Tactile Medical Systems

Call 2

July 19, 2018

CORPORATE PARTICIPANTS

Dr. Karen Herbst, *Endocrinologist*

Dan Carlson, *Senior Marketing Manager*

PRESENTATION

Operator:

Good day. My name is Denise and I'll be your conference operator today. At this time I'd like to welcome everyone to Dr. Karen Herbst's presentation on understanding lymphedema, anatomy, pathophysiology and treatments. All lines have been placed on mute to prevent any background noise. After Dr. Herbst's remarks there will be a question and answer session. If you'd like to ask a question during this time, simply press star, then the number one on your telephone keypad. If you'd like to withdraw your question, press the pound key. However, if you'd like to submit a question during the presentation, you can write it in using the Q&A widget on the webcast platform. Thank you.

The presentation will now begin.

Dr. Karen Herbst:

Hi. My name is Dr. Karen Herbst and I am a board-certified endocrinologist, and I take care of patients who have lymphedema. Today I am going to be talking about the anatomy and physiology of the lymphatic system as well as treatments for lymphedema. As I go through the slides I will be saying "Next slide," or "In this next slide," to help you follow along.

On this next slide I am showing you my disclosures. I am on the Speakers Bureau for Tactile Medical.

Before I begin, I'm going to be spending some time talking about treatment of lymphedema with the Flexitouch Plus. There are FDA approved indications for using the Flexitouch Plus which include chronic venous insufficiency as well as lymphedema. There are also some contraindications. You can find all of this information on the Tactile Medical website.

On this next slide, I am just emphasizing that our focus today is the lymphatic system. We need to talk about flow of fluid on the microvascular level. On this next slide, I am going to be focusing on how the lymphatic system is integral to many of the disorders that are chronic and that are overburdening our healthcare system.

The lymphatic system is integral to the cardiovascular system and this includes the uptake of lipoproteins in the gut. It's important in immunity and infection, and we all know about lymph nodes in the lymphatic system. It's important in regulation of salt and fluid, therefore regulates blood pressure which is something that a lot of people don't know. It's important in the treatment of cancer but unfortunately also the spread of cancer, and the lymphatic system is important in obesity. Obesity is on the rise and a lot of people develop lymphedema and therefore put a burden onto our healthcare system. So, these are all challenges.

Let’s move on to Understanding Fluid Flow Through the Microvasculature.

We all know about the old Starling Principle of fluid exchange. What this principle says is that when blood flows from the heart down through the capillary system, with the capillary system being the smallest part of our vascular system, fluid and nutrients and proteins flow out into the interstitial space. It was originally thought by Starling that after the fluid entered the interstitial space, it was actually taken back up into the venules, so that only about 10% to 30% was taken up by the lymphatic system, and this makes the lymphatic system a secondary player, but actually, that part of the Starling Principle is incorrect.

The new Starling Principle on this next slide shows that yes, as fluid flows from the heart down through the capillary system, nutrients and proteins enter the interstitial space; they cannot return back into the venules because the venules are protected by a glycocalyx, which I’ll talk to you about in a second. Therefore, all of the fluid that leaves that capillary system and feeds our cells needs to enter the lymphatic system and return back to the vascular system and to the heart. Therefore, all edema that occurs indicates that there’s an inadequacy or a failure of lymphatic drainage.

In this next slide, I am showing you the glycocalyx. You can see a vessel there on the left side of the screen with little hairs in it. Those hairs are glycoproteins that are membrane-bound as well as proteoglycans. Those sugar molecules attract water and form a gel-like structure, and that gel-like structure prevents fluids and proteins from re-entering the venules.

You can see on the right that the lymphatic vessels also have a glycocalyx to prevent leakage out of these vessels. You can see that there are smooth muscle cells on the lymphatic vessels that induce pumping and that fluid does not reflux back in the lymphatic vessels because of valves. A lymphangion is a pocket in the lymphatic system that allows fluid to be pumped and this pocket has valves on either side to prevent leakage.

