Thank you very much. This is Bruce Johnson this webinar is a CHAIN webinar titled Eliminating Central Line Associated Blood Stream Infections: The Journey to Zero. It is my pleasure to introduce Pat Posa. She has BSN and MS degrees from Wayne State University with a healthcare administration focus for many years in practice has included staff nurse manager, educator, director of nursing and administrator. She has an excellence in clinical practice is her passion and she has been involved in many programs with that aim including hospital wide sepsis management and state wide Keystone ICU patient initiative where she was a member of the advisory board. She is also a member of the technical task panel for AHRQ programs related to national implementation of and ICU patient safety program. She is currently faculty for the Surviving Sepsis campaign, and for the national project on mechanical ventilated patients. She is also a member of the Society for Critical Care Medicine ICU liberation task force. She has published many articles for clinical and quality journals. Please welcome Pat Posa.

Thank you so much I am excited to be here. To share with you our journey to zero and hopefully you will pick up some ideas to help you continue to work to get your blood screen infections density are. I do have some disclosures. I do some work with the Michigan Hospital Association and the Missouri center for safety and another company for advancing nursing and they have consulting contracts with two product companies. But none of what I say today will have any focus on any of those disclosures. What we are going to talk about today is the objectives. We will briefly review the risk factors for developing central line blood stream infections and talk about key care practices based on the evidence. And how do you get reductions and sustaining low infection rates work and then most importantly talk about strategies as you are putting in evidence-based intervention to decrease your CLABSI rate. We need to work also on safety culture as
those care purposes are changed. And then we will discuss strategies to sustain again and continue to root continuous improvement.

A lot of you have seen this slide before. In order to prevent central line associated bloodstream infections you have to know how you get them. The three ways the bugs and get in is through the skin. Either drain insertion or have the line is in place and the dressing is not inclusive. It can come in through the skin or through a contaminated catheter hub. Or it can come in through contaminated infusing. All of our interventions are focused at these three reasons or sources for infecting our intravascular devices. One of the things as Bruce said I have been involved in the Michigan ICU Keystone project but was AHRQ sponsored and our focus was to improve patient safety and outcomes in the ICU. The model to improve patient safety but we use from Johns Hopkins was called CUSP. What CUSP does is work on adaptive or control change. Instead of -- it is the adaptive change but it is important to make the evidence-based intervention stick. So, in Michigan we were able to achieve significant reduction in our CLABSI rates and our that operates etc. Because at the same time reporting and evidence-based intervention we were working on adaptive and cultural work. I want to talk a bit about that. Ron is the leader in understanding adaptive change and what the difference is between technical and adaptive change. He shares that one of the most common leadership mistakes we make is expecting technical solutions to solve adaptive, and. So what is the difference between technical and adaptive change. The premise there is knowledge to implement a solution and technical. Patient safety and quality method and it focuses on things to do. It checklist. Adaptive work premise is that it can only happen through changes in people's priorities, police, habits, and loyalties. The effects of contact on the successful application of these methods is really by focusing on unit and organizational change.

What we are going to share today and part of our journey is that we did focus on the technical work putting in CLABSI preventions through insertion adult. Thing and uncle. Attentional intervention. And that is what we will be talking about today. Will also be talking about the adaptive work. The comprehensive unit safety program. It is the work that shaped the attitude views and values of the clinicians so they consistently perform the task they know they should into culture change not just a checklist. Let me go back and just talk a little bit about the five components of the CUSP program. The culture we know is unit based. So if you're a friend one condition -- front line clinician. You knew it when it you walked into the room in the morning to see who you're working with that day and what medical team was on. You knew how your day was going to go. Because culture is all about people's attitudes beliefs etc. that they bring to the table. It's important to understand culture and improve that culture and make a positive culture. So the comprehensive unit safety program at the unit level, this work is focused on making sure everyone understands that there is a science kind patient safety. There is a science related to safety. In a not shall. That science says as humans, errors will be made. And we know humans are fallible. But we need to make sure that those errors do not get to the patient. We need to set up systems and processes to prevent those errors were getting to the patient. We must identify defects or errors and bring them to the surface and deal with them. To understand what systems or processes are not in place. We need to partner with senior executives to help remove areas that we might be facing. We need to continually learn from our defects every defect is an opportunity to
figure out what you can do different. We also need to implement teamwork and dedication to of like interdisciplinary rounds and huddles and morning briefings. Crucial conversations as communication framework. That is the CUSP program and we encourage you, I know it part of the national products, it is very important piece and it was the secret sauce in what we were able to achieve Michigan.

