**Marlena Klaic May**

Thanks, guys.

Sorry we’re a few minutes late.

Thanks for all turning up on this really cold morning and super early.

I also wanted to acknowledge that we have some people joining us on Webinar for the first time, so hopefully, it’s all going to work out well, but if not, we’ll live and learn and move on from it.

Before I go on, I just wanted to first of all acknowledge my colleague researchers who have been involved in the hand hub, so Susie mentioned that it was a multidisciplinary team.

There was occupational therapy involved as well as rehab medicine and physiotherapy as well, so Prof Delayer, Prof Kahn, Louisa and Aladdin were all instrumental, all, that’s okay, all instrumental in setting up the hand hub and publishing the paper as well.

We won’t take any questions during the presentation, primarily because the Webinar people may want to ask questions as well, so at the end of the presentation, hopefully, we’ll have 10 or 15 minutes spare for lots of questions.

Can everyone hear me?

At the back of the room, am I loud enough because I can project more?

So, what I’ll go through in today’s presentation is some background information, some stroke statistics which we all probably know because most of us here work in a neuro background, but we’ll just do a bit of a refresher on that, what the research is saying about neuroplasticity, and what the research is also saying about emerging technologies, and then we’ll go through the hand hub study and that had the question around whether emerging technologies can enhance upper limb outcomes.

I’ll go through the results, the overall results and describe it in a bit more detail with one particular case study, and then I’ll also spend a bit of time talking about the research practice gap, and we mentioned before that I just finished my PhD after a million years and my area of interest is really looking at how Allied Health professionals can overcome this research practice gap and we really used a lot of the findings from my PhD with our hand hub study, so looking at how we can engage Allied Health clinicians to produce research and consume research and make it sustainable, because it’s really hard trying to change practice and certainly, if we’re talking about emerging technologies, it’s not a matter of just putting some stuff in to a practice, so putting a robot there and crossing your fingers and hoping it’s going to change things for patients and for clinicians.

So, I’ll go through how we did it, how we made it affordable and how we made it sustainable, so for those of you who were thinking about introducing emerging technologies, if you’re a manager, or you’re a clinician, I hope that you can leave with some really useful handy hints about what to do in your own practice.

All right, so stroke.

We know in developed countries that it’s, it remains the leading cause of disability and in third world countries or developing countries, it still remains one of the most high or most common causes of death.

In Australia, there are nearly half a million people who are living with stroke, and surprisingly, nearly a third of them are under the age of sixty five, so it’s not a disease or a disorder that’s just for elderly people and certainly, I know my clinical practice, we see lots of younger people coming through and I’ll show those statistics later on.

Patients who are presenting to an acute hospital service with a stroke, more than two-thirds of them have a upper-limb impairment, so nearly 70%. When we look at those patients six months down the track, 50% of them continue to have a non-functional upper limb.

So, we know that those who actually have a period of time in rehabilitation, most of them, four out of five, will leave with ongoing upper limb difficulties and there are lots of reasons for why this happens.

This is from the Australian Institute of Health & Welfare, going through some data around disability and what patients report as having the greatest impact on their quality of life, and if you have a look at the top four, most of them involve the upper limb.

So, a restriction in physical activities or work, incomplete use of the feet or legs, incomplete use of arm or fingers and difficulty gripping or holding things.

We also know from research that upper limb dysfunction following the stroke has a high correlation with anxiety, poorer perception of quality of life and depression.

So, as somebody who’s worked in stroke rehab for quite a few years, I understand the challenges to providing upper limb rehabilitation.

In the first instance, there are a lot of tasks that can be done with the non-impaired upper limb.

So, what we find in rehabilitation is that we pretty quickly move to a compensatory approach.

We’ve got very limited length of stay now in subacute services; so it’s not surprising that we do, in the first couple of weeks, look at that compensatory approach and from the patient’s perspective, I guess they’re looking to be independent as much as they can.

If that means using the unaffected upper limb, then that’s what they often revert to.