In this next slide, I want to show you that when we think of the heart we think of large vessels. We also think of the coronary arteries. But the heart has an extensive microvascular system; therefore, the heart also generates lymphatic fluid, as do all the other organs in our body. In that middle picture you can see the lymphatic fluid and proteins and nutrients that leave the vessels and feed our cells are then picked up by the lymphatic system and return through lymph nodes which sample the fluid before it returns back to the heart. Therefore, the lymphatic system is an integral part of the immune system.

On the next slide, I am showing that the liver also generates lymphatic fluid. Lymphatic fluid flows through the liver into the space of Disse. There are Kupffer cells which are modified macrophages in the space of Disse which sample the lymphatic fluids. Therefore, the immune system starts within the liver. The lymph fluid is then collected into a hepatic lymphatic vessel which then returns the fluid to the heart.

The lymphatic fluid collected from the liver, from the intestines which contain cholesterol and other lipids, and from the legs is so high that it has to enter a structure called the Chyli Cisterna I’ve shown there as a little blue circle. The fluid is then returned through the subclavian veins back to the heart.

What people don’t really understand on this next slide is that the liver actually produces 25% to 50% of the lymph that flows through the thoracic duct. When the liver becomes fatty or fibrotic or develops chronic liver disease and cirrhosis, then even more fluid can be produced. Therefore, people who have obesity and have liver disease are at great risk of overloading their lymphatic system.

Next slide. Let me talk directly about lymphedema, which can occur when our lymphatic system is overloaded or dysfunctional. On this next slide we define lymphedema. It is the failure or inadequacy of the lymphatic system to pick up that excess fluid, the proteins and the nutrients that are in that intracellular space and return it into the lymphatic system and back to the vascular system. It can be primary or secondary, or it can be a combination of both. Primary is usually a genetic cause whereas secondary can result from chronic venous insufficiency, cancer and other causes. This excess fluid and protein mixture that is in the intracellular space is not picked up, therefore it deposits and lymphedema becomes a chronic disease. Currently, there is no cure.

If lymphedema persists, it can lead to the development of cellulitis. It can lead to the development of fibrosis in the tissue, which can reduce mobility and cause pain, and if immunodeficiency develops, in rare cases it can cause cancer.

Next slide. What is the prevalence of lymphedema. Primary lymphedema occurs in about 1 in every 10,000 individuals, but secondary lymphedema affects 5 million to 16 million people in the U.S. alone, not even to mention worldwide. What people may not understand is that the most common cause of secondary lymphedema in the Western world is chronic venous insufficiency which we call phlebolymphedema. Cancer does cause lymphedema but it is the second most common cause of lymphedema. Unfortunately, the cause of cancer associated lymphedema is increasing worldwide, and hopefully some of the new techniques that are being developed will help reduce the progression of lymphedema in people who have cancer.

There are other common causes of secondary lymphedema. These include surgery, trauma and also obesity, and in that I include lymphedema in Dercum's disease.

On this next slide, I wanted to show you how chronic venous insufficiency can induce lymphedema. When the system is functioning normally, fluid is moving from the capillary space into the intracellular space and it is picked up by the lymphatics and returned to the blood vascular system. When chronic venous insufficiency occurs, then there's leakage from the venules. This additional leakage of fluid in the intracellular space causes the lymphatics to work harder and they can actually work up to 10 times their normal rate and control the lymphedema. This is, therefore, a pre-lymphedema condition. But when chronic venous insufficiency become moderate to severe, it can actually overload the lymphatic system. The lymphatic system can no longer handle that excess fluid in the interstitial space, and fluid and proteins and other nutrients and cell waste material then begins to collect and this is system overload.

Over time, the high pressure in that lymphatic system can cause damage and then frank lymphedema occurs which can lead to fibrosis and immobility as we talked about before.