Here's the technical work. We know we have to put in place a insertion bundle. This contains the five things. First you need to not put in a central line a listing it. And then every day you really need this answer line, can I use another means. Ask about removing it every day. The letters next to these interventions is the grade of the evidence work the evidence is at the bottom of the slide. We know hand hygiene is important. Maximal barrier precautions. That came out in 94 and not adopted as a standard until the mid-2000. But that means that the patient is covered fairly from head to toe and be putting in the line have them ask and sterile gowns just like you are in the OR. And that you have somebody in there circulating to provide supplies and monitor the patients during the procedure. We use Chlorhexadine instead of Betadine. To ensure that the insertion bundle is completed every time that person that is circulated or observing complete one of these and this is the checklist to make sure that we remember to do everything as expected. The biggest piece of this checklist was the ability to empower the nurse to stop the line insertion if the expected behaviors or techniques or not being followed. If there is a break in sterile technique or the person involved and inserting the line has not found up or etc. That is the cultural piece. That is the adaptive piece. Making it okay to prevent air from occurring by stopping procedure. That was the first step in our journey of being able to begin to improve our culture to accept it. As I said, it's not about the checklist is about the empowerment of the nurse to ensure all the things are done. And if not stopping the line.

We have any evidence bundle -- maintenance bundle. Justin care. Accessing the line. Administrative that changes. Assessing every day if the line is necessary. As more and more has been studied about central line infections additional strategies for the prevention have come up including CHG bath and CHG dressing disinfection And antibiotic impregnated catheters I was not talk about these. The CDC advises to only use those if you have done all of these other inventions and your CLABSI is greater than three. I was not governed big detail. These are the CDC recommendations on care of the dressing, transparent. Change every seven days when Lewis or soiled. That is our biggest issue. Go is addressing every two days. You can use this Chlorhexadine impregnated sponge in patients older than two months. Scrubbing the hub. This is the most difficult thing in the maintenance bundle to get people to adhere to. We are not sure how long you have to scrub and with all of the different connectors you got to get into Waldenbooks and crannies and is scrubbing effective we are not sure.

The other thing is tabulated to replacing the administrative ID sets and whether or not you're using them for bigger IV fluid or blood products.

