Academy of PHYSICAL MEDICINE

Transcript

Diagnostic Ultrasound for MSK Therapies With Chris Myers

Cast List

Steven Bruce	SB
Chris Myers	CM
Rick Calder	RC

SB: I have with me in the studio, Chris Myers. One of the unusual breed, who is not only an osteopath, he's also a physiotherapist. He is also a certified sonographer, and has a lengthy background in training osteopaths, and others, in the use of ultrasound, which is, of course, why we've got him here. Ultrasound is a vastly improved technology, from what it was when I first encountered it myself, about 20 years ago. Probably changed drastically since you last looked at it, and it'll be fascinating, for us to see, how it could improve our clinic outcomes, or just improve treatments, generally.

Chris, it's great to have you with us.

CM: Thanks for having me.

SB: So, I've given you a little bit of a background there. Tell us a bit more about yourself, and why I should be having you in here to talk to me about ultrasound.

CM: Well, first of all, many thanks for inviting me. I'm Chris. I'm a physiotherapist of nearly 20 years now. I'm also an osteopath. I got interested in diagnostic ultrasound about 10 years ago now, when I was working in a department where we bought an ultrasound machine, and there was three or four of us that started using it. Quite quickly, I realized it was something I wanted to take further, and I use every day in my practice now. I'm very passionate about osteos, chiros, physios learning diagnostic ultrasound, and adding it to their clinical repertoire.

SB: That's the point I didn't make, isn't it? Because I said ultrasound, and many people think of ultrasound as an interventional therapy, but we're here to talk about imagery this evening.

CM: Yeah. So, very much nothing to do with therapeutic ultrasound. This is looking inside the body using diagnostic ultrasound.

SB: You've seen massive changes in ultrasound yourself, over the years.

CM: Yeah. I started about 10 years ago, as I say, and even the machines in the last 10 years, have improved massively. So, the picture that we're getting is much better than it used to be. However, if you don't buy a very good machine, the picture still isn't very good. So, having a good machine, and the way the technology's developed, has really improved what we've been able to use it for.

SB: We're actually quite lucky this evening, I think, only because you've brought in one of GE's state of the art, top of the range clinical ultrasound machines.

CM: Yeah, exactly. GE have a good array of machines. We often use the Logiq machines, because they're very portable. You can have them in clinic, and that's what we've got this evening.

SB: Yeah. About five years ago, I remember, we had somebody come to visit me in my clinic, I think it was before we started doing these Academy broadcasts. They were very proud of the fact. They said, "Well, you know, ultrasound has now come down to about ...," I think it was 3-5,000 pounds for a portable, clinically usable imaging device. I was on the point of buying this thing. I thought, "Well, this is going to be fantastic." It was going to change everything we do in the clinic. And I suddenly realized, I looked at this, and all I could see was a fuzzy white screen of nothing particularly relevant. I don't think that was a complete reflection of my lack of anatomical knowledge, although it might have been something to do with that. I just thought it sounded great, but if you weren't a sonographer of huge experience, you're never going to know what it is you're looking at.

CM: Yeah. Well, the machines have developed a lot. For 3-4,000 pound, I would be cautious of purchasing that machine, because like any technology, I think, generally, the more you spend, the better machine you'll get. Generally, if

you can spend around 8-10,000 pound, you'll get a good machine. You can buy a machine a bit cheaper, but often, particularly as you get better, and you rightly say, that it does take quite a long time to learn this, and it's a very operator-dependent modality. So, if you're not very good at it, you're not going to gain the information that you need. And if you don't have a good machine, it makes it even harder.

So, yeah. For me, I'm very biased. I think the first thing to do is, to get a machine and get started. But, if you are going to buy a cheaper machine, you need to be aware of the limitations of it. For example, if you're looking at the lateral hip, or the anterior hip, which is slightly deeper structures, or even the proximal hamstring, those machines are going to really struggle. But, maybe for looking at the achilles or the patella tendon, which are more superficial structures, then maybe that machine was going to be okay. But you have to be aware of your own limitations, which is really important, but also, the limitations of the machine that you buy, or don't buy, as the case may be.

SB: Yeah. We'll look at the machine you brought with you, later in the program. But, how deep can it reliably scan?

CM: The machines go to about 10 centimeters, but reliably ... Most of the things we look at in musculoskeletal, that come in to a clinic, are probably anywhere from nought to four centimeters. These machines will have really good spatial resolution, so you'll be able to get a good image. But, anything over four centimeters, you're not going to get such a good image, but you can certainly see it on the better machines. As you go over six centimeters, it gets difficult, and that's when you may need some other imaging modality, such as MRI. The great thing about ultrasound is, it's in the clinic. You do your clinical assessment, and straight away, you're doing your imaging. I think there's a lot of bad press about imaging, quite a lot of the time, but when you do it within the clinical context, I think that's when it's most useful. Particularly, when it's the clinician, and communicating the findings to the patient. I think that's very powerful, sometimes.

SB: Well, of course, that will be in the minds of a lot of people watching this evening, is well, "This is fine. It's 15 grand. There's a lot of patients that have to be seen, or appointments I'll have to be able to take, in order to cover that 15 grand." What's it actually going to do, in terms of bringing more patients in, or improving my patient outcomes?

CM: Yeah. It's a good question. In terms of bringing patients in, I run a private clinic in London, and I see lots of patients that have been booked in, specifically because I know they know that I do a diagnostic ultrasound scan, as part of their initial assessment. In terms of looking at a spreadsheet, looking at your return on investment, I do ultrasound-guided injections, which I charge more for. I don't specifically charge for the ultrasound, despite doing it for nearly 10 years, purely because, for me, it's just part of what I do

now. It's not an extra thing. For me to get the best outcomes for my patient, I do a clinical assessment, and then I do an ultrasound scan. I now want all of that information before I make a clinical decision. Sometimes, it doesn't change my management, but sometimes it does.

SB: Interesting you mentioned guided imagery, because you came up with an interesting piece of news about CQC regulations of guided imagery, are they wrong?

CM: Oh, right. Yeah, when we were talking earlier. Yeah. We're looking at setting up a clinic, where we're going to be doing all of these procedures, and it was just interesting, that at the moment, physios don't need CQC, they're exempt for doing guided injections, which I don't think that's a very good thing. I think it would be good, if physios had to go through the same rigor, in terms of setting up the clinic, as if it was a sports doctor, because we're doing the same thing, so there shouldn't be any differences.

SB: It is quite curious, isn't it? It's exactly the same intervention, but if you're a physio, you don't need CQC approval. If you're a doctor, or any other practitioner, I presume the osteopaths, chiropractors the same, you do need to have CQC approval.

CM: I think it's going to change. I think it should change. I think, particularly in the physiotherapy landscape, but also in osteopathy and chiropractic is, people are extending their roles. I think, certainly things like CQC, which is an organizing body, it probably takes a little bit of time to catch up. I think the other thing with ultrasound, is certainly when we do our courses, it's really interesting how we get chiros, we get physios, we get osteos, we get radiologists, we get sports doctors, we get rheumatologists. I hope I haven't missed anybody else. Surgeons. Surgeons, so shoulder surgeons. I'm teaching next week, and there will be lots of shoulder surgeons now wanting to learn ultrasound. So, it's great for bringing ... There's not many other courses out there, where you bring all of those different disciplines into a course.

SB: What's prompted the change? Why were they not interested before? Were the machines just not good enough?

CM: Partly that. Because the machines have got better, there is more evidence now. For example, in the shoulder, that if you do an MRI scan, and you do an ultrasound, in an experienced operator's hands, then you're going to get the same results, in terms of how sensitive and specific it is, for a rotator cuff tear, for example. I think there's also research out there now, trying to look at this sort of one-stop clinic. So, instead of being assessed by a surgeon, waiting four months for an MRI, going back to your surgeon for the result, and then being sent off maybe for an injection, you can literally do that process in half an hour, and gain the same information. So, in terms of patient pathways, this is particularly on NHS, where I spent a lot of time

working, you can save a lot of money, but more importantly, you can save the patient an awful lot of time and frustration.

SB: But, you did emphasize how important the quality of the practitioner is in this. With the best will in the world, I imagine that most consulting surgeons, are going to be disinclined to go off and get certified as sonographers. They won't get the same experience that you've had, so are they going to be good enough, being a jack-of-all-trades, rather than just cutting shoulders open?

CM: It's a good question. For somebody like myself, I want to be able to scan all areas of the body. So, straight away, I want to scan everything, and I need to be competent at all of those areas, which is an awful lot. A shoulder surgeon will only scan shoulders. From teaching lots of shoulder surgeons, they do tend to pick it up very quickly, because they've generally got good motor skills anyway, good hand-eye coordination, or I hope they have.

So, they seem to pick it up quite quickly, and there's research to support that, as well. But, also, what surgeons have, and I think this is one of the reasons they are good at it, is because they get the surgical correlation. So, if you come to see me, and I do an ultrasound scan, and I think, for example, there's a full thickness tear of supraspinatus, if you get better, I don't really know if I'm right. Whereas, what the surgeons will do, and on their learning pathways that are suggested, but again as you said, not regulated, they can do a scan. They then take the patient in for surgery, and they immediately get that feedback. I think that feedback is an excellent way of improving your skills.

SB: Before we go on and develop that a bit further, I want to just take you back to the CQC thing, because you talked about the regulation of guided needling. What about CQC regulation of ultrasound? Is there any problem with that? Is there any regulation covering ultrasound?

CM: So, again, anybody can buy a machine. Let's start with that. Anybody can call themself a sonographer. These are not protected titles. And I think, when it comes to carrying out the ultrasound, I think the main thing to be aware of is, that whenever you carry an ultrasound scan, and you add it to your assessment, you've changed the patient's expectations of what they're doing. That's something we need to be aware of, whether, or not, CQC are involved or not. At the moment ... Sorry, could you just repeat the ...

