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2018 NCSBN APRN Roundtable - Researching Diagnostic Error in Medicine: Concepts, Lessons and Tools Video Transcript

Event
2018 NCSBN APRN Roundtable

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Presenter
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- [Gordon] My, again, really great admiration and belief in the role of nurses, in producing quality and safety, has really led me to, every time I can say yes, to opportunity to speak to nurses, so this is really a big privilege to me.

And it recalled a conference I attended, so as you heard I was in Chicago and this was in Normal Illinois, this is a Nursing Patient Safety Conference of Nurse Leaders, and this is almost 15 years ago to the day. If I was going to have to try and remember I would have thought it was about 8 or 10 years ago, so it shows how these things happen. And you can see it was you know, a little bit downstate from Chicago.

So I gave my talk in the morning, but just really out of respect for the nurses, and really I'm going to do this today, I'm going to stay around all day, to hear what else you have to say and learn from you and contribute in any way I can. So they had a closing speaker at 3:00, and you know, I didn't know who this person was. But this person calls at 2:45, sort of I'm the opening keynote and this is the closing keynote.

And this guy says, "I can't make it. I'm tied up in traffic coming down from Chicago." And so I had just gotten my cell phone. I was not like an early adopter, but I had a cell phone, you know, and I had this great idea, I thought of this great idea, why doesn't...if you can't make it and disappoint the nurses it just seems so unfair, maybe you could give your talk from the car.

So he was being driven down, and we could let the nurses hear what you had to say, and at least we would have you know, not let the nurses down. And so I took the phone because this person was calling to the nurse on the cell phone and I said, "Here's my idea..." And as soon as I said it I said, "Gordy, are you kidding, this guy,"and he was some political person, some politician, "this guy never planned to come he just said yes, you know, it's just a typical politician thing, how naive and foolish for me to even suggest this idea," you know?

I mean you know, the neurons started connecting immediately. And instead, from the other end of the phone, that person said, "That's a really good idea." And so this was the politician. And he was a State Senator and I came home to my wife I said, "Have you ever heard of this guy?"

He was so smart and so decent, and obviously, a cut above the politician that would just say you know, "I'm coming to this," and I have you know, no integrity, that he really wasn't going to do it in the first place. But this guy was the real thing. So I said, "Have you ever heard of him?" You know, of course, we had not heard of Senator Obama at that time. And then here he is, and then I guess the special thing about this picture, and see, there's apparently several folks in this picture that Janet and Roberta are in this picture with me.

Are you guys in the room or who else is here? - [Woman 1] Fresh folks.

- Fresh folks, yeah. So again... And again, I didn't even know we have this picture years later somebody sent this to me. So I value this, I show this to my patients, you know, because I'm from Chicago and I kind of knew Obama. We actually have a couple other Obama stories but we won't have time for that now.

But it was a really special moment for many reasons, and it was really positive. So here's what we're going to do to today, and I want to involve as much of your interaction and questions if we can. I have really no commercial interest, financial interest. I have some of this funding that we mentioned, the Moore Foundation and Harvard Malpractice.

I am doing this one project for this company on medication decision support, so I guess that is a financial conflict because it's a for-profit company. So what we're going to do today in this time is really briefly just connect what Mark said, in fact, having to be able to follow Mark is just really so perfect, because I'm going to weave in some of the same themes.

We're not going to duplicate but really it's just a real privilege. By the way, Mark was very modest, but Mark is really sort of the founder of SIDM. I mean he and I actually conceived this first conference together, we were going to do it through the New York Academy of Medicine, and that's really sort of grown into this larger thing.

But Mark was a member of the Institute of Medicine Report, so you really were getting that wisdom. So we're going to kind of try to build on that. Here's some examples from you, talk about some key concepts. I know you talk about research is in the title, I didn't really give the title to this talk, I'll talk about some of my own research but that won't be the really exclusive focus. And then really talk about some ideas for improvement that we've been working on.

So this is the report that you've heard about, I think...although Mark can't promote it quite as shamelessly as me, because he was one of the authors of this. The executive summary, really, you should just read, it's free to download, and the whole report is very worthwhile and very historic and important. And we worked very hard to really culminate the decade of thinking and organizing around these ideas.

And there were eight sort of recommendations or goals from this report. Again there isn't really time to

walk you through each of these, I'm just going to orient you to the report goals, and then talk about what I'm going to be...where I'm going to talk about will fit in. And the first one is just as you heard making teamwork more part of the diagnostic process.

Teamwork with nurses, teamwork with patients, teamwork with the lab, and again, there's more details about what that means. I won't talk too much about that, Mark did a bit. Have doctors and medical education and other education emphasize diagnosis improvement more, learn about how we make these mistakes. The third one is how to use health IT in a positive way, and I'm going to spend a few minutes talking about that.

As Mark mentioned that's an area of interest of mine, and certainly, right now, you could argue that the health IT is part of the problem, not the solution, and we need to kind of turn that on its head and change that. And then this idea about learning from errors you know, as Mark said one of the big... or maybe main recommendation is start looking for these errors and learning from them in your hospital, in your practice, in your clinic.

There just isn't enough of that going on and that's important. We started this learning network in Boston. I hope it can get off the ground really. We've had enormous problems with legal sharing confidential protection, to try to share cases really across institutions in more rigorous way. There's this thing called the Patient Safety Organization, which is supposed to be an umbrella that allows people who do that, that's not working.

Again, longer discussion we could talk about it more, some of you might be involved in PSOs. But we've got to start learning and sharing from these cases. I mean, you've heard about the two cases the Ebola and Rory Staunton, I mean there's a lot to learn just from two cases. But there's just hundreds of these as you know and we should be maximizing our learning. These last four goals, a work system and culture that supports a diagnostic improvement.

In some ways to me, that's the most important one, where people really have this sense of learning and sharing and no blame mistakes. Doctors are very defensive about mistakes, and there's no doctor, I don't think, that don't pride themselves about being good diagnosticians. But this is just not what it's about, this individual blame and this is really about a larger system and culture. A reporting environment where we can report these, and the medical liability I already told you about the problems we're having just sharing cases, there's a lot that's got to change there in the report.

Payment system that's more supportive obviously giving people more time. And even I'm afraid this will be my one critique of the report, Mark, I think is think of all the people that drank this Kool-Aid about how managed care and ACOs are going to... you know and getting rid of Fee for Service, that these are the answers. But I don't think that's really exactly the way to go, and I think we're learning that lesson the hard way a little bit with Obamacare.