On this next slide, I want to show you that lymphatic disease can occur even early on when there are no clinical signs of venous insufficiency. On that bottom left, you see near-infrared fluorescence imaging. You can see that the indocyanine green dye is taken up nicely into linear lymphatics, but if you look at Picture B, you can see that down at the ankles where they've injected the indocyanine green, the dye is no longer flowing up linearly along the lymphatics; in fact, it's flowing backwards towards the skin and we call this dermal backflow.

You can see dermal backflow in C0, C1, C2 and we call this lymphedema Stage 0 because you really aren't seeing the signs of lymphedema but there is significant venous disease present. In the next picture, you can see that there's significant venous disease present in C0, so you can see there's dermal backflow in that leg that has C0 which looks very similar to the leg that has C6. The C classification is part of the CEAP criteria.

On the next slide, we have a clinical Stage 3 venous disease, and in this disease there is lymphedema. The lymphedema is either going to be pitting or nonpitting. In pitting edema, the edema can resolve if the legs are elevated or even overnight, although the lymphatics continue to be overtaxed. Over time, this can develop into lymphedema Stage 2, which is now nonpitting because there's now a buildup of fatty tissue and a buildup of fibrosis in the legs as well as pain and skin changes. This change in the tissue can actually further damage the lymphatic system.

On this next slide, you see clinical Stage 4 venous disease, and at this point the lymphatic system is significantly damaged and you can see a lot of different skin changes including pigmentation, eczema, lipodermatosclerosis and atrophie blanche. In this case, the immune system is so compromised that cellulitis is a huge risk, so therefore people are at risk for recurrent cellulitis infections, inflammation and further fibrosis, which, again, continues to damage the lymphatic system.

As we move on to C5 and C6 disease, we're seeing either ulcers or the presence of healed ulcers. In either case, in the area of that ulcer the lymphatic system has undergone extensive damage. You can get lymphorrhea from the wounds which confirms the presence of lymphatic dysfunction. If this is not treated, individuals can go on to develop lymphedema Stage 3 which is morbid elephantiasis. There's a lot more swelling. There's a lot more deformation of the limbs. There can be chronic lymphorrhea, chronic skin changes, and again, continued damage of the lymphatic system resulting in recurrent infection.

On this next slide we're going to talk about how we diagnose edema and lymphedema. If you have a patient that has had peripheral edema for greater than a month, you need to undergo a differential diagnosis to figure out why the edema is occurring. If you figure out why the edema is occurring, you want to go ahead and treat that.

If you are unable to figure out a particular cause for the peripheral edema, then you want to consider lymphedema. When you're considering lymphedema, you want to consider family history. Are there other members of the family that have lymphedema, and was lymphedema present earlier in life? Then you want to stage your lymphedema. You also want to determine the severity of lymphedema, and because chronic venous insufficiency is the number one cause of lymphedema, you also want to evaluate and treat venous disease. Then you want to determine whether you have primary or secondary lymphedema or both, and also include an additional differential diagnosis.

On this next slide I want to talk a little bit about some of the signs and symptoms of lymphedema and peripheral edema, and also discuss the severity.

A positive Stemmer's sign on the hands or feet indicate lymphedema and usually this is primary, especially in a young individual. You can also see squared off toes which is also an indication, usually of primary lymphedema but it can occur in secondary lymphedema, usually later on.

You can see a hump on the either hand or foot. This has been given different names but it's an indication usually of primary lymphedema.

I also look for skin changes including an orange peel look, and we call that peau d'orange. There can be hyperkeratosis, papillomatosis. You definitely want to look for lymphorrhea, and you want to look for changes in the nails which could be a sign of primary lymphedema as well. You also want to determine whether there's pitting or nonpitting edema.

Next slide. So, how do you treat lymphedema? Patients and clinicians both need to be involved in the treatment of lymphedema, and there's a care pathway that I can direct you down to help your patients get the best care. First of all, I like to equip my patients to manage their lymphedema at home, because lymphedema is a chronic, progressive disease and our healthcare system is not going to be able to handle the entire burden.