SB: Well, I was after some indication of the regulation over the use of the ultrasound imagering.

CM: Yeah. So, in terms of CQC, at the moment, because it's very much an extension of our clinical assessment, it's seen as what we're done, we're not provided a separate ultrasound clinic service. Does that make sense? If you advertise yourself as an ultrasound clinic service, that's something different, and that does have CQC regulation around it. Does that make sense?

SB: I understand what you've said. I'm not sure it makes sense, because, surely, if you're using ultrasound to screen for anything, or to observe anything, it's the same process, whether you're purely an ultrasound clinic, or you're-

CM: I totally agree with you, but that's not how CQC currently see it.

SB: That's absolutely fine.

CM: I agree. This needs to be much more regulated. There's lots of people buying machines. There's lots of people going on two-day introduction courses, which I do run, but on those two-day introduction courses, hopefully we make people very aware of what the learning curve is, how long it takes to get a basic level of skill-up. Hopefully that comes across, because I think we have a responsibility, obviously.

What I'd like so see, in the future, if I had a crystal ball on where this will go, hopefully, we get to the point, and there is some work behind the scenes, going on, where it doesn't matter what your discipline is. So, take out whether you're a osteo, physio, orthopedic surgeon, there should be a regulated learning pathway that everybody has to do, even if it's just a basic level. At the moment, the gold standard of learning is something called a case-accredited post-graduate certificate, and that's what I did. I did that at Canterbury. That's a post-graduate certificate in musculoskeletal ultrasound. That's what we should be aiming to do.

SB: What does that entail? What makes you case-certified?

CM: Yep. I did it in about 10 months, up at Canterbury University.

SB: Not 10 months solid, I'm sure.

CM: No, no. That would be a lot. It was 10 learning, but most of the learning you do, you do in clinic anyway. You have a clinical supervisor that watches you scan. You scan with them. You audit your scans against each other, and you audit your scans against them. And then, you come up with about a log book of 250 scans, is roughly how many you need to be doing, with a mix of supervised and unsupervised, for you to get to that competency level. Then you've got some exams. You have a physics exam, which is never much fun. You attend university, I think it was for about 5-10 days, over those 10 months. So, most of it is done in your own clinic.

SB: Okay. That sounds manageable. How expensive is it?

CM: The PG cert, 2 and a half thousand, something like that.

SB: Yeah. That's a lot of money for five days, isn't it?

CM: And there's no point doing it without an ultrasound machine. Learning ultrasound, getting into ultrasound is an expensive thing to get into.

SB: So, for somebody who doesn't go down that PG cert route, talk us through the realistic process of becoming competent with the big machine you've bought on eBay yourself.

CM: Yeah. The PG cert is what we would call a formal competency pathway, and that's what we should aim for, but there are actually informal competency pathways. There's articles out there, there's ones in rheumatology, there's one from the shoulder surgeons, and sonographers, that give a slightly ... It's not alternative, that's the wrong word, but another way of doing it. Essentially, what it means is, you need to buy a machine, stage one. Stage two is attendant introduction course. Get lots of learning resources, so books. YouTube is excellent for looking at videos. There's lots of good videos on there.

A lot of this is self-learning. This is a question of having a machine, scanning your family, scanning your favorite patients, and getting better at it. It's a motor skill. If you don't pick up the ultrasound machine and scan, then you're never going to get good at it. Alongside that, I would always suggest you aim for 250 scans in a log book. That could just be you in your own clinic, an achilles tendon walks in, you scan the achilles, and then you write a report as part of your clinical assessment. Over time, it might take one, two years, you get 250 scans together, which is what the Royal College of Radiologists level one would expect, what the faculty of sports and exercise medicine expects, and what a post-graduate certificate expects.

SB: Level one being the lowest level or the highest level?

CM: Yeah, lowest level. Still a reasonable level though.

SB: Yeah. Yeah.

CM: And then, at some point in those log books, you need a way of auditing some of your scans. So, either you get somebody to come in, and they scan with you, or you get MRI scans that you can correlate it with, bearing in mind MRI's not necessarily the gold standard, or you can go on supervision pathways. We run a course called the mentorship program, which is at the BSO, which is now the University of College of Osteopathy, and you can do supervised scanning with us there. But, you need to have a log book. You need to have a way of knowing whether some of those scans are correct. You won't be able to do all of them. The issue is, if you go through, do 250 scans, they could all be wrong if you haven't gotten some sort of way of auditing that process. So, that's the log book. Then, at the end of that, in my opinion, there needs to be some sort of competency exam. Somebody needs to watch you scan.

When you watch somebody scan, it's like somebody playing the guitar. If you watch somebody play the guitar, and they're rubbish, you can see that very quickly. It's the same with ultrasound, because, essentially, it's a motor skill, it's a probe skill that you have to develop. People always ask me, how long does it take? It is a bit like, how long is a bit of string? You probably do need to get up to a couple of hundred scans. You probably need to be scanning two half-days a week, and I would say it takes about a year to get to ... That is a basic level of competency. You can go with the informal pathway, but it has to be documented. You have to have your evidence. You have to have your portfolio of scans, and a lot of people aren't doing that. A lot of people aren't doing that.

SB: You've referred, a number of times, to the log or the portfolio there. Can I assume, from what you say then, that machines will record your scans, that you can look back over the imagery, and it could be audited by someone else?

CM: Yeah. That's what we do in the mentorship. Normally, at the 250, you have supervised and unsupervised scans, and you can save images. You can save videos. You can save videos of two minutes. Actually, looking at still images is quite difficult, when you haven't done the scans. So, looking back, retrospectively, is very possible, but if people record videos, you get a much better idea of what they're doing. And then, you could audit that against somebody else, absolutely.

SB: Yeah. Okay. How then, do you put it to best use, in a clinic?

CM: Yeah. First thing is, that for spines, it doesn't have much use. You can look at muscle activation, you can look at muscle atrophy. It's not what I use it for. I see a lot of shoulders, and so, as I said, always do a clinical assessment. If you just do imaging, and you don't do your clinical assessment, you are going to miss your clinical diagnosis. For example, adhesive capsulitis, for an example, an acromioclavicular joint problem. These are clinical diagnosis. You then add your imaging in. I think, at the end of the day, what imaging does, what ultrasound does, because you're doing it in clinic, is it just gives you more information about that patient.

The more information you've got, I believe, the more chance you've got of better getting the diagnosis right. I do believe getting the diagnosis right, is really the stage one of what we should be doing. So, any peripheral joint, I will probably scan. Any muscles, I will scan. Okay? Ultrasound isn't great for intra-articular pathology, so meniscal tears, osteochondral defects. But, for me, in clinic, my first job is to find out whether this is an intra-articular problem. So, actually you can use ultrasound to rule out the structures extra-articulary. That's very useful I think. Then, you put your clinical assessment together, and you may see a joint of fusion. You see joint of fusions really well on ultrasound. So, actually, although you don't know exactly what's

going in the joint, you do know it's more of a joint issue, and then, you may look at other imaging.

But in my practice, I'm using it all the time. It's excellent for tendons. Any of the tendons in the upper limb, you can see beautifully on ultrasound. Most of the tendons and muscles in the lower leg, you can see. Around the hip, it gets trickier, but with good machines, you can see a lot. Anything really, upper limb, lower limb, I will do an ultrasound scan.

SB: Yeah. And the foot?

CM: The foot, yep, you can see lots on the foot. We get lots of podiatrists and ankle surgeons coming on. It's really good for differentiating for foot pain. We talked about Morton's neuroma. You can pick up Morton's neuromas nicely on ultrasound. But again, I work closely with a foot and ankle surgeon, who sends me his Morton's neuromas, so I've got good at it, because I scan a lot of it. I don't scan hernias. I don't see a lot of them. Ultrasound's excellent for hernias, but I don't see that as part of my role. So, we are using it. When I say we, I mean physios, chiros, manual therapists, are using it differently, to how radiologists use it. It's an extension of our skill, and I'm very strict. I will never scan a lump and a bump. That's really important. That's not what I see, as a musculoskeletal, unless, obviously, somebody's been kicked playing rugby, and there's a contusion in the quad. I might scan that. But, I'm very strict about not scanning anything, and I like this phrase, I would never scan anything that I wouldn't clinically assess.

So, if somebody comes in with a lump, that's not for us. That's for other people to do. Because if you scan one lump, one a month, you're just not going to get good at it. If you scan one hernia ... It's like anything, isn't it? If you don't see, if you don't do lots of it, you're not going to get very good at it.

SB: Yeah. I was talking to a podiatrist who uses sonography, a week, 10 days ago. He made the point, in his training, that actually, if you go down an NHS training route, it's probably not suitable for a musculoskeletal therapist, because most NHS sonographers, ultrasonographers, actually, they scan breasts. They don't scan the musculoskeletal system. I guess his point was, that if you want to be trained, you need to go to somebody who does this for a living, rather than just someone who knows how the ultrasound works.

CM: Yeah. A lot of sonographers won't be specialists in musculoskeletal. It might not be part of their basic training. But. I see that as a real opportunity for us clinicians, to actually take this musculoskeletal sonographer to the next stage, which I think, across the board, is what we're doing. We can do it in clinic, they're portable. It really helps to explain to patients, what's going on, as well. Patients love ultrasound. They like looking at it. They think they can self-diagnose on it. And so, it's really good-

SB: I can base that in a minute, but I've been sitting on a question, actually, that came in some time ago, which was largely about what training you need, which I think you covered. Interestingly, this is a really sharp point. If you, in your notes, say that you have diagnosed something, on the basis of your ultrasound, and you get it wrong, are you then going to be liable under any legislation, or in breach of the osteopathic practice standards, the chiropractic code, because you haven't done formal training to certify you in the kit?