And then of course, for us researchers, but really to make progress, the amount of funding for this is miniscule. In fact, I spend most of my time trying to write grants that don't get funded and it's just, that's not a productive way to... I'm contributing. And again, this is a more recent report that the National Quality Forum is trying to grapple with.

So this is still... National groups are really paying attention to this and trying to come up and this is...They came up with sort of a framework that's helpful looking at the role of caregivers, and then looking at the diagnostic process. Again what things need to be improved, what things need to be measured, and then organizational policies, so that's their framework. But again since you asked me to sort of talk about research, I'll just mention a couple things that we've done over the years.

This is one of the starting points for me, is we went around and we did grand rounds on the subject. We asked doctors to... mainly doctors and nurse practitioners, to write down three errors that they've committed, either seen themselves or seen from a colleague. And we collected this for a large case series, and again we're going to do something similar in the room here in a second from you live.

You know, and we've tried to figure out how are we going to sort through this. And this is a quote from Lucian Leape, he's another hero of mine, he's the grandfather of Patient Safety. He says "Safer practice can come about from acknowledging the potential for error and building an error reduction strategies at each stage of clinical practice." So we have to start to recognize that these things are happening. And so we created what we call... this is DEER taxonomy, we looked at the diagnostic process.

So this is right at the time people were looking at medication errors, you know, there's the prescribing, and the transcribing, and then the administering, and the monitoring steps in medication. So we tried to do something similar with diagnosis, creating these steps, and can we break it down and zero down. And we again try to figure out what are the things that go wrong for example in the physical exam, you know, failure and delaying, you didn't get a critical piece of data, so you missed a finding that there was a mass or a rash or something.

Or you misinterpreted it, you said it was one thing when it wasn't, or you didn't give it enough weight, you know, again, you could think about Rory Staunton thing, you know, he had this minor rash but it wasn't taken seriously, or nobody followed up with this, and etc. Testing we have a lot of you know, the ordering steps and the performing of the tests, or even clinicians processing and interpretation.

And then how you generate your hypotheses, and how you weigh your differential, and then the referral steps, and the consultation, follow up. And there's been other attempts to sort of do this, but most of them are sort of follow this kind of general framework. And as we try to look at cases, we find things going wrong at these different steps and then we can try and learn things.

So what do we find from our 583 cases, interestingly enough... and this is just like a Pareto diagram, where in each case, it could have, you know, more than one thing going wrong in the different steps. Failure and delay in considering the diagnosis was, you know, far and away, or failure to order needed tests. Again some of those are hand in hand, if you didn't consider HIV, then you didn't order an HIV test.

So we went through these cases, and so I guess if you could make some divisions, I would say... I don't know this is probably completely not fair to Mark. But Mark is very interested and done a lot of work on cognitive error issues, and I'm kind of more kind of a systems person.

But I think the point is as Mark showed in some of his data, most of these errors are both, there's not...try to separate out cognitive from system. So you could think failure to consider a diagnosis that's a

cognitive error, you never thought of this, but, you know, if you get interrupted, if you don't have enough time. So what I would say here is that these cognitive versus system problems, so you know, certainly lack of knowledge or memory recall, but even that you would say is a system problem.

Why isn't it that I haven't been educated about Ebola, you know, it's a current problem, why is it that I don't know anything or don't remember this, or how can I be better reminded in adequate time. Again, that all contributes I think as we already talked about. So like failure to listen to key piece of history or physical. So if the person had traveled to Africa you know, how did that happen?

Is that... you know, you could just say, "Well, that's a bad doctor who didn't take a good history, or a bad nurse practitioner, she just wasn't thorough enough." But as we begin to understand the way these systems work, again, I would say the systems really in some ways trump this idea about training people to think better, you know, rare atypical things, etc.

So actually as we say what are the causes and what are the remedies. So another study we did which I think in some ways just reinforces the message of what you just heard, was we looked at all the malpractice claims in the state of Massachusetts for the two leading insurers. We had about 85% or 90% of all the primary care malpractice claims. It's is one of these rare instances where two competing insurers put their data altogether.

And we are again interested in primary care, I'm a general internist. And here's... people were saying it looks like diagnoses errors are the most common cause of malpractice claims in some settings. But here we have by a factor of really seven to one is just about... so in the five year period there were about 500 of these, about 100 a year as you can see across, total.

So about 100 a year, and these are the diagnosis ones, so it's about 70 or 80 of these 100. So it turns out that diagnosis is dominating these claims. And then more interesting, what are the kinds of diagnoses that are being missed, that are leading to these suits. And again, you can see cancer, 190, versus the next leading is heart disease, you know, so missing heart attacks is certainly happening, or a ruptured aneurysm, etc.

But it's these four cancers, really, colorectal, lung, prostate, and breast. And again, we've delved more deeply into these and you're going to hear some more data we have on them. But you can see that these are things that are being missed and alleged to be in many cases, you know, doctors are having to... malpractice insurers are having to pay out.

Each one of these different cancers and again has sort of a different fingerprint. So I showed you that DEER Taxonomy where we tried to localize where the problems were. So for colorectal cancer, it's evaluating symptoms. We just did another study of rectal bleeding in...these are Harvard practices and about, you know, 30% of the time or more, rectal bleeding is failed to be followed up with, to follow recommendations.

So these are red flags symptoms. You know, here you have breast where it's evaluation usually of breast lumps that's the problem. And again in prostate cancer and lung cancer, there's a lot about failure to follow up on abnormal test results, so a PSA that's not followed up on or a lung nodule. And again, I'm over generalizing quickly on these findings, but we have a lot of information about these cases and

things we could learn.

But here's one of the most I think disturbing and really sobering things that take a second to orient you. So this is all malpractice cases, all nine general medicine cases, this is just, in general, all malpractice comers [SP]. And you could see even though you hear about how doctors and nurses are getting beat up by this, but most of these are settled or dismissed, that's this group here okay.

This 20%... I'm sorry most of these are just thrown out, only 20% have to be settled, these are dismissed, these are settled. But look at the diagnosis ones in primary care, twice as many. Okay, so here you have 20%, here you have 39% are basically the lawyers look at these cases and they say, "We can't defend this case."

I know it's hard to think about things going on in Washington about what's going to be able to be defended and not legally. But legally, they're saying you know, you overlooked that prostate and PSA that was high, or that lung nodule, we better just settle this case. And not only that, the ones that go to trial 1% here versus 2% here.