Go consider using a split septum valve in addition the recommendation of 2% Chlorhexadine wash. We will talk more about that as well.
Here is our journey in the ICU at St. Joseph Mercy Hospital. We are a 500 facility but community-based. We have 48 ICU bed. About 90,000 ICU visits. Is a large hospital in Ann Arbor Michigan. We began our journey 2004. If you look at this table you can see what our catheter rate infection was and here are the number of infections. Here are the interventions that we did. We began in 2004. Our rate at that time was 7.6 per catheter days. In a nine month period we had one CLABSI and our ICU. That is when we put in the insertion bundle. We had a great reduction and we began working on some of the stuff so that CLABSI just stay there. We saw in 2007 that we were stagnant. We had some infections in the great but how can we get better. Using some of our tools, we did that on every light inspection to identify what our issues were. We found, defect tool but you can answer this for questions. What happened. Why did it happen. And here you look at it through systems Latins not looking at Andy -- a systems lens. [Indiscernible ] Then you decide what you can do to reduce the risk. But issues did you find. What duty do to to prevent those issues from being a problem. How do you know you reduced the risk how do you know these interventions worked and you are going to prevent that CLABSI. Each one was considered a defect and we learned. We examined three CLABSI that occurred in 2008. As we looked at them with a system lens be looked at to see if the evidence was being followed with the insertion been done correctly. I was the maintenance bundle on each of these patients. One thing as we examined the patient, we found out that all of these patients were significantly you know that compromised. Went to the literature and said is there anything we can do with this compromised population to help prevent the CLABSI . We found emerging research on using CHG caving as an intervention. We continued and audit these meeting procedures. Hopkins also brought with them when they came to Michigan Keystone, a CUSP program and a model for translating evidence into practice. We followed this model but if we put in new evidence-based intervention. The first step is summarizing the evidence and looking at it. Selecting those interventions that have the most benefit with at least barriers and converting that into evidence behaviors. Then looking at what your current process is and defining your new process and measures. How will you know that your risk was reduced and then step four is ensuring all patient received intervention. We do that through the four E's. We engage. Educate. Execute the intervention by designing toolkit. And that we evaluate. We use this model. Here are the three E's spelled out. The engage is working on your adaptive work. You want to make easy to do the right thing. Then you continue to evaluate your

in summarizing the evidence this is the evidence that we used to understand that additional intervention called CHG bathing was going to be an important way we can reduce CLABSI. I will review this evidence. It is here for you to look at if this is part of the journey but you need to look on. With traditional evening there are lot of germs that can be harbored in the basin. This is the study of the basins. You can see here that 52% group organisms. 62% had multiple organisms. Our tap water and off bills -- our tap water in hospitals is overlooked. Be recommendation from this study was to minimize patient exposure to Water. The CDC made recommendations based on that literature claiming we should disinfect wash basins and evaluate sources for contamination. Here is an example of outbreak and Water was a corporate. As we compiled this evidence we began to see evidence on CHG bathing. This study was about soap and water -- he found a significant reduction in the patients that had the Chlorhexadine cost of colonization. Patients in the non- CHG-- [Indiscernible ] also the
Contamination of the environment in the patient's room was a lot less in the patient's with Chlorhexidine bathing. They came out with a study that was the to two weeks one 12 arm crossover. The first 28 weeks randomize to pave with a cloth. Then they had a period which they switched and found a significant reduction in CLABSI rates. There were posters presented at meetings that showed that -- here is additional evidence. This was not out when we implemented it. But in the New England trouble of medicine published here was a multi-center clustered trial. Nine ICU including bone marrow can find and six different hospitals. They measured the rate of the multi-drug-resistant organisms and CLABSI and found a 22% reduction in DRO and a 28 reproduction in CLABSI. Evidence is strong to move away from Eason fourth -- basins for bathing. To prevent CLABSI evidence.