The problem with that is that we move in to a learned non-use pattern really quickly, and certainly, from a community-based perspective, a lot of the patients who I see come in through the door have unmasked potential.

They’ve got these learned non-use patterns, so it’s not so much that we’re looking at an impairment level that can’t be remediated, it’s more that they haven’t had the opportunity to actually practice and use the impaired upper limb, so we end up with some cortical changes because of a learned non-use.

The upper limb is complex.

God, who doesn’t know that?

Anybody who’s done upper limb rehab would know it’s never a matter of that upper limb presentation being about one level of impairment.

It’s very rarely just about motor weakness or just about spasticity.

Often, we’re seeing multiple impairments.

We might see that there’s increased tone, loss of strength, sensory changes, perceptual changes, so it’s really a complex field to work in, and often we can have patients with cognitive impairment and that certainly affects rehab outcomes, being able to get your patients to carry through with your rehab recommendations day-to-day can also impact on their progress.

Then we have the organisational factors.

Those of us who work in rehab would be aware that the length of stay is just reducing all the time.

I’ve worked for a number of years and I’ve seen it come down seven days, eight days at least.

Time constraints, we’re all time poor and we all have a lot of patients, being able to rehab the upper limb takes a long time.

It takes a long time if you’re a community-based patient or even for inpatients, and time is something that clinicians don’t really have a lot of.

What we do know is that the upper limb, the impaired upper limb following a neurological event does have the capacity to change.

Neuroplasticity has been in the media and it’s been really popular probably for the last five years or so in terms of mainstream media.

Neuroplasticity refers to the capacity of the brain to reorganise itself.

It doesn’t necessarily happen automatically and I’ll go through in a minute the factors that can really encourage neuroplasticity.

What we see in front of us here is probably the classic experiment showing the outcomes of an enriched environment.

So we see that we’ve got some monkeys there on the left, and the one on the far left has been presented with a really challenging task.

This is food related, most animals respond to food-based training, sometimes humans do, too, but we see this monkey on the far left, he’s got a really complex task.

So he’s trying to reach the food from a really small, shallow sort of aperture, so he has to really work to get to the food.

He’s got to actually turn his hand and he has to establish a much more refined grip than his buddy in the next cage. So, in the next cage, it’s a much larger-sized food well and he really can just do a gross grip, just grab the food, bring it in and eat it, and imaging shows for these monkeys some real differences in terms of cortical representation of the digits, and what we see is that the monkey on the left who really had to work hard to get his food had much greater representation of the digit on his cortical mapping in comparison to his buddy on the other side.

So what we know is that a challenging task actually results in different changes in the brain and that’s really important for us to keep in mind when we’re working with our patients so we know that criteria is important.

So we’ve got some evidence, not just from animal studies, but certainly from the body of evidence that’s growing from human studies to say that there are some particular factors that are really important to get the best outcomes for upper limb rehab.

First of all, we’ve got intensity and this is the kind of sexy topic in rehab at the moment.

We’d spent a lot of years thinking that it was about enriched environments or coming to rehab five days a week and I will talk about frequency in a moment, but what we’re finding is that it’s actually the intensity of practice that our patients are undergoing, so intensity refers to the number of repetitions per minute.

So it’s not so much about the patients coming in and sitting there for an hour and doing ten reps, it’s about how many reps per minute our patients can actually achieve in rehab and we don’t know yet, in terms of research, what the magic number is, but they’re suggesting it’s a couple of hundred reps per session.

So intensity is really critical, probably more so than frequency.

Challenge, we saw from our little monkey buddies before, how important challenge is, so it’s not enough for our patients to come in and practice an activity that they’ve done a thousand times before.

That’s kind of a little bit too easy for them and they’re not really having to cognitively problem solve or use their upper limb in a different way, so their challenge is really important.

We don’t want to make it too challenging because failure is a barrier for some of our patients, but you want to make it challenging enough that they really need to work from a motor perspective to be able to achieve that movement or work on that movement and frequency.