So it's twice as many, basically... the lawyers basically say, "You don't really have a case, you really kind of screwed up and we can't defend this, and we either lose in court or have to settle this." So now is the time where I'm really sort of interested, and Mark put this list up, he sort of asked people to show hands, but I want to actually ask people to rise to the microphone.

And actually to start it off Maureen has a case she's going to share of her own, and then she's going to ask for two or three other volunteers. I'm kind of interested in ones you personally know about and not... I mean, it could be in your role as a health professional, but I think I'd be interested even in people's...as family. As Mark said, the IOM...By the way, this is the one thing in the IOM report that got the most headlines.

Everyone one time in their lifetime will experience a case of diagnosis error, okay, a serious case. This has no... the evidence-base for that is very poor. There's been no study to prove that, but that's the thing that got the headline, you could sort of say that's fake news. I guess what I would say about that is I think that's an underestimate, rather than saying that's you know, an exaggeration.

I think if we probably looked, and we're going to see in this room about cases that people might want to share from their family or otherwise cases they've seen somewhere. Maureen, you want to just talk about the one you just told... I just heard about this at the table, but it's a good illustration of the kinds of things... - [Maureen] Sure, am I on here?

- Yes.

- I'll tell you about... there are two I shared with Gordy, and the second one has better ending. So a couple years ago, my sister she snowbirds in Arizona and comes back here for the good weather. And she returned with a cough that was kind of unrelenting. So she went to see her primary care, and they did an X-ray and she had a nice coin lesion on X-ray.

So I called one of my oncology friends, of course I had connections, who specializes obviously in lung

cancer, and I said, "I'm a little bit worried about what this is." And so he was wonderful and said, "You know, I understand, we'll get her in immediately.Let's get a scan and then we'll take it from there." And on scan, you know, nice, distinct in fact, maybe a little smaller one also.

And he said, "You know, for all the world this is very suspicious, that it could be lung cancer." And so he said, "I'll take her in for an open biopsy like right away. We'll get this done right away," you know, he's trying to be really nice. And I said, "Is it possible that she could have Valley fever because she's out in Arizona part of the time, and when I was in Arizona I would see Valley fever cases."

And he said, "No, you wish that were it but no, the likelihood this is... no, I really don't think so." So off she goes to open biopsy and he calls me and said, "You're not going to believe this, but she has Valley fever." So I said, "Well, we need to get her into somebody, right? You know about the Valley fever, and I said, "Why don't we look at, you know, the institution you're at, is there anybody there?"

And he said, "I don't think so, but I'll call infectious disease and call you back." And it turns out one of the world's experts was on their faculty. So it just kind of goes to show, you know, again, I had it in my brain that it could be because of my recent experience, and he had it in his brain that it looked for all the world like a lot of the lung cancer pictures he was seeing.

So turned out okay though, she got treated. So how about somebody else and actually if you don't mind it would be best if you come to the mic because we're recorded, but if you need me to come to you, holler and I'll do that. So how about other cases anybody got another?

- Thank you, it's interesting the first time I did this exercise was somewhere right around...the issue was in Oak-... Brooke where is joint commission? They had a big. - [Brooke] Oak Brook, yeah.

- Oak Brook and every case that people brought forward...you know they gave me like an hour and a half, so I figured I'm going to you know expand the talk time was invitatory. Every case that people brought forward was within the last two weeks. I mean I didn't ask like give me a recent one or anything, it was just... as I went back I had either four or five at the microphone everyone was in the last two weeks.

So this doesn't have to be... hopefully not in the last two weeks but go right ahead, please. - [Woman 2] Thank you, I am an Advanced Practice Nurse, but I make it a habit not to diagnose my own family members. But my husband complained to me that he had something that it felt like a big clot in the back of his throat.

So I took a look and sure enough he had unilateral tonsillar swelling, and I said, "You need to have this looked at." He went to our primary care doctor who said, "You have tonsillitis, here's a Z-Pack, have a nice day." It seemed to help and about three months later, he said, "You know, I still have that feeling in my throat."

And so I looked same very thing, and I said you know, "You need to have this looked at, and would you ask our physician to please refer you to ENT, because I'm not an expert but I was always taught any unilateral swelling is cancer unless proven otherwise." The primary care said "No, this is the way chronic tonsillitis appears in older men, another Z-Pack, some steroids to help with the swelling.

But he did give my husband an ENT consult which took us three months to get in. And of course, as you probably can guess, it was... had neck cancer. And the reason that our primary care physician did not consider that is that my husband had zero, zippo, no risk factors.

- Okay, yeah, I'm going to come back to both these cases, but obviously, you can see here's infection being called cancer, and here we have cancer being called infection. So there's an interesting, but so many rich... and hopefully, I don't know what the prognosis or the outcome was, but this is obviously even more worrisome than the first case, and hopefully, he's doing okay.

Yeah, go ahead. - [Woman 3] Thank you, this is actually about women in heart disease. My mother was diagnosed with walking pneumonia when she was in her mid-60s, went through... had shortness of breath, that's it, right? So she went through three or four cycles of antibiotics, about four to five months later, started to feel better, because it turns out her collateral circulation had taken over.

And it wasn't until about six years later when she went back and she started developing similar symptoms. And it turned out she had six blockages in her coronary arteries, including the lovely collateral circulation she had probably developed the first time she had her MI, right? And I think that this is something...

Part of it is the patient who just didn't want to believe that she could have heart disease because she wasn't having crushing chest pain. And this was probably at the beginning of the Go Red for women Movement where we were paying more attention. But also it was the general medicine doctor who just couldn't believe that this woman who was healthy, had quit smoking, does eat...you know, she did all the things right but she had had some lifestyle things prior to that.

I will tell you that there was also some errors that happened in the hospital, which I won't get into that eventually led to her death, actually. And my response, because I did some quality and safety research for my doctor, was to write instead of sue, I wrote letters to all the physicians, nurses, managers, directors. And what they did is implement in their CCU interdisciplinary rounds every single day, because things were missed between the nephrologist, and the cardiologist, and the thoracic surgeon.

They weren't talking to each other the way they needed to, and that led to her... eventually, things getting overlooked and her dying. So that turned out to be a really good thing, but we wouldn't have been there in the first place if maybe we would have paid attention to her first MI.

- So much there and I'm going to have to do this justice, sounds like that later set of things included diagnostic errors, miscommunication. We'll come back to your case though in a second. We'll make this the last one unless I... all right, we'll do two more. Yeah. We may cut into lunch here, you'll regret this, but this is really important please give us your story.