When you're considering a home health plan, you want to also figure out do your patients have access to providers that can help them take care of their lymphedema? How close are they? How far do they have to drive? What kind of costs will they incur seeing these providers? You also want to address are your patients able to take care of their lymphedema at home? Are they able to find practitioners in their area to help them? What is their desire to take care of themselves?

I think a home-based plan and access to tools at home is essential for all patients in becoming a partner in the care of lymphedema, especially if they don't have access to therapists who perform complete decongestive therapy or they're not able to afford the care of a therapist.

Next slide. We all know about complete decongestive therapy. There's a decongesting phase and there is a maintenance phase. When patients finish with a complete decongestive therapy program, up to 80% of patients are able to maintain their benefit. However, lack of patient compliance can reduce the efficacy of complete decongestive therapy. This can include not having enough tools at home. It can include difficulty in self-manual lymphatic drainage at home.

Next slide. What's the treatment pathway for lymphedema? Once your patient receives a diagnosis of lymphedema, they're going to return back home, so they need all the tools they can get in order to take care of themselves and prevent the progression of lymphedema as it is a chronic progressive disease. This includes education that you provide to them, education that they find themselves, but also a pneumatic compression device, which includes the Flexitouch Plus Home. They also are going to need compression garments during the day. They may need compression garments at night. If they have moderate to severe lymphedema, they're going to need short stretch bandages at night. They also need other tools including information on skin care and where to find care when they need it.

If they have moderate to severe lymphedema, I will simultaneously refer them to a therapist trained in the care of lymphedema so they can undergo complete decongestive therapy. After they complete their treatment with the therapist, they're going to return back home and need tools such as pneumatic compression devices to take care of their lymphedema.

Every one to two years they need to be re-evaluated, or if they have an acute situation they are going to need care at that time from us, from their therapist and additional tools at home.

Next slide. This is a case study of a 39-year-old woman who had severe Stage 3 lymphedema. Her comorbidities included obesity, lipedema and hypertension. You can see on the bottom of her left leg there is some erythema or redness, and that tissue was very macerated and at risk for leakage. She underwent treatment with a physical therapist which included complete decongestive therapy. She went to the gym and got a trainer, and she used her Flexitouch one to two times per day.

You can see at five months that her leg is dramatically improved. She had a 43% reduction in volume by six months, and she was very excited about the improvement in her leg and was able to function and perform her activities of daily living. This whole process exceeded her expectations.

On this next slide I want to tell you how Tactile Medical can help us take care of our patients with lymphedema. Only Tactile Medical provides clinically proven at-home treatment options for lymphedema and chronic venous insufficiency with a continuity of care with high level service and support that improves outcomes in our patients, reduces costs and gives our patients their lives back.

On this next slide, I want to actually show you what the Flexitouch pump looks like. I affectionately call it the Flexi. It has a physiological mechanism that is a work and release mechanism to stimulate the lymphatic system and replicate that manual lymphatic drainage, and it's the only sequential pneumatic compression pump proven to do so. It offers initial truncal clearance followed by distal to proximal treatment of the limbs, just like a manual lymphatic drainage therapist would provide. It has demonstrated high patient compliance and satisfaction, and patients are trained at home by professionals from Tactile Medical after the equipment is shipped to their home. If they have additional problems later on, staff members from Tactile Medical can come out and help resolve issues.

Next slide. I now want to talk about the clinical efficacy of the Flexitouch System, and this is the largest study to analyze the effectiveness of a sequential pneumatic compression device. The goal of this study was to determine if the Flexitouch pump could improve clinical outcomes and also economic costs in patients who have lymphedema.

In this 34 million large, insured population, they identified 718 patients who used the Flexitouch System. They examined their health one year before using the Flexitouch and one year after using the Flexitouch, and approximately half these patients had cancer-related lymphedema and half had secondary lymphedema.