So we’ve got intensity at one end of the spectrum and then we’ve got frequency at the other end, so ideally, we want our patients to be coming in at least two or three times a week and certainly, if you look at the recommendations made by the National Stroke Foundation, they suggest roughly sixty minutes of practice, physical practice, for upper limb impairment each day, so that’s an ideal to aim for.

I know we haven’t been able to meet that in our public health facility, which is how we came to be looking at emerging technologies.

So when we think about neuroplasticity and the factors that we need to get the best outcomes for our patients, so we need the frequency, we need the intensity, we need the challenge, but we also are aware of the reduced length of stay, the competing priorities all clinicians have, the fact that we’re so busy.

Our patients are only there for 19 days – is our length of stay in our service – so how do we actually get those two to marry up?

How can we provide the intensity, given our limited resources that we’ve just talked about, and that’s how we came up with the idea of the hand hub and our question with the hand hub was whether we could use emerging technologies in a sustainable and affordable way to enhance upper limb function?

Well, let’s start by talking about what emerging technologies are because sometimes there can be a little bit of confusion and people think that robotics is the same as gaming, so I wanted to spend a little bit of time talking about what the difference is with each one of them.

So, in the top left hand side there, with the little kid with his arms up in the air, that’s pretty much your level one gaming technology, and there’s no immersion, so there’s no, it’s too deep, so all you see is this flat sort of screen, there’s no depth to the movement.

You get the frequency and the engagement with playing, but you’re not going to get the same experience of moving into something.

You’re just kind of moving across it and we see that one most commonly in Australian health care settings, so that’s things like your Wii, MITI, the move it to improve it program, and a lot of the gaming technology that we use in the hand hub.

The next one that we see in the bottom right hand corner is non-immersing virtual reality technology, so that’s the next step up and what we’ve got is somebody’s got some gloves or sometimes it can be some glasses and it gives you the extra dimension, it gives you depth, so now you’ve got a 3D environment.

You’re not fully immersed in it and we’ll go on to what that means, but you can, if you’re reaching for something and you’re playing, it will give you a sense of depth that you’re moving into something and we’ve got that.

Then we’ve got immersive ER technology that we see up in that right hand side.

We don’t really see a lot of that here in Australia, but it is more common in the States with veterans’ rehabilitation and it’s got some really fabulous research, some really interesting outcomes and that’s where you’ve got the headset, you’ve got the gloves and you’re fully in that environment.

You can sense yourself walking into that 3D environment, and in the bottom side, the lady in the wheelchair is robotic therapy, so that’s electromechanical devices that usually can provide full compensation as well as gravity-assisted movements and we, we’re seeing a little bit of that here in Australia.

It’s probably a bit cost prohibitive at the moment and I’ll talk about how we can overcome some of that and we do actually have that robot in our hand hub, we didn’t pay for it.

I feel like I should say that, but I’ll talk about how we actually came to have it, and that’s really quite useful for patients with high levels of impairment. So, what do we know about emerging technologies in terms of evidence at the moment?

I’ll go through some of the evidence that we’ve gathered, but there has been a Cochrane Review and it’s just been updated probably about 18 months ago and they’ve looked at 34 trials with a total of just over a 1000 patients, so we’ve got some growing evidence there for emerging technologies and they looked at a few different types of technologies.

They looked at robotics, they looked at VR technology, they didn’t look a lot at just your basic gaming technology, sort of more upper-level technology that I described in the previous slide, and they found some statistically significant changes in terms of upper limb function and importantly, ADL.

So they found some improvement in strength of the upper limb using technologies, and also range and they’ve also found that patients who participated in this sort of therapy had a higher level of independence with their ADL’s, and of course, these studies were comparing to conventional therapy, that was conventional therapy.

If we went to each of the studies, you could probably criticise a little bit around how they control that.

Nonetheless, they have found that it is more likely that their patient population treated with robotic therapy or with emerging technology therapy do fair better.

So that’s heartening to know, especially for those of us who were looking at introducing some of this technology.

