*Interviewer:* Okay. Great. We are interviewing stakeholders to understand the determinants of implementation of lung ultrasound. You have been asked to be interviewed because of your role in lung ultrasound implementation. Interviews will be de-identified, recorded and transcribed, analyzed. Do you consent to being interviewed?

*Interviewee:* Yes.

*Interviewer:* Great. What is your professional title and job description?

*Interviewee:* Yep. I'm a hospitalist and division head of hospital medicine.

*Interviewer:* Okay. What is your role in lung ultrasound implementation and point of care ultrasound implementation?

*Interviewee:* Yeah. Well, it's always funny to answer these questions

*[Laughter]*

it's to support our directors of ultrasound in their implementation. Then I personally find value in it both as a clinician and then as a leader. I think I have like over, gosh, 15 years, sadly experiences in attending and I've seen that increasing importance of it, I guess. I think my role is to hopefully help support those efforts, support our people and ultimately, I think our patients is to witness in the end so—

*Interviewer:* What external factors impact your decision to invest in POCUS as a leader?

*Interviewee:* External factors like beyond the university or?

*Interviewer:* Yeah, beyond university, like what's happening nationally that influences your decision to invest in this endeavor?

*Interviewee:* Yeah, it's a well-known national trend. I think folks that we have here obviously on the front end of that. I think there's definitely a national push, there's more ultra-sound talk now than ever. I remember when I first started as an attending it really wasn't a thing, not at least at Denver Health where I first worked. People would do it a little bit and then I think increasingly there were certain leaders who wanted to start to advocate for us such that you can feel that there's a movement of sorts to implement ultrasound I think in the hospital's world, there's certainly more papers. I think we have an advantage because of the research we do. You know what I think? My dream is to just really be a part of the best hospital/hospitalist group in the country. I think outstanding care, I think it pairs with ultrasound. I personally as a very conservative provider. I like to know what my patient has, the second that they have it, I don't like waiting. I think that exquisite care that we want to be able to provide, I think helps with that. Then I think also, when you think about clinical decision-making and any little bit of tools that you can add into that to help augment that, I think it just goes to the words that total reputation of all of our mission areas really.

*Interviewer:* Do you see point of care ultrasound is becoming standard of care and in the future, is that different people have asked different expectations with regard to that? Is that something in terms of you, you have some experience with it as a clinician you've heard the conversations about it. What is your expectation of the role of point of care ultrasound in hospital medicine and clinical medicine in the future?

*Interviewee:* Yeah. I just assume it eventually becomes like the stethoscope and maybe it is the stethoscope. *[Laughter]* I'm sorry, it's dual functioning. I think the main thing is that ultrasound is now gotten a lot cheaper and accessible to people and so I think that's a big part of it. Whereas before it felt like you had to have like these big machines that cost a ton of money that not everybody could have.

I think the second you start to make it affordable for people available where ideally everybody has their own, people at least can get it that day without hassle. 'Cause I think anytime you have a component of hassle, it's not going to necessarily be implemented as easily. I think just the accessibility of it all and then it just keeps getting cheaper and then the image quality keeps getting better. I think those are the things that help make it where it would be. You could just go on Amazon and buy your own ultrasound for hopefully $500 or less.

*Interviewer:* Yeah. As a division head in an academic center, you have a lot of partners you have to think about and you have to think about their priorities. When you think about the priorities of the education and clinical education, how do you think that, that partnership—how has your decision to invest or not invest, how is that affected by that partnership?

*Interviewee:* Yeah. I would say that at least here people are very supportive of the ultrasound. Jeff Connors, Emily, Julia, I think they're very supportive. I think it's, again, that feeling of it's a movement as in, it's not been fully rolled out, but they are very supportive of different faculty members, not only just here, but there was an effort that I think got squished a little bit with COVID, but there was going to be an effort which I think shows that there's like that investment potential. I think from my own personal perspective the thing I've personally grappled with over time is we'll have folks from the outpatient sector come in and do attending. I think people often, at least in my career have thought that that is equivalent, like hospitalists and somebody who comes into the hospital a couple of weeks out of the year that equivalent.