On this next slide, you can see that there was a dramatic 75% and greater reduction in the incidence of cellulitis with use of the Flexitouch pump. There was also approximately a 30% reduction in visits to occupational and physical therapists who perform complete decongestive therapy. There was a 30% to 40% reduction in just outpatient visits to doctors for problems associated with lymphedema, and in the population with secondary lymphedema, there was a greater than 50% reduction in the number of hospitalizations. This lowered costs in both groups by greater than 35%.

Next slide. I'm not going to tell you about all the other studies that Tactile Medical has conducted on the Flexitouch. You can actually go to their website and find these additional studies, but Tactile Medical is committed to finding evidence-based results to support you and your care of your lymphedema patients.

Thank you very much.

Operator:

At this time if you'd like to ask a question, please press star, then the number one on your telephone keypad. If you'd like to withdraw your question, press the pound key. However, if you'd like to submit a question during the presentation, you can write it in using the Q&A widget on the webcast platform.

Dan Carlson:

First of all, thank you very much Dr. Herbst for a fantastic presentation. We wanted to just cover one question that came in online as we wait for additional questions to come in over the phone. The question is: What is the difference between primary and secondary lymphedema and how does this influence the way that you treat these patients?

Dr. Karen Herbst:

This is Karen Herbst. Thank you for your attention. The difference between primary and secondary lymphedema is that primary lymphedema is inherited, so there's some congenital dysfunction associated with the lymphatic system, and it's usually caused by some known genes, although there are several unknown genes, whereas secondary lymphedema is caused by some disruption of the lymphatic system not associated with a genetic disorder, but they can happen together and they can look very similar. For example, primary lymphedema can affect both legs or it could be unilateral as with secondary lymphedema. There's a very good article by Peter Mortimer and Stan Rockson about the genetics of lymphedema, and they actually have a pathway, a very nice, pretty easy pathway that you can follow through. If you think your patient has primary lymphedema and you can either determine the genes important in primary lymphedema or you can decide that perhaps your patient has actually secondary lymphedema or a combination of the two. At the point where you think your patient has a genetic disorder, it would be a good idea to include a genetic counsellor at that time.

Dan Carlson:

Thank you, Dr. Herbst. Here's another question that came in online. What is the suggested follow-up schedule for maintenance patients?

Dr. Karen Herbst:

The follow-up schedule for maintenance can actually vary. It can be monthly. It could be every six months. It could be yearly. It could be every two years. It really depends on the patient. It depends on their comorbidities, and it even somewhat depends on their sex because we know that lymphedema is more prominent in women and when women reach the age of 50 their lymphatic system slows down dramatically and measurably compared to men. It may be that your patient who initially needed just yearly or every two-year visits to a complete decongestive therapy therapist now is requiring visits every six months. It actually requires a team effort between a primary healthcare provider, most likely a vascular surgeon, especially when chronic venous insufficiency is involved, and then a complete decongestive therapy therapist to decide on follow-up needed for a patient. Also, the insurance company plays a role as well. Some patients are only given, for example, 20 treatments in a year and they may require more, which involves actually discussions with the insurance company and proving that the patient really does need additional therapy sessions. Then it also requires a good home maintenance plan to try and reduce the number of visits to those that are actually truly needed.

Dan Carlson:

All right, great. Here's one additional question coming in online. I treat varicose veins / CVI with ablations. When do you recommend I refer to a lymphedema therapist as opposed to just getting them started with the Flexitouch?

Dr. Karen Herbst:

In my opinion, it's always a good idea to get an opinion from a therapist on the health of your patient because they receive a lot of education from the therapist, including skin care, recommendations for compression garments if they don't get that in your practice, and then teaching self manual lymphatic drainage. Of course, everyone can't refer every single patient to a therapist. Our therapists would be completely overwhelmed, but I would say the patient that has significant swelling and/or significant discomfort in their legs. Those would be the ones that would benefit most from seeing a therapist, and even the ones who you think are at greatest risk for developing, for example, ulcers or who are having trouble doing self-care at home and need a little bit more instruction by the therapist.