- [Woman 4] I had a patient just last week who was in her 50s and she was complaining of having hot flashes, tired, and her daughter was in medical school, and she was stressed out. And she's very healthy, you know, taking vitamins, low weight, just very health conscious. You know, she was just looking for some pills for middle-aged, you know, for going through the hot flashes.

And decided to run some tests and she never had any blood transfusions or anything, and it turned out that she was Hepatitis C positive. So she was kind of stunned by it because she didn't expect that to be a diagnosis. But the good thing about that diagnosis was, you know, there's a cure rate of 95%, so that actually...so she's seeing a GI specialist, and we'll have something else. But I think you know, it wasn't even on her radar but having the ability to you know, persist as a clinician may help her out.

- Do they think those symptoms were related to the Hepatitis B, or was it just an incidental finding or what the...?

- Hepatitis C...

- C, yeah.

- I don't know yet, it's a story still unfolding.

- Yeah, and that illustrates one thing... so often we have these conferences to figure out the errors and what went wrong or what could be better, but even the first question is... even in retrospect, what is the diagnosis of these symptoms right? Is it the Hepatitis C, were the original lung symptoms related to this cardiac thing? It sounds like more likely they were in case one of this case versus not here, but this is what makes things hard and complex.

And certainly, when you start trying to sue somebody or point fingers or do this it gets really off track. I'll take one or two... okay, a couple more quickly. Yeah. - [Woman 5] So my 78-year-old father, 5 days after his 78th birthday, developed chest pain, and he had a known history of heart disease and had had a bypass surgery and aortic valve replacement.

So he presents to a world-renowned academic center where he had always received his cardiac care, and they had EMR, so they had access to all of his records. He presents with complaints of 10 out of 10 sharp pain, all of the classic signs of an MI.

And he had taken, you know, Nitro at home and done all of that, and then presents to the ER. So he is told to go back to the waiting room and wait. Forty-seven minutes later, they finally call him and the nurse puts him in a chair to wheel him back to the exam room when he collapsed and he dies.

And we actually...when my stepmother starts recounting the story the next morning because I was out of state when it occurred, I thought bless her heart, she's got this all confused. This did not happen at this world-renowned academic center.

Everything she told me was true in the medical records, even with the EKG strip telling the triage nurse he's the next person to go back, and he did not go back until 47 minutes later. And obviously, that settled out of court. One of the things though I really wanted was I wanted education for the nurses and at the facility but I was told I could not make that part of the agreement settlement, thank you.

- Yeah, my goodness, talk in length. Just working backwards in addition to that settlement there probably was something in there as non-disclosure, so no one can talk about this right?

- Right.

- So instead of this being something... forget about a serious education correction program that you were hoping for, even for people to be able to talk about it, people sign these things where everybody's lips are sealed. We're going to settle this, but you can't talk about this, you know?

- And the sad thing is that I'm on faculty at that university, teaching nursing and my big push was let's do some education. I was told, "No, we can't do that."

- Okay, well, obviously I'm sorry and you know, you could see... I mean chest pain should be immediately evaluated going right back, right? I mean, you know, whether this would've made a difference you could ask that question. But something clearly went wrong, you know, talk about door to needle time, there's just so many things in terms of the way cases like this should have been handled that weren't, that's obviously an error in diagnostic delay.

Yes? - [Woman 6] So my husband at the time was 59, so pretty young we could say, and now thank God he's okay, but he's going to be 62. So he had the year before his 58-year-old exam and all that, and he told me "You know what, I have this like frequent urination." So I said, "Well, tell them at you know your annual physical."

So he tells the doctor, he does a prostate exam, everything's fine, no worries, don't think about it, done. Then it's a year later and he is almost scheduled for his annual physical, and one morning he comes to me he and he says "You know, I had blood in my urine," and I said, "Oh, really. Are you sure? So he says, "Well, I'll show you. Go look."

So of course, as a nurse, you're going to go look and check that out. I said "Wow, you better go to the doctor tomorrow." So he goes to the doctor, and the doctor says, "Well, it's probably like, you know, a urinary tract infection or a kidney infection." And I go, "That's kind of weird, you know, you're young, you never had that. It's not a guy thing, like that's weird." So he says, "Okay." Well, I said, "What are you supposed to do?"

He says, "Take some antibiotics." And I said, "But did they do a culture to see, you know, what's going on? "Oh yeah, they did." So then about... This happened like a Monday and then it's a Thursday morning, and I said to him, "Hey, did you get a call from the doctor the results of that urine tests? And he says, "No, I didn't get a call." I go, "Did you get...you know, are you taking the antibiotics they gave you?

He goes "Yeah." I go, "How's the urine now?" He says, "Well, it's gone. It was only that one day." I said, "Oh, okay." I'm thinking about all day and I said, "Gee, how come they never called to tell the results?" So I called up the doctor and I said, "Hey, what's the result?" They said, "Oh, it's negative."

I said, "Well, why would he have blood in his urine then?" I said, "Maybe he has bladder cancer." And she says, "Well, it's not likely,"blah, blah, blah. I said, "Well, you need to do a CAT scan. I said, "You have to call the hospital and you know, get him in for a CAT scan then." So she I guess humored me and she said, "Okay, he can go for a CAT scan." So I got him in that Friday and two hours after the CAT scan, they said he had a humongous bladder tumor.

And then as the story goes on it was a very good thing that... I mean if he would have waited another six months, he would have had to have an artificial bladder whatever. We went to an amazing urologist, he was able to take out the tumor, and got everything, and now you know, he gets the check once a year and he's okay.

But if I won't have said to them kind of...like what if he has a bladder tumor, what if he has bladder cancer, there is no way that the doctor would have suggested a CAT scan.

- Yeah. I guess one of the theme, and of course good for you...

- I always say to men if you ever hear like friends...and I also tell everybody in my synagogue, "If you ever have, even one day, of blood in your urine, guy, go for a CAT scan."

- Well good for you for being persistent at the mic, for being persistent with your husband obviously. Even this idea, "Well, the test is negative so we don't have to worry about it, right? The fact that that urine test was negative was a very key reason why you should worry about it, right? Think about that, how many no news is good news, yeah normal. I'll tell you another thing about urine test in our hospital, much longer story, but 43% of the urines collected, mostly these are women who are symptomatic with probably UTI, not males like your husband, 43% of the urines are contaminated.