I think both groups bring a very unique skillset, but I think where hospitalists can perhaps differentiate ourselves 'cause to me, I look at a hospital medicine as a specialty and then to be told that, "Well, people can come in two weeks out of the year and you're equally as good and you don't actually add any more value than the other person."

I think each group brings something different, but increasingly, so what we bring is I think ultrasound because more and more people are implementing it in their regular practice. I think the clinical decision-making part is the other key piece that I look back at my own residency. Those things were just not taught and if you're not in the hospital day in and day out, you will not have that skillset. For me, I think it's a great differentiator of our specialty when you think about what are the unique skillsets. If that's the unique differentiator, then that is a skillset, which is valuable to learners.

*Interviewer:* Yeah. That's great. Then in terms of our other big partner for our division is their hospital. What are their priorities and how does it align with POCUS from your perspective?

*Interviewee:* Yeah, I think that's a good question. I think POCUS is not—I think it's on their radar. I think it is not obviously a lot of things have just been—it's been a purely chaotic here. I think everybody has been on survival mode. There's definitely been a lot of attention briefly for sure this summer on financial. It squashed those conversations; I would say a little bit. I think if you were to say, do you think ultrasound is important for patient care? Does it help?

They would wholeheartedly say, yes. Can we get ultrasound machines? They've supported that clearly. I think if we asked for more and needed more. I think we could get that. I think what needs to be more shared with them is a big vision of how it could impact really the whole health system. I think because that's how they think increasingly.

Is like we're a big health system, we're not just one hospital, and so I think we were starting these conversations like a year ago, or whenever it was. Then it just clearly it was not gonna get the traction because there were just so many other emergency needs, but I think circling back to that proposal that we were building like, here's what this future could be.

I don't think they're gonna say no per se, I think that case needs to be built though for what it adds, not only to that health system, but how do you bring that to patients? What's the value from a patient perspective or a patient flow perspective? I would say in general, the hospital is generally supportive of things, if you can build a good story to it.

*Interviewer:* Yeah. When I was talking to some other people who talk a lot with administrators or the administrative themselves, they talk about the priorities and the perspective of the people making decisions about programmatic things like this is obviously patient care. Evidence of improving patient care, evidence of increased efficiency,

and financial impact on the hospital, and patient satisfaction and then national reputation. Those are some of the priorities I'm hearing about some of these people who are gonna be making programmatic decisions. Do you agree with that in terms of their main priorities or things that they think about when they're making such decisions?

*Interviewee:* Yeah. I think 'cause a financial discussion always takes a big place in all of this. When I've looked at the outright cost beyond people's time, I'm not sure the infrastructure part, that to me, when you're looking at the budget, that at least our health system has doesn't feel that big, but I think the time that support obviously is probably the trickier part to work in for people.

Yeah, I think all of those factors play in, and I think depending on which type of leader or administrator those are weighted more heavy than others, but I think they'll all have to be considered. I think if you were to say, what are the top three, just like at a high global level, ensuring that it does improve patient care, which I think we believe it does, that it expedites care, which I think is also patient friendly.

Then for a system that runs more than capacity a huge priority, you see a lot of effort around that and so I would say that's up there. Then the financial part, just because I think if you actually improve patient care and you improve patient flow, the financial gains on those two actually, are so much bigger than the other stuff that we're talking about that I think the financial considerations important, but looking at it in a perhaps different way than we normally say, "Oh, as a hospitalists you cost X amount of money and you bring in X amount every time you do an ultrasound." I think that's like icing on the cake, but if you can reduce a hospital's

stay by a day or prevent readmissions or move a patient's hospital cost more quickly and hopefully in a safer way, to me, that's where the bigger financial gain is. I think framing it in that context, which financial people don't like to do, but to me, the numbers are much bigger in that context actually than just, this is how much you could bring in via ultrasound.

