- Hi, my name is Larry Allen. I'm a transplant cardiologist at the University of Colorado in Denver.

**What is the importance of MANAGE-HF?**

Patients with heart failure and reduced ejection fraction typically suffer from chronic symptoms. And it's a relapsing and remitting disease where patients are sometimes better and then have acute exacerbations of their illness. There's been much interest in trying to predict or anticipate those decompensations in patients. And one of the ways to do that is to collect physiologic data from those patients remotely. So many patients with heart failure and reduced ejection fraction have an implantable cardioverter-defibrillator or a cardiac resynchronization device with defibrillation. And these devices not only have the ability to pace and defibrillate the heart, but they have the ability to monitor patients. The devices used in the MANAGE study, use a HeartLogic™ system which collects heart sounds, S1 and S3, respiratory information, impedance across the chest, heart rate, and then activity levels. And it creates an algorithm with a score. And in some prior work, they found that when the score based on these five components exceeded 16, that patients were at a higher risk of having a hospitalisation event in the next month. So what we did in the MANAGE study is actually to take the data from the algorithm, enrol patients in the study at 30 sites, and then feed that information to the clinicians taking care of the heart failure patients to ideally preempt a hospitalisation based on the data through changes in medical therapy to essentially stabilise the patient and get them out of an alert or a worsening situation.

**Please describe the study design and patient population?**

Yeah, so there were 30 sites, 27 of them in the US. And they enrolled 191 patients with heart failure and reduced ejection fraction, as well as these patients had to have a device with HeartLogic™ information included in it. And then these patients were actually followed for a period of time and their HeartLogic™ alerts were automatically downloaded to the sites. And those sites then followed a management guide. So of these patients in the study, they had a number of alerts over the study period. So patients over the course of a year or two could go in and out of alert. And what we did is we collected information about not only when the alerts were happening, but what the sites did in terms of changing medical therapy for these patients. And the study that we're presenting is a late-breaker here at the Heart Failure Society of America Annual Scientific Meeting, looked at the variation in medical treatment response to those HeartLogic™ alerts. So we found that if you looked at the patient level, if a patient went into alert, they could get a, basically a score on how they did with the medical management. So if they went into alert, they crossed the level of 16, and they received decongestive therapy to try and cause urination and remove decongestion, they got a score of two. If they had other changes to their medical therapy, including vasodilators, or increases in their a guideline-directed medical therapy, they would have a score of one. And if they had no response, and no change in their medical therapy despite having an alert, then they got a score of zero. So the patients received kind of an average score between zero and two depending on each week how the alerts were responded to. And then we looked at the variation in scores across the 191 patients as well as across sites. What we found was that there was tremendous variation, not only by patients, but between sites. So across the 30 sites, there were some sites that had essentially nearly all of their patients when they hit alert would have a response, and so they had an average score of near two. And we had other sites where the response rates were quite low. And essentially when patients went into alert, they rarely had a change in medical therapy, and so had an average score of near zero. And there was again, almost a graded response across all sites showing a fairly large amount of difference in the way that people reacted to the HeartLogic™ alerts.

**What are your key findings?**

The key finding was that when we then looked at the variation across patients and even across sites, and then we looked at what happened to these patients, there was an association between a higher treatment response score or a score closer to two and a lower rate of getting hospitalised. And so the study was only 191 patients wasn't really powered to look at this, but I think that this association is suggestive of how we should use remote data to translate that into behaviour change in terms of how clinicians respond with medical treatment changes and potentially that such changes could abort or avert significant adverse events like hospitalisation.

**What are the next steps?**

Yeah, again, the study wasn't powered to really see changes in clinical outcomes. It was also a single-arm study, so we don't know exactly what those rates would have been had patients not had their HeartLogic™ alerts turned on. But I do think it's suggestive that this is one way to take multiple physiologic data, put them into a meaningful score that then gets sent in real time automatically to clinicians. And then with an Alert Management Guide helps clinicians react to that data in ways that anticipate and abort such events. I think this is really important because we're in an era now where patients are generating all kinds of automated physiologic data. People have a variety of technology that can say what their activity levels are, what they're doing, and increasingly what people's heart rate, sleep schedule, even soon, I think blood pressure will be on a day-to-day basis. So there's no shortage of data, what there is a shortage of is how do we combine that data in ways that create meaningful alerts from the noise, and then perhaps even more importantly, create behaviour change in clinical actions that make sense and improve health outcomes.