So what does that mean? First of all, wasting a lot of money, collecting them wrong, and how do you interpret that. Do you keep treating? Do you stop treating? Anyway, it's a longer discussion so this is how you perform these tests really matters. So I think I'm going to skip over to come to this figure that maybe will help us put some of this, what we just heard together and maybe not.

But this is my feeble attempt, the Institute of Medicine if you look at the report Mark and his group try to say, what sort of the best model to graphically represent what's going on? And they came up with something much more elegant, much more complicated, but this is sort of Gordy's simple-minded way of thinking about this or trying to, which is this three Venn diagrams. So one hand, you have diagnostic process errors okay?

Nobody called back on the urine results, right? That was a diagnostic process errors. Most of the time, you know, no big deal all right. You know, somebody waits a few more minutes in the waiting room, right? Is that...you know, 43 minute waiting in the emergency room is not such a big deal, but maybe if something went wrong in the diagnostic process, somebody's sodium...you know, somebody is in bed A, in bed B, you get back a sodium of 122, and somebody who had normal sodium say,

[inaudible] you just switched the two patients, patient A, and patient B. I once had a situation at Cook County where we had patients... We had two Smiths. Smith in bed A, and Smith in bed B, and of course, we didn't have bar coding or anything. You can imagine how many times are the blood samples switched. But then there's Linda McDougal and I'm not violating her confidentiality.

She's on the cover of Newsweek. So she woke up from her bilateral mastectomy for breast cancer and the surgeon says, "You don't have breast cancer." She says, "I'm so glad doctor, you were able to cut it all out." And he says, "No, I'm sorry to tell you, you never had breast cancer. We switched

your specimens with another patient."

Okay, so she had a wrong misdiagnosis and she had an adverse outcome. So obviously these are the people that we worry about, these are going on every day, blood samples switched, people drawing urine test...you know, this is a diagnostic process, 43% of these urines are being collected wrong. Now coming back to Maureen's first case, I mean was there a diagnostic process?

Somebody saw something on the X-ray, hopefully, they had a differential diagnosis, maybe they didn't, you know, lung cancer with some other things. So did anything really go wrong in that case in terms of...They have the wrong diagnosis or the wrong working diagnosis right? They thought it was lung cancer and it wasn't.

You were the one that kind of introduced this new diagnosis. But did somebody do something wrong or was that doctor failing to think broadly? Was there any adverse outcome in this case? Well, kind of in a way there is you know, I mean maybe if there was another way to have diagnose this serological, I mean he had an invasive procedure that maybe could have been avoided. So maybe but you can just see even in these extreme...you know, I think yours is sort of a straightforward case.

You know, maybe nothing went wrong in any of these cases and everything was fine and certainly he was reassured that he didn't have cancer. So he was happy to move on and not think about was this an unnecessary lung... Was it open lung biopsy? Yeah, so there was some morbidity involved to that for sure. Fortunately, he didn't...

I mean he could have gotten a pneumothorax and died or sepsis from that, you know? So, fortunately, that didn't lead to any adverse outcomes. So this is the way we have to sort of begin to think about these cases. You know, let's just think about the hematuria case, okay. So you know, we have somebody is initially coming in... you know maybe UTI is a reasonable first diagnosis, but you need to have a differential diagnosis, you need to follow that up, right?

Again as I said the failure to follow up, so you get back a normal urine which usually say, "Okay, we don't even have to tell the patient everything is normal but that's..." So there was obviously a misdiagnosis. And then there was this delay. So there was a diagnostic, we referred the patient with hematuria, and there was three-month delay in him being seen, in addition...

I'm sorry I'm coming to the tonsil patient, right, with unilateral swelling. Three months delay to be seen in ENT. Now, England because of these delays in cancer diagnosis put in place what's called the Two-week Rule, and it actually mostly works pretty well.

There's other issues with the British National Health Service, but there's other things that's very good about it, they put a Two-week Rule, and if you are worried about cancer, then you need to be seen in two weeks by ENT. If you have a skin rash, or a mole that's suspicious you got to be seen in two weeks in dermatology. Acne maybe you can wait three months but not a suspicious mole. And so there was a delay, there was a diagnostic.

Now, did this delay in the diagnosis...it was a misdiagnosis for sure. They diagnosed tonsillitis, does this lead to adverse outcomes? Now, you could say, "Well, obviously this thing grew and a chance for earlier

cure was lost," but sometimes that's not even clear. There was a study by ENT cancer that I used to tell my residents about, that the longer the patient delayed in coming the better the prognosis.

Now, why would that be? So somebody comes in with a big neck mass you say, "Mr. Jones, why did you wait a year and a half? This thing has grown massively. You know, your chance for cure..." And then the next day, Mr. Smith comes in with a little something on his neck okay, and Mr. Jones ends up having a better prognosis than Mr.

Smith, why would that be? Why would a longer delay? Well, it turns out this is head and neck cancer. This little thing is anaplastic lesion, it's growing very quickly. This thing is a more benign cancer that's growing slowly, and so it's complicated. So it's really about systems, I guess I'll use this quote from Don Berwick, still people probably know who he is, quality hero of mine, head of CMS.

So he says, "Great diagnosticians make great stories but they don't make great healthcare. The idea is to make accuracy reliable not heroic." This is in the Boston Globe, and I just saw this just as I was getting started thinking about diagnosis. And this is just sort of resonated with me and guided my thinking, so we need systems that work together not to have great, brilliant diagnosticians, great male doctors stroking their beard coming up with brilliant diagnoses.

It's really coming up with systems that include nursing, and lab, and people following up and collecting the urines properly and giving timely appointments, and EMR. So you know, we've sort of cut the time short first for a lot of this, but... and maybe I'll run over a few minutes to lunch, I think we have about 15, 20 minutes still right?

But the way that I sort of boil this down and I testified before Mark's committee is, you need to have situational awareness and safety nets. You know, so to be aware of the things that can go wrong. And I want to talk about situational awareness for a second because Mark mentioned Sully. So I guess I'll...so this is you know... high-reliability organizations are places where people walk around and you know, they tend to be you know, nuclear submarines and places that have ultra-high levels of safety by necessity.

People are always worrying about things that go wrong, they're trying to anticipate, they know what could go wrong with the test and making failures visible. In our case, I think we ought to talk about misdiagnoses and red flag symptoms, and pitfalls, which we'll hopefully touch on in a minute.