We went locally to say how can we do this and what barriers are there. How do we change that. We look at cost. People like it the current way. There is some compatibility related skincare products and probably the biggest thing, this is perception by the staff. The nursing staff that cleans the patient asks are they really cleaned with just this cloth. And then we put in place some things to make it easy to do the right thing. We put in these signs at the bedside and what the new bidding process was like. Removed the bath basins and make sure we had appropriate power levels. Insured that the lotions and creams were compatible. A warmer to warm the solution, nurses wanted the bath to be warm. Ensuring that we did not -- that we only have be compatible products stocked in the unit so you cannot pick up something that is wrong. And if you are using basins and now you are going to take them away what else would they being used for in making sure that you had something that the staff could use. If you are using them for 24 hour urine. But do they have now that they can use. Educating patients and family about the why you are doing it. But it's not intervention but it's a treatment. And we did some evaluations. What did we see? We had a rate of .9 catheter days that were down 2.7. You might say that is not much but it was three or four inspections. So there were three people that did not get infected. And that is a lot. Then we found here in 2009, we needed to bump up and re-emphasize and package a maintenance bundle. As we learned from our defects we found we still had a couple CLABSI and they were in our patients who needed a femoral line for lack of access. And power lines that were staying in longtime were PIC lines. We reviewed the literature and implemented the CHG dressing for just those specific lines. Here is the research that was published in 2009. Then we said whilst Cammy do. If you think that to the three sources we have been focused on attacking the blood this coming in from the skin. We have not really done anything from the bugs coming into the catheter hub. So we went back to the literature and emerging on the market was disinfection disinfection. As we learned from our defect we realized that we did have inconsistency with scrubbing the hub. We reviewed the literature and recognized understanding the science of safety and human factors. We realized that if we can error proof something or assist the staff entering of for seizure that is difficult to apply with every time. By giving them a device. That was probably going to be more beneficial. We had to do a presentation to our evaluation team. The people that anybody can buy the product or not. And we follow beef for E's. And then we followed the four E's. We treated a business case. We educated, what do I need to do. We converted the evidence into behaviors work so instead of disinfecting We put ports -- we listened to resisters on why this work. We standardize. We put them on all ports making it easy to do the right thing. Week stated independent checks and
discussed this at huddles. We added next to our bedside and eventually added a flush but had one of these disinfecting caps had one of these disinfecting. We set a target for a 75% compliance and drilled down into the data. We measured compliance and assessed at monthly. But literature was published in 2012. This original work was presented at a SHAE meeting. It's pretty strong evidence. Period one is where they put the disinfecting cap in and period one with the standard disinfection of scrubbing the hub. Period to with adding the cap Period to with adding the. What they found was they have a lot of contamination in period one when they were just using standard scrub the hub. That went down as used the caps. They install the rates go down when the used these caps. When they took the caps away that CLABSI on up to where it was at baseline. So the use of caps resulted in a 40% reduction. It was very successful so we did a housewife pilot in 2011 following the same process. We had to get VAT approval again. We did our return on investment as to what we were going to spend and what we were going to avoid. We also discussed human factors and air -- error factors. We looked at our cost and our current impact in our non-ICUTran3. They had a 10 time longer length of stay. If we went home had homecare and they went to hospice. These patients did not end up where we wanted them to. We have done some costing back in 2006 about what a CLABSI lost us in marginal laboratory costs. It was about 12,000. The cost for in fermenting this how slide is going to be 100,000. We needed to present 8 1/2 Clancy's -- CLABSI to offset the cost. We also shared with our value analysis team that human factors engineering was a part of this. Human factors was concerned with the application of what we know about people on their abilities and limitations to the design of equipment. The environment that they work and the jobs that they perform. We know that scrubbing the hub for 10 to 15 seconds every time you go into the IV system is very difficult. It requires you, -- human factors engineering application of knowing that said what can we do to design things differently in our environment. Been working on it the cultural safety and error prevention work in order to reduce errors. You want to use something that forces functions or constrains someone from doing something. Itemization that -- as you move down the list you are less likely to reduce the errors. The disinfecting caps fit somewhere between automation and forcing function. More likely to prevent that error. As you implement you need to measure, has this new intervention taken a hold. We looked at compliance and overall in each unit. Each unit got feedback. The blue line with our target. As he continued some of the units we started in June, you can see compliance, we measured to things. How many valves were covered and how many patients had all of their valves covered. This was our goal. We saw steady improvement in each area and we continue to look at it. We also drilled down into details. As we did each audit if we weren't compliant, what was the non-compliant. So each unit could dig deeper and figure out why it was still happening. We were able to achieve, in our non-ICU areas. These are the number of CLABSI, we are not recording the number of lines Sudafed actual number of inspections. We were able to significantly drop the infection rate in a six month period time. We went from 14 CLABSI to to. The reduction within the maintenance CLABSI. If you get a centerline infection and it occurs in less than seven days combined you inserted the line. The infection is probably related to contamination during line insertion. If it's greater than seven days it's contamination after. So it maintenance or care of the line. The disinfecting caps is related to care of the line. You can see, this is our 75% mark, our last compliance check was in December of last year. We were doing them monthly and
then we spread them out quickly. -- Quarterly. The units that don't hit 75% are still doing them monthly.