All right, so our question I talked about a couple of slides ago was around can we use emerging technologies in our clinic? How are we going to do it? Is it going to be effective? Is it going to be affordable?

So I’m going to go through how we establish the hand hub, how we collected data and what we actually found.

So we launched it in 2014, and we started off with three pieces of equipment, beg, borrowed and stole, literally, so we had no funding, we had no grants, we had no extra EFT.

So we resourced it with what we had in house.

Three pieces of gaming technology that we had, we had a giant mouse, and I’ll show you the pictures in a moment, we had a biolateral joystick device and we had a Sabo Rejoice.

The Sabo Rejoice we got for free, somebody had been using it for some spinal rehab research, and they didn’t want it any more, so I snaffled it.

I said, I’ll have that, and the other two pieces of equipment, we were doing a bit of quid pro quo, we were doing some trialling for the company that were developing it, so we got to use it.

That’s what I mean, that we literally had no money, so that’s how we made it sustainable.

We set it up as graded workstations, we ran it as a group, so with the graded workstations, we had patients who were unable to move against gravity, we started a certain station and they could work their way up to a next station where our patients who had some antigravity movement could work on their function, and then to the higher level, say, by rejoice where you could practice fine motor grip, etc.

Unilateral and biolateral options which were really important and we also made some partnerships with external stakeholders, like I mentioned, the company that was trialling some equipment, we put our hands up to trial it, we partnered with the university and that was a really great partnership and that’s something that health services can really, really think about doing and I’ll go through how we went about establishing that partnership.

I think this is the video, if I’m not wrong.

No, it’s not, all right, so this is the equipment that we had in there, the giant mouse which is really as simple as what it means.

It’s a big mouse that you can have a patient with who has high pertinacity so they might have a really tight hand, you can take off the bottom part of the device so they can just sit on it like this or patients who are flaccid, it’s just a really great starting point because you can set your patients up on a table, they’re supported in terms of their shoulder, they can use it bilaterally to get themselves started in the movement or they can use it unilaterally.

That’s the joystick device. The joystick sits in a biolateral bar, so for patients, they can use that biolaterally or they can do an active assist grip on to the joystick device.

So, that’s really good if patients have got some anti-gravity movement, even if they don’t, they could actually just rest it on their lap and they can use a bit of gravity to help them and this is the Sabo Rejoice which really can be used for patients with low or high function, so you can even use it if you’re retraining some balance, so it can be used standing or sitting, it can, essentially, any sort of movement that you want to practice, you can do so with the Sabo Rejoice, so wrist flexion extension, externational rotation, there’s just any sort of movement that you like, so that’s a really fantastic device.

That was the one that we actually got for free because somebody wasn’t using it any more and the Armio power, which came to us probably about 12 months after we started the hand hub.

So, I’m just going to show you a video and I apologise in advance because it’s a video of me which is really gross, but it just goes through, shows some people actually practising on the equipment which is kind of cool.

Viewing:

Okay, so when we introduced the hand hub, we wanted to collect data and I’ll talk a little bit more about that later on, so we very much took a practice-based evidence approach and rather than going down the pathway of saying RCT where we had really stringent inclusion or exclusion criteria, we wanted it to reflect what you see in rehab.

So our criteria for acceptance in to the hand hub are really broad because that’s what you get, that’s what walks in through the door.

We very rarely get the sort of patient who reflects what you see in RCT’s, so our criteria for acceptance in to the hand hub was the patient should be able to follow a one-stage command, so we took some patients with really significant cognitive impairment and even in the acute setting, I’ve used some of this technology with patients who are really, really impaired cognitively and I’ve had some incredible results.

You have to have adequate vision because you’ve got to be able to see the gaming technology and that’s pretty much it, so that’s really quite different to what you might see with an RCT, but that’s really what we see in rehab.

These are the sorts of patients who are coming to us.

They’re going to have comorbidities, they’re going to have cognitive impairment, they may have perceptual impairment, etc, so we wanted our population who we’re collecting data on to really reflect what we’re seeing coming in through the door.

