAHA: Yeah, that's great. Makes so much sense and that's definitely the way of the future. I want to talk about one of the few forward-thinking ideas before we close up here. I love, Mikhail, what you said about the physician champion. Obviously, you need the physician champion, but you then said something very important. It doesn't have to be a cardiologist. It doesn't have to be an endocrinologist. It could be a primary care doctor or even another specialty.

I wanted to talk about kind of the future of what the cardiometabolic specialist looks like. I mean, right now, of course, we're drawing from existing specialists who are in heart disease, diabetes, or primary care. Let's think about the future. People taking this course are probably thinking about becoming cardiometabolic specialists and what is the future of training or thinking about cardiometabolic specialists. Who's going to staff these clinics in the future I guess is what I'm asking. Mikhail, what do you think about that?

DR. KOSIBOROD: Yeah. I honestly think, Mike, that we are moving into the world where you're going to see more and more confluence of these disease states that really require people to go outside of their bounds of comfort as an organ or disease state-based specialty. To be honest with you, cardio-oncology is another great example of this.

DR. BLAHA: Yes.

DR. KOSIBOROD: It's really emerging as its own field and as are many, many others. Really, it's a way that if you talk to somebody in the cardio-oncology space or for example valve disease space now. It used to be is that cardiologist gives certain things and surgeons give certain things, but now, it's really a high team approach to managing valve disease, and it's the most appropriate because you pool together a team of people that have evidence-based approach to patients that can make decisions about patient management and not just thinking about one issue, but a range of issues that these patients experience to deliver the best possible outcome.

I think the future of cardiometabolic field is that it's so vibrant, but there is so much more that's going to be happening in the next few years. This is just the beginning, so the future is very bright but it's, also, future is very complicated because if we think it's complicated now, wait 5 to 10 years from now in terms of choices of different interventions that we're going to have, the various effects that these medications and interventions may have on a variety of different things, all the aspects of the disease that we've talked about before. You really need to have a team of people that are trained in cardiometabolic disease and understand what it is.

It's not traditional cardiology. It's not traditional endocrinology. It's not liver specialist and kidney specialist. You've got to have a cadre of people. Now, is that going to continue to be a role for specialists in a traditional sense like a cardiologist, hepatologist, and nephrologist? Absolutely. That's not going away because a cardiometabolic specialist ultimately is not going to be taking care of somebody who's got end-stage fibrosis in the liver and cirrhosis and needs a liver transplant or a kidney transplant, right?

For example, getting to verge of that, you're still going to need that very subspecialized or subspecialized person to take care of a patient like that, but that's really a small fraction of the patients that we're talking about. There is a whole cadre of patients which is the majority that are going to need this team-based approach. I think that's clearly where the field is going, and I think the training needs and education needs are going to be quite substantial because more and more people hopefully will want to get involved but also, there will be more and more for them to know.

DR. BLAHA: Melissa, what do you think?

MS. MAGWIRE: I think, going back to that care coordination, those foundations of meeting the patient satisfaction, the provider satisfaction, the cost, this approach just really puts all of those things on the table and in perspective. To Mikhail's point earlier, having been in practice over 30 years, the last three years have been some of the most satisfying because I think we are making such inroads. I see great things to come, and I think it's going to take a team effort, but we're well on our way.

DR. BLAHA: Yeah, I think – go ahead, Mikhail.

DR. KOSIBOROD: No, I was going to say on a very optimistic note, especially for Melissa and I. We've talked about this kind of collaborative, team-based approach for a number of years now, right? Going all the way back probably starting back in 2015 or maybe even before that or more than a decade ago when some of these cardiovascular outcome trial started coming out. We started putting those teams right in place now for clinical trials. That's where it started. Now, we're talking about putting the teams in clinical care, but for a long time it was like a unicorn, right? It's like an unusual creature that everybody dreams about but nobody's seen. Now, it's a reality. It actually exists and is delivering excellent data to suggest that it works. So, I think just in the past few years we've made huge leaps forward, but it's still just the beginning of the story I think.

DR. BLAHA: I completely agree. There's so much need for this, right? If you start a clinic, there's a shortage of patients and the future is so bright. Like I said, thinking of the future is very interesting about people who self-identify even in their training. I want to do cardiometabolic medicine, and I'm going to not just repurpose myself, which is going to be a lot of people at first, but the people who take on this as their desired career is indeed the next step I think in cardiometabolic medicine.

Anyway, thank you guys for this wonderful discussion. I hope our listeners out there, many of which are probably going to start a cardiometabolic clinic at their center, learn from Melissa and Mikhail who really led the way on this. I guess we'll be seeing data from your clinic public for years to come, and I can't wait to see that reduction in outcomes that I'm sure you'll demonstrate somewhere down the line. So, thank you guys again.

MS. MAGWIRE: Thank you.

DR. KOSIBOROD: Great to be with you today, Michael.