Continued improvement and sustainability. Measurement. Learn from defects. We are at zero in our ICU for almost 3 years, they just had an infection last August and it was the first one in 26 month. We were very disappointed but the tried to learn from it. This patient that got it last August, was a patient who was in their for over 30 days. He audit on day 31. He had with ration and moisture issues. It was tough to keep the dressing dry. We do we could. We continued to learn from that. Reviewing the literature and doing things related to trying different types of dressings. Especially on those patients who are hard to keep dressings exclusive. What to measure and how often. You should always measure your CLABSI rates that you also want to measure process measures. When we originally started the collective every insertion checklist and showed it with our teams. We are not doing that consistently anymore we will take a month, quarterly and look at all of them. And just make sure we are still on the Mark. We definitely do with real-time compliance issues. We have education that goes on every month to our new residence as the entity ICU. Our maintenance bundle has a monthly audit of at least 15 centerlines. All of our ICUs and looking to see if we get the appropriate care for the dressing Thomas to things etc. to things etc. Our insertion bundle. This is your process measure. Is your dressing intact. Date and time. Isn't anchored properly. We check because we have CHG dressing for our pick lines. Those other processes that we check. As we shared earlier. We spread the disinfecting caps throughout the hospital. We did that for all of the evidence and we follow the Hopkins model and the four E's and made sure we had a team together for the non-ICU areas year. We showed them how patients were being harmed and how our CLABSI rate was. In the non-ICUs. We shared with them the insertion and the maintenance bundle empowering the nurse to stop the line insertion is the best practice would not follow. We also put in a process called the preprocedure briefing. Since line insertion on a nine ICU area was less common this allowed the nurse to talk with whoever put in the line. Making sure they reviewed the checklist with them. What they're role was during the line procedure. They agreed, the nurse would say if I saw a break in sterile technique I will stop you. How would you like me to do that. They made it clear that expectations were there for each role. We educated people. We did that through simulation. In our ICU we had centerline parts. In the non-ICU we had centerline bags. Now we have a PIC team and a line in place that do most of the centerlines and they come with their supplies so we no longer need the centerline bags. We added to our expectation our multidisciplinary rounds about the lines being removed and we learned from each defect. We also continued to measure and give feedback to the staff. Eco-these are the results from Michigan. 109 ICU. Their medium CLABSI rate went from 2.7 to 0 at three months. There was also a decrease in mortality seen impaired to other Midwest states. This article was in the British medical Journal. If you had an ICU stay in Michigan versus 11 the states surrounding Michigan. Your overall mortality was less. This was after the two-year initial Keystone ICU had been implemented. At 36 months there was still a significant reduction in CLABSI rates. As estate we set out about .6. Definitely under the one. In Michigan we also did work that was published in health services research, where we did linking between the response and the safety culture survey and CLABSI rates. In Michigan, the strongest predictor of clinical excellence with the caregiver felt comfortable speaking out if they perceived a problem. Units with the highest teamwork were the ones that had no
CLABSIs. Linking this adaptive cultural work to the technical interventions. The projects went nationally and sponsored by the AHRQ to get the CLABSIs rate under one. What they were able to do through 44 state hospital associations, they bought a 40% reduction. Preventing more than 2000 2010 three and saving more than 500 lives. Less than 20% of all hospitals participated. Just imagine if everybody did this work. Hopkins has added two additional E's onto their for. Embed. And expand. You can see that in the work we did at our hospital we have done five and six as well.