CM: Potentially, absolutely. First of all, is if you put an ultrasound on somebody, you're massively changed the expectations of that patient. I think that's the first thing we need to be aware of.

SB: In what way?

CM: Well, because they expected to come in to the clinic, potentially, for you to move their arm around, do some assessment, take a history, but then, as soon as you start showing them the inside of their body, I think that has change what their expectations of it was. And if they have seen that you've looked inside their body, and you've got something wrong, then there is that potential, where somebody comes back and says, "You missed it." But, I think that's what happens in clinical practice. You do get things wrong sometimes, and therefore, we have to make sure that we've done the formal training that's going to support it. I don't think it's anything different for ultrasound, other than the fact you're now looking inside the body, which is-

SB: No, but I guess the relevant point is, that if you miss something, and you've got the formal qualification in it, then people can say, "Okay, well that's fair enough. That happens." If you miss something, and you haven't got a qualification, people would say, "Well, actually, you were outside your area of competency."

CM: Yeah. It also comes down to what environment you work in. When I worked in the NHS, I was working in what I call a very protected environment. If I wasn't sure about something, I'd send for an MRI. If I wasn't sure of something, they could go to the radiologist. It was a lot less likely to happen, because we had that protected environment. But, a lot of clinicians are out there working on their own, and I think that's when it gets even more difficult for that specific clinician. We've done-

SB: That's very much the case for osteopaths and-

CM: Yeah, I know.

SB: Much more than physios.

CM: Absolutely. Absolutely, but there's still lots of physios out there on their own. That's why I'm very passionate that, if you're going to do ultrasound, you do

it, you do it well, and you try and formalize that process as much as possible. That may not be a post-graduate certificate, because even a post-graduate certificate, if you think about what I explained, that's 10 days at university. That doesn't guarantee standards. What guarantees standard is, when you go back to your clinic, and you practice, and you've got that clinical supervision.

So, for some people, I would advise them not to put ultrasound into their clinic, if they're not able to go through that learning pathway. I think, from our two-day introduction, we do get quite a few that go, "Okay. That was really interesting, but that's probably not for me, because this is going to take quite a lot of time up." And so, I think, in a way, the course has done its job there, as well, because I think we need to get the people that are really going to be able to push it forward. It's a good question, and there's definitely things we need to consider with that sort of situation.

SB: Yeah. We have seen ... I know I bang on about this to a lot of us, because we've seen some bizarre decisions in the professional conduct committee, about people using interventional ultrasound, in the recent past, and we're still waiting for the final decision on that. I'm guessing that, when you find yourself in front of the PCC, you need to have some good, hard evidence, to say that you did things right, because patients will be very impressed when they see the kit, but they're very quick to get antsy, if it doesn't go the way they want it to.

CM: Yeah. Yeah. I think there's responsibility that comes with it. I think the concern, from people that teach ultrasound, is the machines are getting cheaper, generally, the machines now ... People will have Googled around, and seen that you can get a ultrasound machine on your iPhone. It looks very cool. There's a machine called The Butterfly, it's 2,000 pounds. It looks very cool, but I wouldn't scan with it, and I'm going to be better at scanning than most the viewers. So, when you first get started, the temptation is to buy a cheap machine, but actually, you're as bad as you're ever going to be at scanning. So, not only are you bad at scanning, you also have the worst machine you'll probably ever have in your career. So, it makes it very tricky. So, I'm a bit buyer beware, on just going for that sort of cool-looking ultrasound machine, because it's not going to give the image that we need. It's not going to give us the detail that we need. You'll see the detail that we have, that these machines pick up. That's what you really need.

SB: Might well have to put your cards on the table a little here. Do you have any financial interest in GE's machines?

CM: I have absolutely no financial interest.

SB: Good.

CM: So, GE-

SB: That's important, when you start saying-

CM: No, absolutely.

SB: ... the expensive machines are the better of what you need.

CM: The courses that we run, GE will provide as many machines as we want. We ran a course last year, with a guy called Professor John Jacobson. We did it at Twickenham Stadium, and we had a lot of people on the course, and they provided 16 really good machines. So, they just provide the machines. There's a lot of people that go on, from our course, to buy these machines, and we do get special discounts on the machines, when you come on the course, but from the training-

SB: But, that's GE offering that, right?

CM: Yeah. Yeah. But if you come on our course, then you get a cheaper deal, if that makes sense.

SB: Yes.

CM: But, we make no money off it. We need good machines on our courses.

SB: Clearly, the issue of training has captured some people's attention They're not giving me their names at the moment. They're all being a bit shy. But somebody here has said, if it takes a year to get good, does that mean you risk missing things during that year? Which, I guess you do, but-

CM: Absolutely.

SB: ... during that year, are you purporting to use your machine clinically, as an effective sonographer, or are you just using it for practice?

CM: It's a gray area.

SB: Yeah.

CM: What I would say is, if you're in your osteo clinic, on your own, you're not going to courses, you're not getting clinical supervision. You're just trying to do it on your own, which you can actually learn this on your own, then I think it's going to be a little bit tricky to get the standards that you need. Yeah, essentially, you are putting it on your patients, before you become competent, but I would argue that's very similar with a lot of the other skills that we learn through our career.

SB: So, another question, related to that, which has come in, is, just how easy is it to find yourself a supervisor, because not everybody lives in London.

CM: It's really difficult. One of the biggest barriers for learning ultrasound, other than buying the machine in the first place, is getting the clinical supervision. So, we bang on about the gold standard is, do a post-graduate certificate, which is case-accredited, but to do that, you have to have a clinical supervisor, that you're going to scan with, for certain periods through the week. Most people, particularly people in private practice, don't do that. What I did was, we had a radiologist that helped us, and we also had a physio who we actually ... I now run SMUG, which is our training company, who we used to buy-in, and he used to supervise us whilst we scanned. But, what we have done, is the mentorship program. It's taken a long time to set up, but it means, now, we have patients ... In the teaching clinic at UCO, we have patients, and we supervise the people on our course. That's meant that we can supervise more than just one person at a time, because it's very… Time, it takes a lot of time to supervise somebody. But one of the biggest barriers is, it's a good question. Because one of the biggest barriers is getting a clinical supervisor, and I know people that have gone on PG Cert, have clinical supervisors that they thought where going to supervise them, and they've left or the radiologist wants them to supervise them or there's someone body else that needs supervising. And so they've done a PG search, but they've not been able to finish it. That's not uncommon, so you need all these things in place before you sign up.

SB: That's quite intimidating, isn't it? So you have people who might be thinking along these lines.

CM: Yes it is.

SB: I'm gonna lose a lot the audience here, but have you ever watched "I'm sorry I Haven't a Clue" on Radio 4?

CM: No

SB: No, Okay. So Radio 4 comedy quiz game, it's a very long standing, very very funny, recommend it to anybody. In there, they regularly have letters from Mrs. Trellis of North Wales, a clearly fictional character who asks bizarre questions. Well Matthew Davis has asked a question.

CM: He put his name to it too

SB: Matthew always puts his name to it, and he's one of our regular questions. He doesn't ask bizarre questions, and he's not entirely fictional. But he does come up with some really interesting questions, and he wants to know where this is good for detecting foreign bodies, like undetected glass fragments in healed wounds, and would you undertake that as it might present as an incidental finding in an osteopathic patient, for example a painful foot.

CM: Yeah, I can think of at least four or five clinical situations where I've had that.

SB: Really?

CM: So I had one last, so first of all for foreign objects like glass, shards of wood; oh sorry shards of glass, wood. You, ultrasound is excellent if not the imaging modality of choice, for picking these up. So I had a lady a few years back, came into to the clinic, she came in with anterior knee pain, was told it was a patella tendon, which it was. But when we scanned the tendon, we saw some glass in the tendon, and you could see a small area but not a lot. And she said "oh do you know what? Two years ago, whenever it started I do remember falling over on a dance floor." I think she actually picked up on it, but nobody at saw of taking it any further, so she had glass in her patella tendon. I've seen glass in the foot. There's lot stories like that, so good question and ultrasound is excellent for looking at foreign bodies.

SB: Matthew, thank you for that. The machines a bit too big to fit in your utility belt, which we discussed last time. Decent sized rucksack, you'll be fine with this one. Thank you again.

CM: Sounds like he might actually have something in his foot he's worried about.

SB: Someone's just asked if you watch radio, I watched radio 4. Well you know what I mean.

CM: I did pick up on that. I didn't want to pick up on it.

SB: I watch it, I mean I watch it when I'm listening to it. Another interesting one here, more and more we are being told by lots of people that lots of have defects that don't show up on scans, or things that show up on scans, which are not symptomatic. I mean is this just as much a problem here as it with say, MRI?

CM: So, this is one my favorite questions. So we know that, say for example, the shoulder we know with the lower back that if we do a scan, ultrasound/MRI in somebody that doesn't have pain, there is a significant amount of asymptomatic pathology, and if you look at an MRI for the lower back, it has been shown that is of a low value intervention for that. What's different about ultrasound, is that's it's in the hands on the clinician. So how you would report to somebody with degenerative disc disease with an MRI scan would be probably quite different to how a surgeon would, or somebody else in terms of how valuable, how much emphasis should put on the finding.

SB: Yes.

CM: As I said I scan a lot of shoulders, so we know over the age of sixty, you're just as likely to have a full-thickness symptomatic as well asymptomatic tear. What's great about ultrasound is you can scan the other side. So our job is to put that into some sort of clinical context. We know you can have full range of movement and have a massive cuff tear. Okay, so we know our clinical

tests aren't very useful. So first of all you can scan the other side. If you see a full thickness tear on the other side, those findings straight away seem less relevant top that patient's presentation and patients can relate to that.

SB: I can see that. Is that likely: If you've got an asymptomatic tear one side, you're likely to have one the other side.