Dan Carlson:

Okay, thank you. One additional question that just came in online from Dr. Goldman out of Johnson Creek, Wisconsin. Is there any prospective continued trials of MLD, part of lymphedema management of lower extremities?

Dr. Karen Herbst:

I'm going to try and see if I understand that question. So, the question is are there any studies currently on manual lymphatic drainage of the lower—I guess the effectiveness of manual lymphatic drainage therapy of the lower extremities. Is that correct?

Dan Carlson:

One clarification on it too; it was specifically asked are there any prospective continued trials of MLD as part of lymphedema management of lower extremities?

Dr. Karen Herbst:

I do not know of any prospective trials going on right now for manual lymphatic drainage therapy, but that does not mean that they are not going on. Lymphedema and chronic venous insufficiency are worldwide problems so there may be some research studies going on in other countries, for example Germany or Sweden, in addition to the United States.

Dan Carlson:

Okay, thank you. Here is an additional question that came in online. When is imaging of the lymphatics necessary?

Dr. Karen Herbst:

I think imaging of the lymphatics is necessary when it's going to change your management. For example, I see a lot of patients who have lipedema who have normal Stemmer's signs of their hands and feet, and getting a lymphatics imaging evaluation, for example, by lymphangioscintigraphy by nuclear medicine really isn't going to help my management. But if I'm unable to quite figure out why my patient is having swelling, for example, they get a venous duplex ultrasound and their veins may have some minor issues but do not seem to be responsible for the swelling my patient is having, or I have unilateral swelling, for me that's a reason to look at the lymphatic system to see what the issues are because a lot of times when you have unilateral swelling the adjacent limb is also affected, or current treatment modalities are not working well for my patient. For example, they have a pump, they have compression, they're diligent, they go to a therapist but they're just not getting any better, it makes me think that something else might be going on and that I should image that lymphatic system.

I usually use the lymphangioscintigraphy because it's most available to me. There are other imaging modalities that you can use, for example near-infrared fluorescence imaging, but I'm not sure that's really readily available in most centers outside of individual surgeons or research-based studies, so I think the lymphangioscintigraphy is the primary exam to be used. Some centers do have MRI lymphography and more and more centers are picking up on that particular imaging modality.

Dan Carlson:

Thank you Dr. Herbst. Here is another question that came in online, that says thank you and very interesting information about the compromised immune response in these patients. On one of your slides you had a picture of a patient's legs with hyperpigmentation but that it did not appear to have much edema. Do you look for both edema and hyperpigmentation to diagnose lymphedema, or does the hyperpigmentation alone indicate lymphedema?

Dr. Karen Herbst:

Whenever you see hyperpigmentation you want to think chronic venous insufficiency. They think that the hyperpigmentation early on is from the deposition of melanin, and I know a lot of people talk about the deposition of hemosiderin in the skin which comes from the erythrocytes, but there's a nice study in 2008 showing that it actually is melanin deposition and that the hemosiderin occurs later. That is from chronic venous insufficiency, not lymphedema, but lymphedema is a component of that because we know when you have chronic venous insufficiency, even in the early stages, you actually have lymphedema either in the earlier or later stages.

I look for edema to diagnose lymphedema, but I know that chronic venous insufficiency is involved when there's hyperpigmentation.

Dan Carlson:

Great. Here's another question online that just came in. Are there any studies that indicate how long the lymphatic system can function at increased capacity before it becomes damaged?

Dr. Karen Herbst:

We do know that the lymphatic system can become overloaded and that's part of that Starling equation, the new Starling equation, but we really don't have good research studies showing at what point the lymphatic system becomes overloaded. There is some information from Professor Hugo Partsch showing that it takes about three months of continuous edema to damage the lymphatic system, however, as I mentioned, this depends on the age and sex of the person as well, and we know that lymphedema is more prevalent in women. For example, the lymphatic system does lose function after the age of around 50 in a woman, so you might expect that the lymphatic system could become overwhelmed earlier than three months of continuous edema in a woman over 50 as compared to a woman under the age of 50 or a man.