But this is where people really are aware of what are some of the dangers, and this is a quote from James Reason, "Perhaps the most important distinguishing features of these high-reliability organizations, is their collective preoccupation with the possibility of failure.They expect to make errors." So he's not saying no errors, "Expect to make errors and they train their workforce to recognize and recover them. They continually rehearse familiar scenarios of failure and strive hard to imagine novel one, instead of isolating failures."

Let's get rid of that bad doctor, bad nurse. "Instead of isolating failures they generalize them, instead of making local repairs they look for system reforms." So here's the story, here's the Sully story people probably saw the movie. There's even controversy about this movie in the Patient Safety Community because there is controversy about the NTSB, and this hero thing. But putting those aside it

was a wonderful movie to see.

I recommend it living through this because I thought you sort of know the plot and the outcome, but you really don't until you see it. So this was this airplane that took off from I guess Kennedy Airport and crashed and he had the crash in the Hudson, they got birds in all three or four of the jet propellers. And they safely managed landing this, and it turns out...oops I used to have a slide, that that take off, before they took off, this is talk of...

they rehearsed what to do with a water landing that morning. And there were a certain number of steps, they actually didn't get through all of them in the rehearsal, but there had never been a water landing of a commercial jet in the United States. But they had rehearsed this, and obviously they were prepared, they got everybody off and you know, saved everybody's life.

And so we're trying to promote this idea about diagnostic pitfalls, being aware of all the things that can go wrong, and we went into a bunch of the databases that we have, and we haven't published this, so this is new and there's a bit of data. We looked at the patient safety reports at Brigham, which turned out to be kind of useless. Nobody is reporting these diagnostic errors, not 100%, but M&M reports which I run this conference.

We looked at some of these cases, but we looked at malpractice claims, and then we went to specialists, and we did focus groups. And we try do you know... Here's what we found here, again, the usual suspects, rectal cancer, colorectal, lung, breast, MIs, prostate, sepsis. You know oncology, neurology. Again part of this was the focus groups, we did some of these focus groups in neurology, but still... and we tried to use this DEER classification, failure to order needed tests, failure to consider the right diagnosis, failure to follow up on the abnormal test, failure to weigh a critical piece of data, and failure to order a referral.

So here, let's get down to some specifics related to the diagnosis. Well, I'm sorry this is one more... So this is just overview, disease A, being mistaken for disease B. So bipolar being mistaken for depression. Failure to appreciate the limitations of a test. So a woman with a breast lump you send her for a mammogram, and it comes back normal, and the doctor says, "Don't worry you don't have breast cancer," that's a pitfall, that's not 100%.

That's a limitation to that test. She needs...If there's really a lump there, palpable lump, she needs a biopsy or ultrasound. Atypical presentation. Presuming a chronic disease accounts for new symptoms. And again somebody with lung cancer they had had some pulmonary symptoms and you attribute to their underlying COPD. Overlooking drug or other environmental causes.

Mark alluded to that. Or failure to monitor evolving symptoms. So you know, it's one thing to treat this person for tonsillitis, okay, but if it keeps getting worse or it doesn't resolve or it evolves in a certain way, then there's something else that needs to be considered. We also did this other thing of looking at some of the contributing causes.

I don't think we'll go into that here. So I want to get to breast cancer. We went deeply into these breast cancer cases, failure to elicit a family history of breast cancer. So if you know there's a problem that we should build in safety nets atypical presentations. So these were young women fast-growing lesions.

Again I don't have time to go through these, but let me go through the third one...I'm sorry the physically... I want to go through this, one number six, false negative mammogram. So somebody had a false negative because they had fibrocystic changes in their breast, failure to examine, misreading of a mammogram by radiologists, failure to follow up on a nipple retraction.

So this is again one of those risks that we should be aware of, and mammography units now are, in fact, they've taken this away from the primary care doctors. If somebody comes with a breast lump to my mammography center, you know, if that mammogram's negative they follow that up, that's their responsibility. So we've changed the whole process around that.

Biopsy performance. Number 11 diffusion of responsibility. So it's failure to see who is responsible for following up on an abnormal mammogram. Failure to coordinate between the PCP and Gynecology, whose responsibility is this? So you can see that we can see these issues. So for the safety nets, we really need to build these in, recognizing there's the uncertainties and these risks.

And again, I would love to have the time to go through each of these cases and talk about the kind of safety nets, because the idea is not, you know, unilateral tonsillar swelling to get the diagnosis of the exact cell type that first visit that somebody has seen. It's really to say this is what's the most likely, these are other possibilities, this is the plan, if it doesn't get better in two weeks I want to follow up.

And this is what we're going to do. But instead, you have to be the squeaky wheel and keep saying, "I don't like this, I don't like the way it's evolving, you have to be looking at it." That kind of proactive monitoring and follow up should be built into the system, not just depend on having kind of a fanatical spouse who doesn't quit, you know? And frankly, those of us at the other end that say, "Oh, she's got a crazy wife, you know, in healthcare, she's just worrying for nothing," right?

But that's not the case. So we need these proactive systems, and we're going to in the last few minutes talk about the role of HIT to hardwire this. So again, these are a couple papers, this is an Open Access paper, we did. Actually comes off of these conferences that Mark has helped organize with me. But we've put this together. And we wanted to create a series of ways that health IT could really help.

So one is tools that assist in information gathering. So what about instead of overlooking family history, there should be automatic ways that that's collected and updated online. So I don't even have to think about it or do it or take time out of my visit. Cognitive facilitation by enhanced organization and information display, so abnormal results ought to stand out in red in the flow sheets.

Whoever invented that, you know, it's a simple thing, but we ought to be thinking about getting rid of the clutter, making sure things are visible and not overlooked. Things are getting lost in the chart. This is probably one of the... malpractice people are very worried about this. There's things buried in those huge EMRs that are just overlooked. And you say, "Doctor, it's your responsibility, didn't you read the chart it's right here in your office."

Well geez, there's 20 different notes from consultants, and a recommendation is buried at the bottom of this. Aids in generating differential diagnosis, that's what Mark talked about this Isabel thing. You can go online and see this. I would say we've been very disappointed in general, you know, we've gotten a

little bit of improvement you saw, but in general, the hopes for these technologies have been disappointing and not realized, and maybe the next generation will do better, longer discussion.

Things to calculate what we call Bayesian probabilities. What is the probability of somebody who comes with a unilateral neck swelling has tonsillitis versus cancer? You could say, "Well as a rule, always consider, does that mean it's 100% cancer, or what's the prior likelihood?" I would say as a primary care doctor when somebody comes to me with a sore throat or swollen tonsil that's very unlikely, okay.