CM: Yeah, Yeah absolutely. If you've got an asymptomatic tear on one side, you're more likely to have it on the other.

SB: Okay.

CM: Same with calcification in the cuff, which ultrasound's excellent for. Looking for calcification. But the key thing I think I sort of alluded to earlier: First of all gain as much information as you can and ultrasound imaging is excellent for that, but then how present that information to the patient, I think is the skill, because we know language and what we say, words matter to patients. If people go for an MRI scan and they get, you know, they use words like tears or massive tear, they even say things like that, significant tear, that could easily be irrelevant. But if you are the clinician doing the scan who can immediately report back so they don't have time to form their beliefs, between the two months where they've had the MRI, then I think you can really influence it and you can use it quite in a powerful way to influence your management.

SB: Yeah that does, it makes a lot of sense and it ties in with what we've been told by other people. That actually there's a lot of power in how we describe our findings to patients.

CM: I think it's the most important part of imaging is how you present the information.

SB: And we forget that words that are common place to us, are actually quite frightening in some cases to our patients aren't they?

CM: It's just like as we get older, we get wrinklier, we lose our hair.

SB: Thank you

CM: Some more than others.

SB: (laughs)

CM: And it's the same inside the body, it's not abnormal. So what's normal and what's abnormal is the whole other thing isn't it? Should we even be calling it a tear? Is it pathology, or is it just normal age related findings?

SB: Yeah, yeah.

CM: And there's no doubt your words matter massively, but I do believe it's important to get that information. I don't think we should, there's the other school of thought: Well if everybody's got abnormalities, why bother doing a scan? And I don't see that. I think I want to know the abnormality, but the way I communicate it is the bit that's going to make the difference.

SB: Yeah

CM: Going back to the record keeping you were talking about earlier on. This is actually a very interesting question because first whoever it is that's asked the question says "Do you keep a record of the diagnostic scans you perform every day and how often do you have to sit and write a report on that?" To which I would add: How do you record it in the notes? Do you just record anything significant that you find or do you just say "I've got a recording of this, go look at the recording."

SB: Yeah. So first of all I think everybody does it differently and I think again there needs to be something more regulated around that and I think it will happen.

CM: So in my own practice, I save all of my scans and then I will always do a letter for every patient that I scan.

SB: Which is virtually every patient you said.

CM: Yeah, well not every patient. I do clinic on Monday which was yesterday (seems like a long time ago) I would have done eight to ten dictated letters, but that's what I did in the NHS for five, six years. So I got pretty quick at dictating, but for every patient I never separate , this is the really important thing is, you never separate your ultrasound report from your clinical letter. My letters are exactly the same as before I scanned but there's a paragraph in there about the imaging, so I do do a report. And one of the skills of ultrasound is getting those images and putting them into words. We actually lose quite a lot when we put them into words. So if somebody show me an ultrasound report, I would always want to see the images because there's so much spectrum, there's such a big spectrum of normal anatomy and abnormal anatomy. So I always put in the ultrasound report as part of my overall clinical letter and I never separate the two, and I don't think we should.

SB: Okay, Sarah's sent in a comment. I think she said she missed the start of our discussion but, from what she's seen so far she says "The main reason to have one of these machines is to examine the shoulder; what else do you use it for commonly or frequently?"

CM: I suppose I see it a lot for the shoulder. Let's go through it, so the shoulder sees the rotator cuff really well, it sees the bursa very well. Around the elbow, you can see all the tendons around the elbow: Distal biceps tendon,

common flexor, common extensor, ulna nerve, radial nerve, median nerve. You can see the joint lines. You can see if there's an effusion. You can see the tricep. So any tendon here you can see really well on ultrasound, so it's not just for the shoulder at all. In terms of the legs, we are going to do some scanning in a bit, and I think that will help to highlight what you were saying.

SB: Shall we go and do that now?

CM: Yes sure.

SB: We can get on with that now. Let's go over and meet our model for the evening. Right Charlie. Thank you for coming in. Charlie is not mic'd up, so he can say what he likes and nobody can hear him. No, we will hear you if you scream.

CM: So we thought we'd start with the knee. As I said earlier, there's some areas of the body are actually a lot easier than others: The shoulder is quite tricky, we'll do that later. On our introduction course, we normally start around the achilles and the calf and we go to the knee as well. So we'll start with the patella tendon and we can just orientate the viewers as to where we are. So obviously, we need the gel. This is just sound waves so the patient doesn't feel anything. Certainly let me know if you do, and then I'll just go through on the screen so the viewers can see: So this is the top of the, this is the skin here. Okay? So this is the most superficial element. Okay? If we go a little bit lower, what I do is I go into long section, I think that will make a bit more sense. And then we've got some pre-patella tissue here okay? That goes all the way over across the top of the tendon and then what you can see here is the bone. So this is the patella bone. Anything underneath the patella is arthro-fat because bone reflects the sound waves completely so it just bounces back. That's why it's bright. Okay?

Coming off the bone then you can see the patella tendon. What's great about ultrasound and I think we overuse MRI generally in muscular skeletal medicine. There's no reason if you want to look at the patella tendon why you would do an MRI, because ultrasound has better spacial resolution. So you can see, what I am pointing at here, is the internal fibula pattern of the patella tendon and we can follow it all the way down. Everything underneath here is Hoffa's fat pad. As we follow the patella tendon down, we keep going, we keep going, and then you can see here attaching on to the tibial tuberosity. And then we can go back. So this is the fat pad. This is the tibia and this is the patella tendon. So we'll go back up.

SB: It's interesting looking at this. It must take a little bit of time to get used to the orientation because your probe there, your scanner is longitudinally orientated.

CM: Absolutely.

SB: So the top end of that is on the patella. The bottom end somewhere near the tuberosity.

CM: Absolutely, yeah.

SB: But on the screen, it's the left hand end which is.

CM: To you it is, to me it's the other way.

SB: Right.

CM: Because we're on different sides. I'm assuming that's what it is.

SB: Yeah.

CM: So yeah, you're right. You can go the other way, but that feels backwards to me.

SB: Right, yeah. (laughs)

CM: So I think the key, so if somebody's a patella tendinopathy, this is where it normally happens and what you see is it gets thicker, so the tendon will be thicker. This is a very nice looking tendon because you can see the internal architecture very nicely of the tendon and it would be darker and you lose the nice linear tibular pattern. If we go into cross-section, this is where sometimes it is harder to get your head around it. If we come off the bone, so this is the bone. Then I always think this patella tendon is very flat. Can you se it going all the way around?

SB: Yes

CM: Then it's got that sort of pen ade appearance, because now we crossing, we are going through on a cross-section. Underneath it here you can actually see the femoral condyle. And this is articular cartilage. I'll show you that a little bit more. So you can actually see the articular cartilage. You can always get a nice view of the cartilage which is one my favorite views of the knee. Which is almost like that skyline view and you can see the articular cartilage there and that's obviously the femoral groove there.

SB: Yes.

CM: You can get some nice information from it. They are starting to use this now to say whether or not there's arthritis. The measuring here, laterally and measuring here medially. Maybe that will save all these X-Rays that don't always seem that useful. Yeah. Then we can come back down. I think the other thing we need to remember with ultrasound and one of the sort of beauties of ultrasound is the dynamic nature of it. So for example if we look at Hoffa's fat pad, which is over here, so then everything underneath here is

Hoffa's fat pad. Everything here, we just keep an eye on how that behaves as we bend the knee up. You can see that you get some nice dynamic movement on the fat pad. So as you go into extension, it comes out, which is why a lot of people get pain of extension and then as you get into flexion, it just goes back in.

Now what I also think is really fascinating with anatomy and ultrasound is the bursa, so basically a bursa, and you were describing it earlier, but it's just a potential space. So if there's nothing wrong with the bursa, often you don't actually see it. But if we go to the knee here, you can see, there's just a very thin slip of fluid here which is his infrapatellar bursa, but you can't see it when the knee is straight. It's only when the fat pad actually starts to retract can you see it. There you go, you can actually see a little bit of a just a potential space. Okay.

SB: We just had something come in here.

CM: Yeah.

SB: I've just learned that somewhere around here, we have a patient with a really weird shoulder and if we can get them in here before the end of the show, is there a chance you can sort of put it over and show us. I'm not going to ask you to do any treatment or anything like that, just show us what you are seeing, I think that might be entertaining.

CM: Yeah. It depends how weird it is but (laughs)

SB: (laughs) I know nothing more than I have told you.

CM: Yeah why not?

SB: What I did want to ask though is, can you go back to that longitudinal view (whatever you call it), it is a clearer view: We have got here a very fit patient and clean and enthusiastic and very successful cyclist. There's very little fat on him; He's young and all his tissue …

CM: I like this chap. Yeah. Yeah. Oh you're a cyclist.

SB: Yeah, can't you tell by the suntan? Look.

CM: Oh yeah. Either that or a farmer.

SB: Yeah but how would this differ, if we got you know the middle-aged person with all the things that come with middle age, and probably a bit more given the recent nature of society, how difficult does it get when you trying?

CM: For scanning the patella tendon it would probably be okay, but it's a very valid point, when you're learning. It's a big difference is the answer. For the

reasons you said is as we get older, you know, we do start to get these changes in our anatomy. So if somebody's very muscular, basically anything that effects depth is the big issue, so if somebody's very muscular or very overweight, and they've got a thick subcutaneous layer, then you're not going to get the resolution and sometimes, I've scanned shoulders on large people and I've said "I can't really see what I need to see. We probably need to get some other imaging."

So yeah, when you're learning ultrasound and this is really important for the viewers: When you're learning ultrasound, you need to learn normal anatomy first. So these guys are really useful to scan on, because you can see everything so nicely. If you just start scanning straight away on your 50 year old patient with shoulder pain, that's gonna be trickier. So first thing is just to look at good young normal anatomy. Get used to what looks normal and then develop. A lot of people just start scanning their patients and that's the hardest group to scan initially.