Dan Carlson:

All right. Dr. Herbst, one follow-up question to the question out of Johnson Creek, Wisconsin with regard to the randomized control trial. Yes, it's clarifying that it was meant controlled but also looking back from studies in the past which related to effectiveness of MLD, are you aware of any of those and what they said?

Dr. Karen Herbst:

There are some small studies showing the effectiveness of manual lymphatic drainage in lymphedema and also in lipedema, but to be honest with you, we need larger randomized, controlled trials showing the effectiveness of manual lymphatic drainage therapy.

It is a problem because getting compression garments covered by insurance companies, getting pumps covered by insurance companies would both benefit from more research studies showing improvements in lymphedema, such as the studies done by Tactile Medical.

Dan Carlson:

Okay, great. This next question actually from online fits well along that same vein. It says, do you recommend the use of compression garments along with the Flexitouch System, and if so, do you recommend the patient wear them during the treatment?

Dr. Karen Herbst:

I do recommend the use of compression garments, especially in patients that benefit from the Flexitouch System, and I think the compression garments actually help maintain the reduced fluid in the limb and trunk that the Flexitouch System provides. But I do not recommend that they wear their compression garments while they are using the Flexitouch System because the Flexitouch System works similar to manual lymphatic drainage therapy, and during manual lymphatic drainage therapy, you're not having your patients wear compression garments. So, in order to get the biggest bang out of the Flexitouch pump, it's best to have your patients remove their garments prior to using the pump.

Dan Carlson:

Great. This question appears to be a follow-on to the question related to timing of chronic edema. It says, if a patient has been swelling three months or more before a venous procedure and after the procedure this patient still has minimal swelling in the ankle and foot, is the lymphatic system still in danger to develop lymphedema? In other words, is there a timeframe before and after a venous procedure a patient should start MLV / Flexitouch?

Dr. Karen Herbst:

The lymphatic system actually repairs slowly. It responds a lot slower than the blood vascular system, so even after a procedure a patient would still be at risk for ongoing lymphedema, and having a manual lymphatic drainage therapist work with your patient to ensure the success of your procedure makes a lot of sense. I don't think we can say that all patients are going to need manual lymphatic drainage therapy after a procedure, but there is benefit to it and it can be a short period of time, a few number of treatments followed by continued use of the pump at home.

Dan Carlson:

Great. One additional question that came in online. Dr. Herbst, what one main point from this lecture do you feel is most important for clinicians to understand in caring for patients with chronic edema?

Dr. Karen Herbst:

I think from my talk, I hope you got the take-home message that taking care of patients who have chronic lymphedema requires a team effort. I think the manual lymphatic drainage therapists are a very strong ally. I continue to get educated from them, but after they've completed their maintenance phase of therapy then we need to make sure that we empower our patients at home to take care of themselves, and this includes education from the MLD therapists, including watchful skin care, good compression garments that aren't going to constrict the tissues, but also a sequential pneumatic compression pump for home use.

Dan Carlson:

Dr. Herbst, thank you very much. That covers all the questions at this time, and really to recap the main point that you just made there, thank you so much in pointing out how Tactile Medical is really looking to partner with clinicians around the country to really work towards better outcomes and empower patients at home. For those of you out there that do have questions, as you're sitting with your Tactile Medical representative, if we didn't get to them or if they come up in discussion in follow-up, please get those to those representatives as we'd like to collect them and be able to follow-up with you with answers to those questions.

Thank you again for taking the time to dial in or view over the web and thank you very much again to Dr. Herbst for sharing your wisdom with us today.

Dr. Karen Herbst:

Thank you.

Operator:

This concludes today's conference call. You may now disconnect.