*Interviewer:* Maybe this is an opportunity for you to explain to me why their perspective on cost is so narrow as opposed to a little bit longer term, since it seems like that they would want the most accurate assessment of costs longer term since they're trying to make a sustainable enterprise. Do you have a sense of that? That's something I struggle with understanding where that's coming from?

*Interviewee:* Yeah. I'll just say it's not unique to a specific institution. It's been my whole career when I've had to do budgeting stuff. I think it's the easy math, right? It's the direct math where, you know for sure a hospitalist costs X amount and you know for sure that this is what they bring in. It's just very direct, easy math. I think then when you're saying, well, you improve length of stay, and maybe your paid based on a DRG or something and so if you can make it shorter, or more efficient, then you get more money for what you've done.

Whereas if it's a lot longer, perhaps you're not bringing in as much as you could. I think it's just a harder, more indirect math that like, you need almost an economist to help with. I've talked to Angela about this. I was like, I just wanna do a programmatic evaluation and with a deep dive from this perspective that it's not just how much we cost and how much we bring in.

The whole hospitalist model has been built on better care, more efficiency, but it's really hard math and then I think just as institutions have more pressures for sure financially, it's just hard to take the time to see that. As a provider, you feel it, right? 'Cause you're just like the burnout, the stress of your job. I think that has a cost to it as well. Yeah, this is like my whole life's *[laughter]* work project.

*Interviewer:* Do you think spelling it out? 'Cause one of the things I'd been thinking is that if we knew a little bit more about that stuff and we're able to build more convincing arguments around that, if that was part of our skillset, then maybe that would be the way to show them why we think that that's a better approach to thinking about things. Do you think that that's something worth investing in?

*Interviewee:* *[Crosstalk 14:35]* Well, it's gonna be—this is like the research that we do more at a program level not specific to ultrasound and my bigger interest is around workforce and ensuring safe patient loads and things like that. We built a financial model actually looking at when the census rides high, what does it do to length of stay? We actually showed just similar to a paper that was published around 2011, 2012, that the length of stay goes up as your starting census goes up.

Then when you look at the costs then per patient, you can imagine that if you could actually get those patients discharged, then you could actually bring in then new patients, you wouldn't have to turn away patients. We actually showed like a cost savings, or even the potential to bring in a lot more money. It was not given much attention and I was just told nobody likes that math. *[Laughter]*

*Interviewer:* It wasn't given much attention by like the academics or wasn't given much attention by the people making the decisions?

*Interviewee:* That's about everybody I talk to. You know what? We need a movement on this and we actually have a really fun paper coming out at the end of this month that gets at this a little bit, but we're gonna just start paper, project after project, and we're gonna get at it one by one to build the case that this is not the right thing.

It's not the right thing actually for the institution either. I think you can actually have it—everybody can win, providers cannot be crispy, patients can get better care, and your patient flow problems, you know what? We're hitting our heads against a wall because they're like discharged sooner, discharged faster, yet they wanna incentivize or tell us to see more patients. I'm like, those too are *[laughter 16:24]*

*Interviewer:* They're mutually exclusive. Yeah. There's only so many. Yeah. Exactly. Okay. That sounds like a related, but a big problem that is an entity in itself.

*Interviewee:*  It's international.

*Interviewer:* Okay, but good to know where to put your efforts in terms of what's a short-term strategies and longer-term strategies. What do you see as the potential pitfalls to POCUS implementation from your perspective?

*Interviewee:* Pitfalls, I don't know that there's anything negative per se. I think it's just finding the bandwidth and the way to incorporate it into people's daily work. How does it become so ingrained in your culture, I guess, and then thinking about what people don't have right now is just added bandwidth, I think. How do you start to build those things?

I think you could say it's like ultrasound, it could be research, it could be whatever it is that you're trying to integrate into a culture. I think it just has to be very present in everything that we do, and that it's a clear important part. I don't know that there's a negative thing.

I think it's just, how do you in the middle of a lot of chaos add another thing to people's plates and hopefully the chaos is gonna die down, but you can feel when I talk to people that they're just like, I can't take one more thing. How can you integrate it into daily work in some way to with small little bits help with it? 'Cause the one thing I would stay just thinking about just my own career and how I could incorporate it into the work I do, have just about zero free time.