SB: And on any training course, is there a sort of a list of the structures, to go through, so you're taken through in a progressive way, so that you know what all the normal structures look like to you.

CM: Yeah, yeah. We do that and at the beginning, we sort of show you - I don't like to use the word protocol, I think we need to go away from that because at the end of the day, I just want to prove or disprove the hypothesis I've formed from my clinical assessment - so if somebody walks in with anterior knee pain, I just want to separate the bursars for the fat pad from the patella tendon. I don't necessarily need to do the whole knee. When we teach it, we do do a bit more protocol based scanning because you need that place to start with.

SB: How useful do you find it for measuring the success of your treatment.

CM: So that's a good question, quite controversial really, so it depends what you're looking at. So if I've got an acute muscle tear, for example the calf, okay? And I see like a tennis players leg is the classic, and what that actually is, is where the aponeurosis has split between gastroc and soleus. And when you scan them, you see a mass of fluid accumulation, a lot of the time. Sometimes we aspirate that out and actually you can then follow that over the next week or it normally takes months, up to three months for that to completely close. So I do use the imaging to help a little bit with what I'm seeing, but I will always sort of hang my hat on my clinical assessment, my functional assessment.

In terms of tendons, tendon is an area I like to look at a lot. Patella tendons, Achilles tendons, Rotator cuff tendons, most people will not monitor it on ultrasound, because for every person that gets better, and the imaging looks

better, there's that person that doesn't get better and the imaging looks the same, or gets worse.

SB: Isn't that useful diagnostically? You can say "Oh well that wasn't the structure causing the symptoms."

CM: No no, so what I'm saying is that the pain will get better but the structure doesn't change, but the structure's still abnormal. Does that make sense?

SB: Yes.

CM: So there's a massive, the correlation between imaging findings and pain they don't match, so to use it to monitor, you have to do very cautiously for tendons, I would say it's not useful.

SB: Right.

CM: The only exception to that would be a tenosynovitis.

SB: Right.

CM: So yeah that's. I think that's really important. You get a patient back, you re-scan them and they're much better. It doesn't necessarily look different. So ultrasound is there to confirm you diagnosis.

SB: So how has this type of imagery changed the way that you treat? This is a question from one of our audience members.

CM: So the first thing is to get the right diagnosis. That's the role of ultrasound, on top of your clinical assessment, is to get the right clinical diagnosis. Our clinical tests, are not very good a lot of the time. They look around the shoulder, they're not sensitive, they're not specific. We cannot diagnose, a full thickness tear from a partial thickness tear accurately and that's what the research shows. So for me it's about getting the right diagnosis. If you get the right diagnosis, I think you're halfway there for sure.

SB: Our shoulder patient is on his way, apparently, or on her way. Shall we have a look at a normal shoulder before we go there? I mean you do your stuff with the machine there and I'll get rid of all this gel, or some of it. Right. Now you've treated this knee supine, so presumably, you could have done this in any position if you wanted to.

CM: For the knee?

SB: Yeah.

CM: Yeah yeah. Generally, you can even have them sitting and you can scan in front of them. I think when you get confident at scanning, yeah you can

adjust your position but if the knee's bent or the knee's flexed, you actually see, different bits. So I had to bend the knee up to see the groove and the cartilage. So we'll have a look at a shoulder. Which I say is one of the areas I do a lot of work. It's also technically one of he hardest areas to scan because it's round and what you are scanning is the tendons that wrap around the bone.

SB: Right, and is the part of the technique to keep this perpendicular to the bone at this point?

CM: Absolutely so one of my colleagues, Mark has a phrase "Bone bright, soft tissue right." So that's a guy called Mark Maybury if he's out there. Good lad. So this is the bone here so we know that if this bone is quite bright, that means I'm perpendicular to it. Okay? So this is the long, just to orientate you a little bit, this is obviously the skin. Very thin layer of subcutaneous fat. This is the deltoid muscle. We've then got the bursal plane and then underneath here you can see the long-headed bicep. I'll just turn that up a little bit. This is the long-headed bicep. So if I went down, you can see the bicipital groove there. Yeah?

SB: Yup.

CM: If we move the arm a little bit you can start to orientate yourself form where we are from a humerus point of view. If we come up to here.

SB: And if you weren't perpendicular, what happens?

CM: Yeah, so then you end up with not a very pleasant picture. Which looks like something like that, or you can go the other way and it goes dark. And this is where one of the pitfalls of ultrasound is. One it's very operator dependent; it's very easy to actually. What we're getting there is an artifact called an isotropy and that means something is appearing darker, but it's purely because you're not perpendicular, and that's one of the biggest pitfalls of basically ultrasound.

SB: Yeah

CM: So if we go down, this is the long headed bicep sitting in the groove there, we can spin on that, and then we can see a really nice image of the long headed bicep going down. So I'm now in the bicipital groove, so this is the bone, this is the biceps. I've got the sheath of the biceps and then we've got the deltoid. You can even follow that all the way down, and then you can see the muscle belly of the biceps coming out there. Yeah?

SB: Gosh.

CM: You get a lot of nice information, so this is the long-headed biceps. If I just show you one of the tendons, so if I show you supraspinatus what we

normally do is we get the elbow back, then we go and find the long-headed bicep which is our landmark. So this is the bicipital groove, we come round the lateral aspect. Okay, so this is the distal on the greater tuberosity, and then we come up and over, okay, and then what we start to see is the tendon of supraspinatus. Okay? So this is supraspinatus here, and it's a great way of teaching anatomy. I'm sure at undergraduate level, this is how anatomy should be taught. And then if we just move the arm, we can actually see two areas slide on each other, so we've got the bursal fat there, we've got supraspinatus underneath and then just in here, we've got what's called the subacromial bursa.

Now it's very hard to see, it's just this slightly black area here, or hypo, which is a dark area. You can just see how when I move him, how one area moves on another. And that's what the subacromial bursa is, and that goes all the way over the shoulder and that's why one of the reasons that when you push around the shoulder, it's not very useful from a diagnosis point of view, because essentially you're just pushing on the most pain sensitive structure there, which is the bursa. If we look at the longitudinal section of supraspinatus, if we keep the arm back, okay that's a nice image there. So you can see just like we saw on the patella tendon. Can you see these fibers?

SB: Yup

CM: Going across there? You can actually start to appreciate them and then as they come and they start to attach into the tuberosity. So this is the bursa on top. This is the deltoid and this is the supraspinatus in longitudinal section. You can see these are nice machines, they give you a really nice image.

SB: Yes.

CM: With lots of detail. Way more detail than an MRI would. I think that's important. Most shoulder injuries that come into an osteo-physio clinic, don't need an MRI. If you want to know if the rotator cuff is torn, an ultrasound diagnosis in the right hands is just as sensitive and specific.

SB: And cheaper and quicker.

CM: Cheaper, quicker, and saves a lot of time and obviously if required you can do a guided intervention at the same time. So that's that one stop clinic that I think is pretty useful.

SB: Somebody's asked "Could they see the MCL?" Which I don't know if you could do it from there?

CM: The MCL?

SB: Yeah

CM: Yeah?

SB: Can you do it there, or do you want to come back up on the treatment table. Ooh, this is going to test us isn't it?

CM: Yeah. So the MCL is a really, in fact the MCL is a good one to have a look at, because you can see the detail of it very nicely. I did have a quick look at his MCL earlier. The MCL has got a superficial and a deep band

SB: Get rid of the goo for you for a second.

CM: And it's also a nice way of highlighting how you can use ultrasound dynamically. So the MCL, so if we come down, first thing we do is we find the joint okay, so what we've got here, is we've got the bone of the femur underneath here, we've got the tibia. Just can you see it's quite bright at the top. I'm just going to bring that up a little bit. That's better. Okay and then you've got the medial meniscus. Can you see it looks like half a bow-tie?

SB: Yes

CM: Okay, so that's the medial meniscus. On top of it, this darker band is the superficial band of the MCL. Okay, so actually what I always find fascinating and students find fascinating when they come on the course: If I follow the MCL down, all the way, you can see it actually attaches all the way down to there.

SB: Yeah.

CM: It's a very long structure. Okay? And then if we get it into this position. This is the deep. This is superficial, this is the deep band. This is where we get a lot of the tears. So you can see the nice alignment there of the MCL. So that's the MCL, however.

SB: So if it were torn, what would you see? Would you just see lots of black colouring in the…

CM: Yeah you lose that fibular alignment; it gets thicker; you may see some fluid. What's great about ultrasound is obviously in clinic, most of us will do a vulgar stress test, but what we can do now is, we can do that, and do it dynamically, so I've got the probe over the MCL over the joint line. I want to see how much that joint opens up. In or around 20, 30 degrees and then if I push, you can see how the MCL on the top goes tight.

SB: Yeah.

CM: So not only are you getting information about the static image, you're looking more importantly and that's what we're interested in, is how does it behave when you put stress on it. So is it still doing the job of the MCL. I'm pleased to

say this MCL looks normal, and it's got a nice hardened feel, but also he's got a nice fibular pattern there. With no opening up of the joint.

SB: If you're going to see some shading, shadowing in there on a damaged MCL, is there any point in doing the stress test?

CM: Oh massive point because in theory the MCL that's healed nicely, is not going to be lax.

SB: Yeah.

MC: Whereas if you've got an MCL that is lax, that may give them more long term issues.

SB: Okay. Now. Our surprise patient has arrived, but before we do anything with that, he needs time to take his shirt off I think, so can we spin this towards the camera and you explain to us what the bits and pieces on here do, because there's a lot of knobs and bells and whistles on this screen. Is it complicated to use?

CM: So if you think about radiologists, they have these massive cart-based machines

SB: Have a seat.

CM: Don't they? They have the big cart-based machines; there's lots of knobs and the learning of knobs is called knob ology.