But how do we weigh this, and how do we calculate this, and how do we do this? We need some help, doctors don't do these probabilities, nurses don't do these probabilities very well in their head. Help us select the right diagnostic tests, I want to work up somebody for hemochromatosis. What's the right test to choose? I want to be able to write in hemochromatosi, not remember some genetic test that keeps changing every time I go to order it.

And Epic won't even let me find it anyway because it's so horribly unfriendly. Enhance guidelines to diagnostic reference information. So you know, this idea about being able... hematuria, what's the differential diagnosis of hematuria? I should look up an up to date, or what's the work up for hematuria? Is it after two weeks, or six weeks, or you know?

So doctors are using these tools but they ought to be made easier in the workflow. In fact, I shouldn't even have to look up hematuria I just highlight the word hematuria and information should come up like we do with drugs these info buttons. Tools to facilitate reliable follow up. So I want to see somebody back and they don't come back, or a result comes back there should be tools to make that easier.

There are some that are being developed, but this is a very underdeveloped state of the art. In fact, right now the EMRs are probably making it harder than easier. Tools that help us with the screening, keeping track of who's due for when instead of people getting lost. Now you have to do mammograms every other year, or Paps every three years.

I mean who can keep track of that? Yellow Post-its in people's offices? This will have to be automated. Facilitate diagnostic collaborations. So I can just push a button and say, "Look at this rash, what do you think? Do you want to see this person? No, that's nothing," reassure them.

And then systems that actually give us the feedback. So again, I'll give you some examples... and clinical documentation should be part of the solution rather than the problem. Now we think of clinical documentation sort of the paperwork to sort of clean up after the job is done, you know? I was just doing a note on a patient this morning but you know, the CYA, okay.

But really it should be a canvas for your assessment, that's what CYA. It should be the time when I space where I can think out loud what I think is going on. What is the differential diagnosis? What is the likelihood? How certain am I? You know, am I pretty sure? I'm really not sure what's going on with the etiology, what's the urgency?

This ought to be what we're kind of thinking out loud. And so the next person to come along could say, you know, "You dummy, this is obviously something you didn't consider it," but at least they could know what I was thinking instead of me saying, "Yeah, I was thinking of Coccidioidomycosis, but I just

didn't write it down." But we should figure out how to do this in a way that doesn't take too much of my time.

I don't have to write a Russian novel here, but these assessments... and by the way, the assessment is buried way down in the bottom of the note just even to scroll down. Some people come in for URIs and they have 11-page notes in my clinic, an 11-page note for a URI, well you copy and paste the old stuff, all the problems are there, you can't even get down to the assessment, it's so many clicks down to get to the assessment.

I started writing my assessment near the top, but my notes are a mess, I'm not in any way claiming, but we need to think of this clinical documentation. This is one thing that's being done now in Cerner and I think it's now hooked into Epic, where when you start typing your... it says patient is 20-year-old with target shaped legions and eschar, it starts generating a differential diagnosis hooked into Isabel.

And here it is blown up. So here's a differential diagnosis, Lyme disease, and tularemia, you could say this is all kind of rare things, but you know, eschar is sort of an unusual skin lesion. So this will help me, this is kind of trigger so I may at least consider some of these things. And then this red flag is sort of a don't misdiagnosis or frequently missed diagnosis.

So the last thing I think we'll talk about is open loop versus closed loop systems, all right. And diagnosis it turns out violates a basic engineering principle which is we need closed loop systems. Like you have a thermostat in your house, and you turn on the heat and then when it gets to be 72...we keep our house at 55, by the way, trying to save the planet single-handedly, my wife and I walk around shivering, but this is in the winter, yeah.

But you know, if the thermostat turns off when it gets to be 72, and then when it gets colder it turns back on. Diagnosis, we make these diagnoses, we don't keep score, just the way Mark said, nobody really is keeping track of how many of these things that we're calling lung cancer turn out to be Coccidio. And what were the features that should have told me.

So one analogy is this is an open loop system, this is a sprinkling system. The water goes out on the same time each day regardless of whether it's raining or the lawn is flooded, rather than something that knows that the grass needs to be watered or doesn't. So that's what diagnosis is. We've really tried to emphasize this, in fact, this is like a little debate I was having with Mark and Edith Burner [SP].

I don't know if Mark remembers, we went down to Florida and we... Is it because doctors are overconfident that they were making diagnostic errors? And I said, "No, it's because we're not getting enough feedback on what we're doing, and learning, and help." Again I'm oversimplifying all these discussions, but I think you see my point here. So it's to keep in patient safety. First of all, it structurally says that the patient has a role to play because the only way I'm going to get this feedback is from the patient, you know?

Did that thing in your throat go away or is it still there? There's no way to do that without it actively involving the patient, and you know, the family and the partnership is necessary. It conveys a message to the patient that you know, I don't think this throat thing is anything more than just a simple tonsillitis, but we're going to keep the door open, we want to follow you up.

You know, there's a differential, there's rare things it could be, I don't think it's that, turns out it was something more rare. It allows deployment into the most important test we have in medicine, which is the test of time. So everybody who's come with a sore throat does not...even probably even unilateral sore throat, does not need to be worked up with a needle biopsy and an MRI of the neck that first visit.

Let's see what happens in two weeks it's going to be gone in most cases, three weeks okay. But we shouldn't have to wait three months, okay. And then another three months. So it allows deployment of test of time, more conservative diagnosis. We're going to talk about conservative diagnosis this afternoon. In fact, you're going to go away saying this is Dr. Schiff he's talking out of both sides of his mouth.

On one hand, he's saying don't miss these things and work people up, on the other hand, don't over test and don't over treat. So we're going to have to strike a balance there. It enables a differential diagnosis. So emphasizes a disease or dynamically change over time. It emphasizes this need to learn, right? Because the only way I'm going to get better is to get feedback.

You know, I am a tennis player or a guitar player, you know, somebody has to tell me "You're not doing this right." We've got to get feedback on that. And mainly it makes the invisible misdiagnoses visible. So let me give you just two... we tried to do this in various ways. We had an M&M conference where we tried to give upstream feedback to...this is...

I guess I can say this, is Lowell Hospital, sent somebody in with a spinal epidural abscess, and she was paralyzed by the time we saw her. This woman will never walk again, and they didn't even know this happened. She turned up in their hospital for back pain, she didn't even have a CT scan of her back.