I'm running negative hours if I could just like sleep less or something, but I'm personally really interested, but it's like soul crushing to have to go to a conference for many days and then pay for it on the back-end with trying to dig out of all the stuff I'm supposed to do. Then frankly, I just never can protect a whole day anyway. Even when I go to like SHM, I don't actually walk away from work. I'm still working and I go network and I don't attend any meetings whatsoever. That's my life.

I think we have a decent number of people in that same situation. It's a number of mid-career people who have other things that's just really hard. Then on the flip side, our younger people are so highly clinical. It's like, how do you work in yet another thing? I think that's the tricky part of it. I don't know that there's a negative downside to implementing ultrasound. The ultrasound machines are increasingly pretty cheap. It's just getting the skillset. Then I think the quality control part of it, is the other big beast to ensure that it's like a okay and if we're doing a good job, so it's just like, I think that infrastructure can be challenging, but hopefully not insurmountable, I guess.

*Interviewer:* Great. Besides the folks that we've already talked about, what other disciplines, like, who else are we collaborating with or who else are the stakeholders besides the learners, the education folks, the hospital, who else are we collaborating with in this? An important—

*Interviewee:*  Specifically, or people to think about—

*Interviewer:* Yeah. People to think about in terms of getting their perspective and their input on what we're doing.

*Interviewee:* Yeah. The only thing that I find really interesting about ultrasound is it feels sometimes there's a lot of territorialness. I think in thinking about that, like who are our partners that we don't want to have territorialness with? Radiology, like the cardiologists, anybody who does that kind of thing, even across our own sites, thinking about how if we want everybody to share in this, then we should be arms wide open. How do we all participate? Not also at the same time either take business or have this sense of loss or whatever. I think that's the delicate balance here that I find just really interesting.

*Interviewer:* I think we're in a time—my personal sense is we're in a time and place where I'm not feeling a lot of territorialness with my subspecialty colleagues and in fact, for instance, radiology has been incredibly supportive of this work and actually encouraged it to an extent or some of them have. I'm wondering if you have experience maybe at DH or here. 'Cause I really haven't yet?

*Interviewee:* Yeah. I would say just thinking about a few of the meetings, we've just had where I'm like, you can feel it a little bit. My hope is that radiology is not gonna feel like somebody is taking you something or that the collective educational efforts are shared. I just—

*Interviewer:* Yeah. It's subtle. I know, definitely. I guess I'm so used to resistance to that level, I'm like, "Oh, they'll be okay with that." It's not like a hard stop, but yeah, you're right. *[Laughter]*

*Interviewee:*  Defiantly not a hard stop, but you can feel the tension. It's just something I've noticed.

*Interviewer:* Yeah. Yeah, but nothing like where you're seeing big boundaries being raised per se, just kind of disease with it.

*Interviewee:* I just think people are very sensitive to it.

*Interviewer:* Yeah. Yeah. Okay. That makes sense. I get that. I'm trying to think. I guess, what would you like to see as a program director, what would you like to see for our division and with POCUS locally, nationally in the next 10 years. What ideally would you like us to accomplish, and then what do you think we can do? I guess.

*Interviewee:* Well, I've no doubt that whatever we decide we wanna do, we can do. It's not the ability part. Well, you personally—I love that we built that SHM conference and obviously once we can start doing that again. I'm sure that will come back. I think that's great for a large immersive experience. I think the other thing to think about is the people who feel that they have no bandwidth for whatever reason. How do we infuse that ultrasound, where it's constantly at the back of your mind, constantly part of our culture?

One guy just like these little small nuggets of educational sessions. Just like even an hour or less where you can say, "Hey, if you're on service, come we're gonna go scan people." Maybe it's like a handful of your crew where you just literally take people and everybody grabs an ultrasound, so you can get familiar with it if you're not. Take away that barrier, where do you find ultrasounds? We're just gonna go scan it.