We wanted them to have a pain-free upper limb.

If they were referred to us and they had some sort of a shoulder syndrome or some sort of pain, they would be referred to our medical colleagues for opinion before we could take them in to the hand hub.

Exclusion criteria, uncontrolled, epilepsy, obviously, we can’t have people who might be seizing in a group context.

Serious progressive disease, having said that, we’ve had a lot of patients with GBM come through the clinic with some nice results.

Severe receptive aphasia, we need them to be able to follow a one-stage command.

Severe cognitive deficits, so when they were referred in to the hand hub, we’d take a whole heap of baseline assessments, so they’d see the OT or the physio and then a rehab consultant and the assessments that we used were things like the Wolf motor function test to give us some baseline motor ability, cognition was assessed using the MOCA, the Montreal cog assessment, we assessed functional upper limb use, using the armer which goes through some questions around the last seven days and how well the patient has been using their upper limb, their perception of how impaired their upper limb is and we’ve set goals with the patient, so we’d use the gas as well.

The intervention was provided in a group context and I think that really surprises people because there’s this perception that technology really needs to be used one-on-one.

We couldn’t afford to use it one-on-one, we had to do it in a group context.

As I said, we didn’t have additional funding, so we had to be a little bit clever in how we were going to use our resources and hands down, that’s probably the best decision we made and I think in retrospect, we’re lucky we didn’t have funding and try and do it one-on-one because I don’t think it would’ve been as successful as it was.

Patients had to attend a 60-minute session and ideally, we wanted them in three times a week to be able to meet the frequency requirement and there was graduated difficulty, so we were really on top of patients who we saw were changing, so they weren’t stuck on the giant mouse and therefore, all 12 of their treatments.

If we saw that they progressed, we’d move them on and that’s really important.

There also has to be functional training as well, so I think it’s important to acknowledge that emerging technologies are quite impairment focused.

You’re going to get the repetition, you’re going to get the challenge, you’ll have the intensity and the frequency, but doing this sort of movement for 45 minutes doesn’t necessarily mean your patients then going to be able to hold their cutlery, so there has to be an element of practising functional activities, whether they do that at home with a home-based program or within your service depends on how you set it up, but I really need to encourage that you take the impairment specific training and that you practice functionally with the patients and then we had post intervention assessments immediately after the 12 sessions that the patients had, after their four weeks of treatment, and also the six-month mark so we could see around sustainability.

We’ll go through the results.

So the results have been published and it’s only on the first 92 patients.

The last time I had a look, we had over 300 patients come through, so we need to look at the data again because we’ve continued to collect data which in itself is a miracle because Allied Health were just not good at collecting data and I feel like I can say that because I’m an Allied Health professional and we’ve kept collecting data, so just being able to change that alone has been just incredible.

Okay, so a snapshot of the first 92 patients who we assessed.

Average age: 55.6 which really surprised me because I mentioned earlier on in our stroke statistics that roughly a third were under the age of sixty five, but I sort of had the perception that our patients were a bit older.

Obviously, they’re not. They’re sort of sitting in that younger catchment and it might be that our older patients are actually going off to gym, to aged care rehab more so now than inpatient rehab.

The majority had stroke, so that’s 88% had stroke, but we certainly took in some others there, so we had patients with MS, we had some nice results with them, I mentioned before a few brain tumours, a couple of GBM’s, a couple post-resection of glomas and other.

I think we had a young bloke with a spinal cord injury as well, a 17-year-old.

At presentation, 20% had aphasia, 32% had cog deficits, 23% had attention deficits and 20% had perceptual deficits.

We didn’t really collect a lot of data around the perceptual deficits.

I’ve tried to have a look at the technology itself to see what I could pull from it and that’s still something we’re working on because I would also say, I’m going to go through some motor results, etc, but I would say, and I’m just speaking anecdotally because I haven’t collected data on it, that emerging technologies is probably one of the best ways to remediate perceptual deficits that I’ve seen, but I haven’t been able to capture it well enough.