SB: (laughs)

CM: And so this has still got lots of knobs. It looks a little bit daunting, there's other machines out there that look a bit more simple, but essentially you're not going to use all of this. Okay? You're going to use the gain, which you can see there increases the brightness. You're going to use the depth obviously depending on what you're going to look at. We've also got these little yellow things here, which is the focal zone.

SB: So is that depth button changing the actual depth that the ultrasound is penetrating?

CM: Yes

SB: Increasing the power?

CM: Absolutely. Yes as you can see there and then we also adjust the frequency. The higher the frequency, these are good high frequency probes, the better the spacial resolution, so the better you can see the image. The lower, the worse, but the lower frequencies are for looking at a deeper object.

SB: Right.

CM: So it's a bit of a balance between frequency and depth basically.

SB: Okay.

CM: But you know, they're quite straight forward, you can do nice split screen view, so you can compare to your patient left and right. That's quite nice to use. Help to explain patients and empower the patients with what's going on. You can measure things, but yeah they're pretty straight forward. Well I say they're straight forward, they're not straight forward at all, but what you need to use in clinic is quite straight forward. Now when you look at the bigger machines and even these machines, you can then adjust the settings accordingly. But when you buy one of these machines, the applications specialist will come down and set it up, so for every, you see at the top right, here, it says shoulder, although we've used that for the shoulder and the knee, you have specific setups for specific joints.

SB: Would we have seen a vast difference if you had changed the setting?

CM: You might have a looked a bit better. (laughs) But it looked pretty good anyway. Certainly on him, it's fine, but if you got a trickier knee to scan, then it's probably something that you need to use.

SB: Okay I think you probably need to put that back where it was for the shoulder. I have no idea which shoulder it is we're going to look at. That's the right shoulder.

CM: Well that's a bit of luck.

SB: (laughs) All right, I apologize for springing this on you, but I thought it might be interesting, something that's-

CM: Well I can certainly scan it. It might be useful to get a little bit of clinical history as well.

SB: We've got a microphone, so. Sorry. Would you like to introduce yourself? You need to face that way.

CM: Try to just sit yourself down. That's it.

SB: Would you like to tell us a bit about yourself first of all and a bit about your injury?

RC: Absolutely. My name is Rick Calder. I'm 38 years of age. I had a car accident four weeks ago, yesterday evening. As a result I've got a little pain in my arm. I've been to see Claire Ashgrove Clinic who's been extremely helpful, but

she's concerned that the damage to my arm is more than what we originally believed it to be, so.

SB: Okay. Well, great. Thank you for coming in and letting all these people look at this potential injury. Let's see what the ultrasound thinks.

CM: So, what; where's your pain? Should we start with that?

RC: I get a lot of pain just here. I get a lot of pain that shoots down my arm to my wrist.

CM: Yep.

RC: It goes into my shoulder as well.

CM: Okay.

RC: Currently most of my pain is around…

CM: Is it when you move your shoulder?

RC: I can't raise my arm.

CM: More than that.

RC: I can raise it a bit more than that, but not much more than that.

CM: It's painful. At that point when you lift up, where do you feel it?

RC: I'm starting to feel it-

CM: Somewhere up there. Okay. Well let's have a look. Should we? Just sit yourself up nice and tall, just facing that way. Okay. Okay, so. Now straight away we're seeing a few things, so I'm just going to have a quick look at the left side. Are you happy for me to report on your findings?

RC: Absolutely.

CM: Yeah, fine. I'll just show you, just for the viewers at home, just a split screen there. This is a long head of biceps sitting in the groove, and straight away I'm going to put in on for two seconds and you can see already it looks quite different…

SB: That's the long head of biceps on the good side?

CM: Yeah, yeah. I see that's a little bit dark, but that is the long head there. Then, if we look here, he's actually got fluid around the long head of biceps here. He's also got a bit of, you see these white areas here?

SB: Yes.

CM: Yeah, so you can see, I mean anybody can see there they look quite different. He's also got looks like some bursts from swelling over the top there.

SB: You can't see your finger so well so...

CM: Yeah, let me do that. It's fine. All right, good finger and good point. You can see there that the long head of biceps in the groove, but you can see there's other tissue on top there.

SB: Yeah.

CM: So straight away, we can see that there's something not quite right here. What was your, and as we go a little bit lower, we've now got fluid around the long head of biceps. Can you see that? If we put the power doppler on; power doppler is something that just starts to pick up some inflammation, so that you can see there is actually some inflammation in that sheath. What's really important, and I'm going to go through this quickly for, but there's, I can certainly take some questions on it. Fluid around the long head of biceps is not anything necessarily to do with the long head of biceps, okay? It does indicate most of the time that there's fluid in the...Is that soft?

RC: No, it's fine.

SB: That doppler thing you said just now, that is specifically bringing up inflammatory markers, is it?

CM: No, no; not inflammatory markers. It's just picking up low flow blood.

SB: Right.

CM: Which may well be part of that process. That's what they used to use in rheumatology. Do you remember looking for sign of iso…? Can you see we've got a bit of bone here in the tendon?

SB: Yep.

CM: We don't know if that's new. We don't know if that was there before. We've certainly got some bursts or fluid in there. As we come around here, if I compare this, this is subscapularis. You can see here...what was your mechanism? This was quite a high impact, was it?

RC: As in the impacts of the accident?

CM: Well, yeah. What happened to your shoulder?

RC: To be honest, I don't know. I presume it's the hand that was holding the steering wheel, but I don't quite actually know.

CM: I am suspicious here. Have you had any investigations other than me?

RC: I have had a CT scan at the hospital, but we haven't been told whether it included my shoulder or not.

CM: Yeah. So what you'll see I'm doing here is I am looking-

RC: Uh huh.

CM: Yeah, yeah. Is it getting a bit sore? I'm not surprised. If we look here on his left shoulder, that's how a subscap should look. Can you see it's very nice and clear? You can see the fibular line that we saw? Then if we go on to subscap on the right...Now I'm not going to make, we'll scan this at the end of the show I think, because this is, you know, it's not a normal scan. I think we need to report on this.

SB: We didn't have a mic on you a moment ago. Could you just repeat how this happened, how you think it happened?

RC: If I'm perfectly honest, I don't know what my arm was doing at the time of the accident, but I believe this must be the hand that was holding the steering wheel at time of impact. I was...we hit a car head on, but it was like lamppost, lamppost; so, all the impact was on my side.

CM: Yeah. So you can see here, he's got some cortical irregularity in the bone. Ultrasound is excellent at looking at bone. We cannot rule out a fracture at this point of the bone, of the tuberosity; you can see here this black area, and you can see the- this is in subscapularis. This is the same image, left and right. You can see it's thicker. It's got some thickening of the bursal plane, and then it looks like there's a tear also in subscapularis there. Okay, we'll go on because I'm not sure that will be it. Then we've got this bit of bone here which, again, this is something that we will need to report on. I think you're going to be a bit sore. Is that okay there?

RC: It's fine.

CM: Then we're going to look at superspinatus. We're going to come round to here, and you can see, this is superspinatus. This is looking more normal. Here, this is where infraspinatus comes into this dark area. It's not because it's a tear, it's because infraspinatus muscle fibers are going a different orientation. We can see here, these aren't tears here. This is superspinatus looking pretty good. It's certainly subscap so far that, and also the bone and also long head of biceps. This looks pretty good. This is superspinatus in long section. I'm doing this quite quickly because I want to have a look at the back

of the joint, but super certainly doesn't look like subscap does. Pop it down there. It's a very good case. Well thank you for coming in.

This is the sort of thing that you get when you start scanning. Then we can see superspinatus at the back of the joint. Okay, I'm going to drop the frequency a bit. Remember, dropping the frequency normally helps a little bit with the image. This is now infraspinatus. You okay there?

RC: Yeah.

CM: Not too sore? This is infraspinatus going into the back of the greater tuberosity. As we come round this, this is the joint here, so this your ball and your socket. This is the glenoid. If we just rotate out a little bit. I know you're a bit sore. As we come out, you can see these little areas here indicates that there's fluid in the joint, and it's sore as well. Then come back down. We can also look at the AC joint, although, clinically it doesn't appear to be the problem. That's the AC joint. So I have a look at this is a bit more detail, because it's not 100% straightforward, but it's an excellent way of demonstrating what information that you can get. In my opinion, this needs other imaging at this point. Just to sum up, we've got fluid around the long head of biceps. We've got, all we know at this is stage is we've got some bone there. We've got quite a bit of cortical irregularity around the tuberosity, so I am suspicious of a fracture where certainly it needs to be ruled out. Then as we go on to the subscapularis....you all right? Sorry, last one.

RC: Fine.

CM: One issue of ultrasound is can be a bit sore. Then, the subscapularis is something I think we need to, certainly investigate a little bit further with the other things. It's got that little bit of cortical irregularity there. I can tell you now, clinical assessment wouldn't have helped me at all with this. This shoulder's really painful. You can do whatever clinical assessment you like, but it's not going to give you the information that you've just gained there.

SB: One of the obvious questions about-

CM: In five minutes.

SB: ...about ultrasound and all the other examinations imaging that you could go to is-

CM: Yeah.

SB: Which is the right one? It would seem that CT scan was not the right one for this, because it's-

CM: What- I don't know what he...whether it was-...but yeah, no. To answer, well, if he's had a CT scan we should know about the bone.

SB: Yes.

CM: So that's actually very useful. Was that done...we don't know if that was done on your shoulder.

RC: I believe it was… my chest.

CM: I think it probably was, yeah. So he has, he's not had an x-ray of his shoulder, which would be very useful at this stage. Ultrasound is very good at looking at those fractures, so that when you see a break in the cortex, but obviously you can't tell exactly where that break goes, because you can only see the superficial element of the bone.

SB: Yeah.