We're gonna do real-time learning and discussion. I think those little small little tidbits, constantly throughout the year, well, can it elevate that culture of like, "Hey ultrasound is what we do as a division." I think that would be incredibly powerful. I think thinking about then what's an easy path to getting certified and easy being low barrier obviously you wanna have a standard, but how do you make it really accessible? How does every single person, if you walked up to any division member, would be like, "If I wanted to do this, I know how to go about doing it."

Then I think the other thing, you had alluded to this that could have been just an email. How do we incentivize people? I think if you lower the barriers to learning, I think I've never been a big believer, like I read the end-pink and stuff like that. I think you have to be very careful with incentives.

There are some incentives that already exist. You can use this for clinical excellence, for promotion that already exists. That's really easy to do. The scholarship, incentives that the department of medicine built. You can build that into the clinical excellence piece where you could argue really easily. Like Lee and I *[laughter 25:21]* like, look at those documents so and we're not gonna fight it. That can count towards that incentive that should come back hopefully this year depending on what happens with COVID. I think there's small incentives that people may just not even be aware of to be what I would personally gain is like, I can maybe be a little bit more efficient clinically. I could worry less probably the biggest thing, actually. I think at some point all the younger folks actually are gonna have the skillset and when you're on teaching, they're gonna be like, "You don't know how to do ultrasound."

*Interviewer:* Yeah. No, I think those are all good thoughts. Thank you for that. I'm gonna turn off the recorders and then we'll just continue that. That's a perfect segue to our next conversation. Thank you.

*[End of Audio]*

LEGEND::=> TOP LEVEL COLOR IDENTIFICATION  
Multi-level organizations Characteristics-creating an environment (infrastructure) for encouraging spread :  
Multi-level organizations Perspectives/Values -sharing best practices; observing results and adjusting processes accordingly:  
Implementation and Sustainability infrastructure- facilitating use of the intervention; -ensuring adaptability of protocols that fit the multilevel context:

LEGEND::=> SUB LEVEL COLOR IDENTIFICATION  
Value equation: quality/cost/efficiency/patient satisfaction (Hosp leaders-background for implementation):  
credientialing /quality assurance infrastructure:  
Finanicial Impact:  
Health System characteristics (academics; bed capacity also):  
Clinical utility & efficiency-Provider perspective:  
Workflow (with subcoding [bolded]: access equipment, order vs encounter-based; uploading & saving images; type of equipment. End user need to acquire and use:  
Provider characteristcs:  
training:  
Patient/Physican interaction in LUS:  
Imaging modalities in general:  
Clinical utility & efficiency-Provider perspective:  
Value equation: quality/cost/efficiency/patient satisfaction (Hosp leaders) High-value care (providers):

SUMMARY:  
**High-level label counts:**Multi-level organizations Characteristics-creating an environment (infrastructure) for encouraging spread : 4  
Multi-level organizations Perspectives/Values -sharing best practices; observing results and adjusting processes accordingly: 2  
Implementation and Sustainability infrastructure- facilitating use of the intervention; -ensuring adaptability of protocols that fit the multilevel context: 4  
 **Low-level label counts:**Value equation: quality/cost/efficiency/patient satisfaction (Hosp leaders-background for implementation): 0  
credientialing /quality assurance infrastructure: 0  
Finanicial Impact: 4  
Health System characteristics (academics; bed capacity also): 0  
Clinical utility & efficiency-Provider perspective: 0  
Workflow (with subcoding [bolded]: access equipment, order vs encounter-based; uploading & saving images; type of equipment. End user need to acquire and use: 2  
Provider characteristcs: 4  
training: 0  
Patient/Physican interaction in LUS: 0  
Imaging modalities in general: 0  
Clinical utility & efficiency-Provider perspective: 0  
Value equation: quality/cost/efficiency/patient satisfaction (Hosp leaders) High-value care (providers): 0  
 **Most Occurred High-level Label:**Multi-level organizations Characteristics-creating an environment (infrastructure) for encouraging spread : 40.00%  
 **Most Occurred Low-level Label:**Finanicial Impact: 40.00%