So, a summary of outcome data, so we’ve got the Ashworth scale, the armer, the Wolf motor function test and also the AQ5D which is a quality-of-life measure.

On the far right side, you see something called effect size, so what that means is that’s a measure of the difference pre and post, so the level of change that we saw from baseline to our final assessment.

A 0.1 score for effect size is pretty small, 0.3 is considered to be moderate, 0.5 and above is considered to be a large effect size, so that’s a pretty important number to look at then.

So, if we have a look at the MAS, we saw a moderate change in terms of spasticity, so we saw a reduction, which surprised me because it’s not really a target of what we were doing.

The armer, which is the assessment tool that I mentioned earlier on, it is a self reported scale around how well the patient perceives that they’re using their impaired upper limb, we saw really large effect sizes for their perception around completing tasks bilaterally or unilaterally and their impact on participation and that’s a really high value as well.

The Wolf motor function test, we saw some significant changes with elbow extension, and also with tasks like lifting a pencil, so a tripod grip, so we saw some moderate changes with those two measures, and in terms of quality-of-life measures, we saw some really significant changes in their perception of their overall health and that kind of reflects really what we saw as well from the armer. If you’re feeling that you’ve improved in terms of your participation with your activities, then you’re going to assume that you will have an overall improvement in your perception of health and wellbeing.

So, they’re some really good results for the patients who came through.

So, I wanted to go through a particular case study, just to give a bit more detail of some of the outcome measures that we took and this young lady’s story. So she was a 35-year-old who came to us.

She was probably maybe two years down the track.

She was from regional Victoria, so she had to travel a good three hours to come to us.

Some serious dedication, she had two kids, so that was quite a commitment to rehab.

She’d had left MCA on the background of an ICA dissection, she’d previously been really high functioning, very sporty and was also working at a higher level in an exec role.

She was using the single point stick for outdoor mobility, doing okay indoors, right upper-limb dysfunction, but I have to say she was one of those patients who when she comes in, thinks she can’t use her upper limb, but had lots of unmasked potential there.

Typical disuse, just hadn’t really used it at home, a little bit of executive dysfunction, but doing okay from a cognitive perspective.

The goal that she set for her rehab component for her attendance at the hand hub, she wanted to be able to use her cutlery, especially when she was going out.

She felt a bit embarrassed about having to use modified or adaptor cutlery and she also wanted to be able to put on makeup, she was right dominant.

So, she wanted to be able to put on mascara and eyeliner and things like that, that was really important for her. So, when she started, like I said, she actually had quite a lot of movement there, but she really wasn’t using her right upper limb at all in function at home, but we were able to actually start her on the bilateral device.

She probably moved on to the Sabo Rejoice after the second or third session, so she progressed quickly and she was a dream patient.

She was one of those patients who does everything you want her to do at home, we don’t always get those sorts of patients, but I was talking to Katy before around engagement, this really engaged her. She really felt like she was getting lots of practice, she was getting in to it, she went with the technology and she really ran with it.

I trialled some other things at home with her as well, she’s the sort of person who you could set up at home and know she was going to do her one or two hours of practice there.

So we moved her on to the Sabo Rejoice really quickly and she ended up spending the majority of her time working on movements like pincer grip, tripod grip, the opening and closing components for some deviation movements, all the things that you can do on the Sabo Rejoice.

So I’m going to go through some of her results for the Wolf motor function test.

I’m not sure who uses the Wolf function motor test, but I’ll just quickly tell you, it gives you two scores.

It scores on time to complete the task, the maximum time is two minutes, so 120 seconds and there’s a series of movements that you trial the patients on that progressively get more difficult.

We were using the streamlined version of the Wolf motor function test with our patients. The second component the patients are scored on is quality-of-movement and I really like this assessment because it gives us both.

Sometimes you’ve got to slow your patients down to get better quality movement and you can capture that.

So TM, when she first came to clinic, these are her baseline results for the Wolf motor function test and this is just the timing component, so it took her 2.8 seconds to get her hand to the table. It doesn’t sound like long, that’s a really long time, most people are below one second for that.