I said you know, "So did they do something wrong? How did they miss this diagnosis? Well, it turns out they did it of a lumber area and she had an epidural abscess in the thoracic area. You could say, "Well did they do something wrong or not, did the patient not tell them where the pain was?" Interesting one more case let me just... I could go through one, this an autopsy feedback. So we talked about how autopsies are rarely done, how often... so this is somebody who was in the hospital for three months, and they had a fever, and nobody really knew what the fever was.

You can imagine they got all sorts of antibiotics and you know, they were a little bit of a compromised host. So we went back to 32 doctors who took care of that patient, and I'm not talking about somebody who got called in the middle of the night to give Tylenol for a fever. This is the person who had the person on their service for a month. This is the infectious disease consultant who followed them for two weeks.

32 consultants who... Turns out this person had disseminated CMV infection. So how many people learned of what they actually had, seven out of 32, so those other 25 people are walking around saying, you know, "I always wonder what happened to that patient," or maybe they thought, "I'm sure that person had disseminated TB, and we just didn't pick it up."

Now, this doesn't prove... excuse me, wrong thing here. You know that doesn't prove what you should do on the next patient that has an unknown fever, certainly, you should be considering disseminated

CMV. But the fact that nobody got any feedback on that was a real problem, an issue. So we did this with some outpatient visits, we called people after they...we use IVR, this is this robocall thing which we'll never use again, it's just a very difficult technology.

And you know, 16% of patients with acute problems had not approved, how many have they called back and told the doctor, only 38%. So like two-thirds of the time, the doctors, the clinic, the nurses are in the dark about this failure to improve. They didn't even know that this neck thing... I mean, did this doctor who initially said tonsillitis, did that doctor ever get the follow-up?

If you're going to an urgent care center they'll never follow up, that doctor will never even hear about their mistakes. So I'm conscious of the time, the only thing we haven't really covered in more depth is really the role for the patient because we think that's really important, and we emphasize this lot in our society for improving diagnosis. In fact, we have a whole committee related to patients and advocacy and people of experienced diagnosis, and the way everyone here lined up at the microphone, a number of you, you know, just tells us that the patients really have a lot to tell us and they're going to be a vital force in making change.

So patients have to push for timely access. How many examples do we hear in our cases of, you know, you go back, tell the doctor this doesn't make sense. Why is he sitting here in the waiting room for these...minutes are counting, these life-saving minutes. So whether it's in terms of minutes for acute things or days or weeks for more urgent things, less urgent things.

Reliable follow up, so the patient, [inaudible] and said, "I'd like to see you in two weeks and see what happens with your throat." The patient just doesn't bother to come back or can't get in, you know? Again you start getting this it's the patient's fault, or the doctor's fault, there's no win to thinking about that way. What we really need to do is we need systems that allow the patient to have access.

Be a keen observer, person says, well...accurately saying what's going on helps us, tell me that you just came from Africa, or you just came from Arizona. I mean if you don't tell me I'm not going to consider Coccidioidomycosis, right? I mean every patient with lung cancer, do I do a complete travel history? I don't think I do, but by the way, doc, I lived half the year in Arizona.

Sharing hunches. You know, I just read on the internet there could be this weird thing now half the time the patients are getting completely misguided, but I think that's important for me to hear from the patient, and hear their hunches, because sometimes they're right, they help me think about this, reading on their own, hearing trial [inaudible]. So this UTI if you never even took the antibiotic and the urine...

I just need to know that you actually adhered to the regiment so I can interpret correctly the response, etc. Being patient, agreeing to disagree, helping with communication. And the final thing is actually getting involved with patient organizations, so we can advocate for change. So the key question is what will it take at the provider and the institution level, to support these roles and help them flourish?

So that's it, you know, this is the patient's concept, the patient's nothing about us, without us, is for us. So we're going to all have to be in this together everybody on the healthcare team and the patients' families. And this is actually...I don't think Mark has seen this, this is an editorial that's going to be in the Journal of GeneralInternal Medicine. So this is a sneak preview you can't...

and it actually is a little bit of a kind of like a little mini-controversy related to an article that Mark wrote about creating metrics. And we said, maybe yes, metrics but maybe not as important as creating a culture around diagnosis safety. So again, these are all points that have been made widely but just as a sort of a consolidation or re-emphasis.

So number one driving out fear so no one is afraid to ask questions. So that's the nurse's role speaking up, questioning the diagnosis, sharing when things go wrong more widely with other people. So dealing with the adverse events, replacing fear and blame with learning and improvement. So number two, an organizational commitment to improving diagnosis.

So organizations have to roll up their sleeves and say this is something important, we reckon that the leadership knows, this is the number one cause of patient-reported error, and what are we doing about this? This has to be sort of a top-down organization-wide effort to learn from diagnosis and improve the diagnostic process from A to Z. I had some process problems with Hyatt today, one of the reasons...I just had to run up to my room, in

[inaudible] because I called the manager from the hotel desk to come up to my room to both see what I experienced as a customer, and it was around two things. It was around getting here on that shuttle, and I don't know if other people had trouble finding the shuttle center and I missed two busses, it was really kind of a nightmare. I was there at door one and the bus pulls out because they're parked somewhere else.

So that was one so I thought that was it, but then when I finally arrived in my room last night at 11:30, 11:45, and the TV didn't work, the telephone didn't work, there was nowhere to plug in my computer. And I just thought somebody should just come in and experience what it was like... you know the usual thing.

I couldn't figure out how to turn the lights but that's just normal in a hotel room, right, where you're stumbling around in the dark. But put yourself in the shoes of the patients and see what the diagnostic process feels like from a leadership this should be reporting, and curiosity about what could go wrong. And again, these are points we made. And this really an obsession with the details of diagnostic process, what can go wrong, what are the limitations of these tests.

And then the last ones are recognizing that uncertainty is inherent, we're going to talk about that in this next hour. Everywhere really in the test in the way illnesses present and evolve, and what are the pitfalls. Respecting human limitations. This is taken from the Institute of Medicine, first report the To Err Is Human. I suggest everybody go back and read chapter eight of To Err Is Human. They basically say, you know, what are the ways that human limitations cause errors, and I think we really haven't come that far in 20 years, but the need for supporting the cognitive process and redesigning EMRs as we said, and then the enhanced role for the patient.

So if you could go to number 170 now, so that's I guess to sort of transition, consolidation. Re-emphasis of the culture is so important and people say, "Well, culture is this sort of feely-dealy thing, we can't measure it, we can't improve it," but I would disagree I think both are true.