CM: So suspicion of the subscap; the long head of biceps. He's got fluid in the joint. I would definitely want to rule out a bone injury on this one.

SB: Right. Okay. Richard, thank you very- it's been a bit of a surprise for everybody here, but thank you very much for coming in. Do you want to hang around for a little bit so that we can both-

CM: Yeah.

SB: ...talk to you after we finish the broadcast?

RC: Yeah, that would be good.

SB: Okay, should we go back to our seats for the moment?

CM: Well that was interesting, wasn't it?

SB: Well I- I do apologize. I do apologize for-

CM: Well you did spring that one on me, so yeah.

SB: ...springing that on you. And then that's great- that's- and I'm impressed that you took it on. And I'm-

CM: Well I had no choice. No, no. I actually am very pleased he's come in, because I think for the osteo, everybody out there, we have to be aware of our- the fact that our clinical assessment is quite limited if you want to know a little bit more about the subachromial involvement of the subachromial tissue. I think it's an excellent case. I get a case probably every two months where it's a greater tuberosity fracture that is even not being seen on x-ray, although they've not had an x-ray.

SB: Right.

CM: It's actually very good for picking up those fractures. It's a good case. It's going to be a very painful shoulder, that's for sure.

SB: Yeah, and I was about to say, well how much will it change your treatment? Well it's a greater tuberosity fracture; it probably will change your treatment of it.

CM: I'm not into let's sit and wait and see how you get on. I want to know what that diagnosis is and from that inflammation, that's not a normal scan at all. I think we need more information.

SB: Yeah. You might have guessed in the way I mentioned his name earlier on, that's Matthew Davis, Mrs Trellis. He's one of our regular questioners. He sent me a couple more. This one is- the case he had in mind, he asked about looking at foreign bodies.

CM: Yeah.

SB: It was an overweight, a very overweight patient, with a painful foot.

CM: Yeah.

SB: And there was a palpable hardness deep in the soft tissues of his big toe, and it turned out to be a propelling pencil that from maybe 20 years before. He thought it was finally found with a sharp probe.

CM: Yeah. Ultrasound would show that really nicely. It would take you 10 seconds to find it.

SB: Yeah. His second question is, 'What's the width of the imaging plane?' I.e., in the first sagittal plane view of the knee, how deep a slice of data is used to form the image?

CM: That fat way or length?

SB: Well, I think-

CM: So, the probe is about that long.

SB: So we're talking five centimeters-

CM: Yeah, something like that. Yeah, yeah.

SB: But the width-

CM: I think that's-

SB: But the width of the probe-

CM: Yeah, that's-

SB: Is that relevant?

CM: Well, no it is relevant because what you're seeing is only a slice of the tendon, so a lot of the time you'll see images where it's one image of the patellar tendon, but it's like, well what about the other images.

SB: Yes.

CM: What about the right, the medial and the lateral aspect? So that's why videos are really useful, because you can scan through an area, which is what you have to do.

SB: Okay. Do you know of an existing network of manual therapists or practitioners you can offer a supervisor?

CM: Do I know- So, do I know any clinical supervisors?

SB: Is there an existing network of therapists who could offer a supervisor? Yes.

CM: No.

SB: Right. That's a bit of a shortcoming, isn't it?

CM: It's- There's lots of reasons for it. I work in private practice. I can't- I've not set up a situation where students can scan my patients. I don't-

SB: This is coming from one of our members called Rean, who said, a lone worker in a rural area.

CM: Yeah. It's tricky.

SB: It's going to make like tricky.

CM: I mean, you can do it. Obviously you can travel to London. Otherwise, you need to become friendly with your local radiologist. Start sitting in with them. Start observing him and go, “Actually I'm really interested in doing this; will you help me?” That's how these things, you know, can work sometimes. I know lots of osteos who have done it that route. They've started sitting in, showing some interest, and then they decide to pick it up themselves.

SB: Yeah. Well, of course, that's one of the things we want to know, is there any, what's your advice to those who are interested? I mean-

CM: Yeah.

SB: Maybe someone who's alone in a rural area; maybe it's just a bridge too far, but-

CM: Well, look. You can learn this on your own, and you can make it happen. I'm a big believer in knocking down barriers, so, all those barriers we've talked about, there are ways around it. You need to put yourself out there and network and do that. Start attending different courses and that sort of thing. In the SMUG group that we run, we have a closed Facebook group called SMUG Ultrasound Forum, which is for anybody that has attended one of our courses. Today there's been about five scans uploaded and people are commenting on them, talking about what treatments to do and that sort of thing. We've tried to give some sort of- a bit like what you guys do- try and put some support into it. I think outside can be quite isolating, particularly when you live in quite an isolated area anyway. If you go on to our website as well- I'm sure we can put a link on to that-

SB: I will.

CM: ...but it's ultrasoundtraining.co.uk. If you you go to resources on the top right, I've written an article on the Top 10 tips To Get Started On into Ultrasound.

SB: Yeah, okay.

CM: So that's a nice place to start. There's other blogs and resources on there.

SB: And you did compare this with what we're doing, and I'm just sitting here thinking, Well, again, rural areas, you may be a bit short on internet, but actually if you're watching this program in a rural area then you've got good enough internet to send up live imagery by various means.

CM; Yeah.

SB: Presumably, you could get live supervision by an expert in London, for example.

CM: Yep. So that's something-

SB: Using-

CM: It's...and I absolutely...technology's there, and it's something that we're looking at. The thing you cannot be is, if you come on one of my courses, your scan, and I'll just get your hand an go, No, you do it like that.

SB: Of Course, yeah.

CM: And that's what you can't get over the internet, and that is a big part. Again, I use the comparison of learning the guitar. You can watch it on YouTube, you

can practice; there's nothing quite like getting someone that's an expert at doing it and just feeding back there and then.

SB: Yeah.

CM: ...and helping you out, so. It's very much a participation sport you've got to get started. You've got to just practice, it's lots and lots of practice but at some point you need some supervision.

SB: How much training are you giving to undergraduates at the UCO?

CM: The undergraduates, they, so what happens is they refer their patient in, and then they observe the scan, but all the delegates learning are people from my course, as in, as rheumatologists, radiologists; so, they're also exposed to that multi-disciplinary team. I think it's great that they're being exposed to the anatomy now from ultrasound, because I'm a big believer that it's very hard to visualize these things if you're not actually looking at them and the books don't always represent the way it actually is.

SB: Yeah. Someone's actually sent in an observation saying 'This is freaking awesome'. So I hope that encourages you-

CM: Yeah, we get a lot of that with ultrasound. I mean, what's cooler than looking inside of the body?

SB: Yeah, well, but also-

CM: When we're dealing with things all the time.

SB: Like I sent you five years ago, the stuff we were looking at, which was clinically applicable and portable machines; actually, it was like the white-noise on the television from 50 years ago when you had to twiddle a little knob-

CM: But that was a bad machine.

SB: Yeah, well-

CM: That machine, the one before that, I've got one of those as well in my clinic and it still gives you a good image. So, at 4,000 pound, you'll get a better scanner now for 4,000 pound, but it's still not a-

SB: Yeah.

CM: You know, unfortunately, there is a....you've got to get a good machine.

SB: And what is, I don't, I'm sorry if you did answer this earlier on, but what is the minimum you would expect to pay for a new machine of adequate quality for someone learning this skill?

CM: Seven or eight grand?

SB: Seven or eight grand.

CM: I get that question a lot, so I've, you know, seven or eight grand.

SB: Okay, and from, I know you aren't involved in the sale of the machines, but did GE make it easy? Do they do leasing programs? Do they do-

CM: They do, because people are always asking about leasing and renting. My experience is that people just end up buying, because it just works out, obviously more money. GE will come and they'll come and do a, you can ask them to come to your clinic, and you can have a play with the machine; have a go. Then they come back and they set the machine up for you through the application specialist, comes in and gets started. I think their aftercare's pretty good.

SB: Yeah.

CM: It's, there's no easy, there's no cheap way of doing this, that's the thing. If you go cheap, you go cheap by twice, or whatever the phrase is, but, yeah.

SB: Well, I'm just saying-

CM: It just makes it harder.

SB: There will be a lot of people who are very impressed with the images, because we've seen images under the hands of an expert who knows exactly where to hold the head, how to hold the head, and-

CM: Yeah.

SB: And to describe what he's looking at.

CM: Yeah.

SB: But I suspect a lot of them will be deterred by the difficulty in getting the adequate training, the amount of money they're going to have to put up front, and the fact that there's possibly no, certainly, no immediate tangible benefit to the clinic finances in having this machine. You didn't buy an 8,000 pounds machine and say as a result of that I'm going to get 20,000 pounds back.

CM: Yeah, in three years I'll make my money back. Well, there you probably....you might do but it's very hard to put that on a spreadsheet.

SB: Well, it is, but-

CM: You do it, you buy it because you want it and because you feel that that is an, that it's going to help you do your job better.

SB: The only sort of counsel I might put to that is, as you said earlier on, patients do like seeing this sort of thing, and if, if you're the clinic that's got this stuff and it will be on your website, because you'd be mad not to have it on your website-

CM: Yeah, yeah.

SB: And, the other clinics haven't. Just as patients are always saying, 'Well I need an MRI'-

CM: Yep.

SB: Well, they can say 'Well, actually, you've got imaging; you must be better at getting me better than the person-

CM: Yep.

SB: ...who hasn't got the imagery.'

CM: So, I know people charging for it. I've got no problem with that. I think in terms of what I would charge, I might charge more, because it's part of what I do. I do a ultrasound scan, but it's not being charged for the ultrasound scan. It's just a bit more to see me. Does that make sense?

SB: Yeah.