What are the barriers? Lack of time or importance work lack of evidence-based education. Absence of protocol and policies. Jilly with staff turnover and replacement. Lack of supplies. Probably not having data and feedback on how we are doing is the key barrier.

So what do you do? You need to follow an organized step by step process similar to one that I shared with you. There are other frameworks that work well. The difference with those as compared to the framework we use is that we combined the technical works and also at the same time worked on the adaptive cultural work. That is the difference to sustaining the games that you make because the culture comes unacceptable that we have these infections. So we have to do these things to prevent them. Measurement and feedback is key. Checklists and reinforcements and independent checks. We use our interdisciplinary rounds of the time to check if the patient is receiving all the evidence-based practice they should. And lacing these new practices and orientation and stimulation.

Can we change practice through process improvement alone or will sustainable change require an altering of the value structure within the unit?

I think that is very important. I encourage you all to be courageous. We are responsible for the safety of our patients. We need to own these issues. If not this than what. If not now then when. Is not me then who.

Are there any questions. This was a lot of information.

Pat this is Bruce. Think you for this outstanding. We will entertain questions. I will start off with two. This question. The CHG bathing. Did you have patient sensitivity to that and how did you deal with it if you did.

Very rare. If a patient -- in that large study there were very few skin issues. You will have some if people have sensitive skin or lots of allergies. We used the non-CHG cloth for them and just could not do that intervention. But it was rare.

Second question may be outside of the scope of this. You outlined that your suppressed patients were relook that. That is when you instituted the CHG bathing. In your opinion, does CHG bathing the applicable to our other HAI's.

It has been shown in SSI to do preop CHG. We currently use that for all of our cardiovascular surgery and extended it to orthopedics. So yes or is a place for it. The literature is just emerging on whether or not, but there are some links to impacting
clotting rates as well. I don't have that on the top of my tongue but there is emerging literature related to that as well. We are in the process of learning from our infections that are still occurring in the non-ICU areas. We have a cluster of them in our oncology unit. We are in the process of beginning CHG bathing. They are and you know -- [Inaudible]

are there any other questions.

The floor is open for questions.

With patient going on with centerlines at what point is CLABSI not a HCI.

I think the timeframe the CDC uses is 48 hours. If they go home and it's longer than 48 hours. When they come back and they are found to have went, then it is not attributed to a hospital acquired.

Just like in the hospital, depending on what area they are in, they use that 40 our role. So if the patient was in your ICU and transferred out to another unit. The next day they had a positive blood culture attributed to a central line, that hospital acquired infection would belong to the ICU.

To ask a question please press the number seven new telephone keypad.

When you rolled out North CHG bathing on the ICU did you do the daily bathing once a day to all patients or did you base it on whether they had a central line or whether they were actually ICU.

We gave it to all patients regardless of whether or not they had a central line. Burden -- Vernon study earlier decreased changing the floor and entire environment. Also understanding human factors. If I had to remember this person gets a CHG bathing that and this person doesn't. It made it hard to remember. All patients in the ICU area, once a day, it's an intervention.

What type of valve did you have. Did you standardize that first before you added your disinfecting cap?

Guess we standardized that burst. Yes we standardized that first. Is dark blue. I cannot remember the name.

So you had the same valve for your pic line?

Yes.

Is Bruce. I want to thank you so much for this outstanding presentation. You have given us a lot to think about. The process you outlined was outstanding. I'm glad it can potentially be duplicated. Again. Thank you again for this presentation.
Thank you for having me. In some parting comments I wanted to share with you to remember that this is a journey. It's really about keeping the patient at the forefront and anytime something happens try to learn from each of those defects. So you can continue to shape and improve your processes to dispute those errors.

We will be sending out a link to everyone who registered to give us feedback and evaluation. Please send that back to us. We learn by your feedback. Thank you very much and have a good day. We go this concludes.

This concludes. You may now disconnect.

[Event concluded]