CM: That's one way of doing it, definitely. My issue with it-

SB: It's reasonable to charge more. A, they're going to pay for your time, but also there's the depreciation on this machine which you're going to have to replace it with…

CM: Yeah, I get that totally. The issue with it for me, I think we talked about it before, is who needs a scan and who doesn't. If you come in to see me; that chap comes and see me; and' I go, 'I'll assess your shoulder', which is what you did at your clinic, you assessed his shoulder, you charged him whatever you charged him and I go "Look, I'm a bit worried about this. I'm going to do an ultrasound scan, but it's going to be a hundred pounds.' For me, I just don't want that conversation, because for me, I'm doing my job much better if I can just scan him straight away; not much better, that's the wrong phrase.

I'm gaining more information if I do an ultrasound. I want to do it whether he wants to pay for it or not. That's where it gets difficult.

SB: But what about-

CM: Because can you get, if you walk in with an achilles problem, can I get you better without a scan? 80% of the time, yeah. But if you're not getting better six weeks down the line, three months down the line, I probably want to do a scan because something's not quite right. And then it's...again, it's about having that conversation, I'm going to do a scan and it's going to cost you 80 pounds more. I just, I'm not; I don't like that. If you ring up-

SB: The obvious answer is, why didn't you do it in the first place, and that would piss a patient off a little.

CM: There you go. I think you've nailed it. It gets very gray. It gets a big tricky. If a patient goes on your website and sees you do ultrasounds and says 'I'd like to book in its 120 pounds for an ultrasound' I say 'yeah, that's fine, no problem.' Come in, they'll do a clinical assessment as well. That's easy. The setup is quite often not like that where they come in and then you have to talk about the scan.

SB: It's always a horrible ethical dilemma, isn't it, when you're asking a patient to pay more money for something and-

CM: Yeah.

SB: That may or may not get useful information from.

CM: That I want to do anyways. So if they say no, what? Am I not going to scan, because I...do you know what I mean?

SB: Yeah.

CM: It gets difficult. There's people out there that are doing it, and I'm sure they're doing it very well and I've got no problem with people charging for scans, as long as it's done in the right way. What you shouldn't do is offer an ultrasound clinic service, because you'll get your lumps and bumps. You'll get your hernias. You'll get your weirds and wonderfuls that we wouldn't normally clinically assess, and that means you're going outside your scope of practice potentially.

SB: Yes.

CM: So, that's where-

SB: Which leaves you open to all sort-

CM: Yeah.

SB: Now we've got two related questions, which might well be the last ones unless people are quick with remark with the follow ups. Robin has asked one; I don't know who's asked the other, but they're both about spinal related injuries, disk related injuries. Robin has said, he understands you said it's not much use on the spine. If you could see jointed fusion, could it be used to differentiate between faceted fusion and interspinous ligament edema, or swelling, and why is it not so useful for the spine and the other ones, can you see disk related injuries?

CM: Can you see disk related injuries? No, the problem is that you've got bone in the way. That's the main problem. If there's no bone, you know, in the way, then you can see it. So, you can see the facet joints, and you might be able to see a bit of an osteophyte or a joined fusion. You may be able to see that a little bit. I don't, I'm sort of speaking outside of my scope here, because I don't use it for that, but I know pain consultants do it to guide injections and that sort of thing. The answer is, you can see some of the ligaments, but I don't think it will help any differential diagnosis.

SB: Okay. Couple of questions; both from somebody called Jason, but I don't know if it's the same Jason.

CM: Right.

SB: One of them is in Liverpool. The first one is what do you think are the best clinical tests of the shoulder in your experience with the ultrasound?

CM: Clinical....what-

SB: I think he's probably saying having seen what you've seen in the ultrasound, which clinical tests do you therefore feel are more reliable?

CM: A quick answer? So, clinical diagnosis of the shoulder is acromioclavicular joint. So, a patient comes in and goes 'It hurts there.' That's pretty sensitive and specific for it being in the acromioclavicular joint. So, clinical diagnosis; you poke it, particularly at the posterior aspect, and they go 'It hurts.' So, that's one clinical test. Then, looking for a capsular restriction. So I'm always specific. I always look for a capsular restriction passively here and up at 90% abduction. If you want to know what's going in the rotator cuff, the subachromial bursa, there is not a clinical test that's going to tell you that.

SB: Yeah, so full cans, empty cans, all that sort of stuff.

CM: Nope, nope. As you get more experienced and you put a few of them together, you may get some of them. Empty can, for me, all those are pain provocation tests. So, if the capture was clear, then it tells you that there may be some pain coming from the subachromial region. That's all we know.

SB: Yeah. An interesting one; red flags. When can you not use ultrasound, and of course we were always used to be taught ultrasound's a great marker for fracture, isn't it, because…

CM: Yeah, different frequencies. Yeah, yeah. So, I mean there's no, in terms of sort of contraindications or anything like that, you wouldn't scan over, I don't know, an infected area, an open wound, but there's very few. There's a fear of ultrasound, I don't know if there's people with that, but, yeah, there's very few. It's an extremely safe, It's sound waves, you know.

SB: Well, presumably the one thing that everybody calls a red flag, pregnancy is not a red flag for this because it's used all the time-

CM: No.

SB: ...time to look at fetuses.

CM: No, no.

SB: I think I know the answer to this. Can ultrasound provide any information about bone density?

CM: Nope.

SB: It can tell you that there's bone there and that's it.

CM: Yep. But, you can see the cortex of the bone very nicely, so. I've had lots of cases of greater tuberosity fractures missed; not missed on x-ray, not seen on x-ray; radial head fractures, lunate fractures, lateralmalleolus of old shins-

SB: Right.

CM: Yep, where the fifth metatarsal, had one of them the other day where clinically, it is a fracture, you know, where you poke it. They've had an x-ray; it's normal, but on the scan you an see the break of the cortex.

SB: Yes, yeah.

CM: And, then they go off for further imaging if required, and that confirms your diagnosis. An area that people probably don't think of so much. But, I'm not saying you use it to diagnose fractures, it's just that these walk in to our clinic-

SB: Yeah.

CM: And, you're trying to gain more information on that patient.

SB: Okay. Marian Jones says, "It would be helpful to know who uses this in their clinic so they could refer. Is there a directory of who does have this stuff?" But, I was going to ask, do people, do GP's and other refer into you-

CM: Yep.

SB: ....as you…

CM: So, I've got an osteopath, called Alex, who's at Pontio Osteopaths, and I went and did a teaching for them, and he refers an awful lot now, because he's really now understood that we can't keep guessing.

SB: Yeah.

CM: It takes away the guesswork; educated guesswork, but a lot of it is still guesswork.

SB: And what about a directory of those you are using, so that we can refer ourselves

CM: I think that's a really good idea. I suppose that comes back to who would be on the directory, because they would have to be, for me, if I set up a directory, which I think is a really good idea, I would have to make sure that they've been through some sort of competency-based training. But, that's a very good idea because patients want this facility. They want this one-stop shop and they-

SB: Well, I think the directory was for practitioners, not for patients who… And also, an osteopath, chiropractor or physio can know where they can send someone…

CM: Oh, that's what I meant. That's what I meant.

SB: Are you…?

CM: Yeah, but I still need to check the people in the diretory, as to whether or not they've got the right-

SB: All right, I thought again you were saying it's the patient's-

CM: No, no, no. Although, you could.

SB: Yeah. Patient's are less likely to understand the nuances of training, I would assume-

CM: Yeah, and I wouldn't go there either.

SB: Yeah.

CM: Because I think what's, I think it's a good idea that if you guys have, for example, that gentleman that came in this evening-

SB: Richard.

CM: If he knew that in the area within the 10 miles there was somebody, a physio, a cartero, a sports doctor who was using ultrasound who could do it-

SB: Yeah.

CM: ...who could do it there and then, and get that information.

SB: Obviously, you do run courses, and it would be-

CM: Yeah.

SB: ...Remiss of me not to talk of it, just for a minute or for-

CM: Yeah.

SB: ...You to talk for a minute or two about those courses. How long are they? When do they run? How much do they cost?

CM: Yeah. All that information. So, ultrasoundtraining.co.uk, it's called SMUG, Sports Medicine Ultrasound Group. It's run by physios of myself and guy called Rob. We've got sports doctors that lecture, radiologists that lectures. We've tried to get all different disciplines in, but don't actually have an osteo, oh, I'm an osteo. If you go onto there, we do a, the place to start is a two day introduction. Find out a bit more about ultrasound. See if it's something you'd want to incorporate into your practice. You get lots of time to practice. All of our courses are set up that we have lots of machines, lots of tutors, so you get lots of time to practice. We then do an advanced course and we do a mentorship program. That's the one that we get quite a lot of osteos on, because that is a competency pathway, so it's perfect for the private practitioner basically, who can't get a clinical supervisor.

SB: But we'll-

CM: And then we do the guided injections.

SB: We will put that stuff up.

CM: Yeah.

SB: Quick word on, one question coming from Sally, it's definitely the last question. Can you detect clots; blood clots in the legs?

CM: So, it's a really place, a good place to end. Beautifully, yes, it's outside the scope of any of us doing ultrasound. It's a vascular, it needs to be done by a vascular sonographer.

SB: Right.

CM: That's outside our scope.

SB: So you're not going to go in and do that specifically?

CM: If somebody comes in, potential DVT, I send them away.

SB: Yeah.

CM: Quite quickly.

SB: Chris, it's been freaking awesome.

CM: Okay.

SB: I thank you so much for coming in.

CM: Thank you for having me.

SB: I have lots of people going to your courses.

CM: Yeah, yeah.

SB: I hope that the kit becomes more widely available-

CM: Yeah.

SB: ...That we all see more use made of it. My wife's already getting, having kittens over there thinking they're about to buy a machine.

CM: Yeah, yeah. Good stuff. Well thanks very much for having me.

SB: Anyways, it's been a delight to have you here. Thank you so much for coming in.

CM: Thank you very much.