4.2 seconds to get her hand up on to a box.

114 seconds to lift a can and it’s a very specific grip to lift the can of drink. They’re not allowed to do this sort of movement. You have to have a little bit of wrist extension and you’ve got to approach it in this direction. She couldn’t lift a pencil at all for love nor money, there’s no way she could do that.

Reach and retrieve is around a weighted item and coming in to elbow flexion, so she was able to do that in 2.2 seconds and folding a towel is really that bilateral movement, so it just took her just over a minute. So, following her 12 sessions in the hand hub, these are the changes in time that she had.

So one second, hand to table, still not hugely fast, but a decent improvement.

She was probably twice as fast with hand to box.

The biggest change, if we have a look at lifting the can, so a minute.

That’s going to be slower than what you and I do, but that’s a really big change, so bear in mind this patient, she wasn’t using the right upper limb at home, so she wasn’t using it to do her drinking or anything, despite being right dominant, so that’s a really big change for her and she could lift a pencil and that’s really important, not because she wanted to be walking around lifting a pencil, but you need that grip to be able to put your mascara and your eyeliner on, so bear in mind what her goals were, that she wanted to be able to use cutlery, what sort of grip do we use with cutlery and that she wanted to be able to put her makeup on.

Reach and retrieve also improved and so did folding a towel, so that’s quite significant, those improvements.

So this is around the quality of movement.

I’m sorry, that’s a little bit sideways there, but it just shows you how it’s scored.

One refers to not using the impaired upper limb at all, so that’s just kind of sitting there, it might be quite a profound neglect or extremely hypertonic. Five is really quite normal, so as normal as it can be.

Four suggests some compensatory movements or that might be a patient who just does a little bit of hitching as they’re reaching, so how did TM go?

So hand to table, she scored three, which suggests that she could do the movement, but there is either some sort of effort or some sort of compensatory stuff going on.

Lifting a can, she was at one, so she really couldn’t do it at all. She needed to use the other hand to help, so she did this sort of thing to be able to lift the can.

The same thing with lifting the pencil, she actually couldn’t do that at all. If you recall, I think it was 120 seconds, so from memory, I think she just said, yeah, there’s no way I can do it.

Three for reach and retrieve, so some effort, some unusual sort of patterns there and folding the towel, she couldn’t do either, and a lot of that is going to be the disuse that we saw when she came in.

Okay, so hand to table and hand to box, we saw that she improved in speed, there was still effort required, so she was faster, but it wasn’t necessarily the most beautiful movement at the end of the day.

Lifting a can, really big difference and I think that this really reflects the device that she was working on, so she was using the Sabo Rejoice, so we really had a strong focus on more distill sort of components of her upper limb retraining, so she went to a four for lifting a can and a four for lifting a pencil.

That is such a big change, a really big change for her.

Reach and retrieve stayed about the same and folding towel improved as well, so she was able to do it, but she needed to do a little bit of support with the other upper limb, so quite significant changes.

So the armer asks the patient in the last seven days, tell us how well you have done things like opening a jar, caring for your upper limb, getting things out of your pocket, etc, so a really functional-based assessment, it’s actually a really lovely assessment to use with your patients.

So what did we get here?

So unable to do activity is four, so we’ve got a lot of fours there, so from her perspective, she was unable to open a jar and she wasn’t doing any of these things at home. I have to say that I reckon if I pushed her, she probably could’ve done some of these things, but from her perspective, she wasn’t doing it at home.

Picking up a glass, severe difficulty, drinking from a cup, severe difficulty, brushing teeth, etc, so we can see that she really wasn’t using that upper limb at baseline at all and that’s following intervention.

So moderate difficulty to drinking from a cup, only mild difficulty.

Brushing teeth, only mild difficulty.

Writing on paper, so she was actually able to do some writing as well, so again, some really significant changes, we didn’t get to using a key. I think if she had’ve continued on or had another burst, we would’ve really been able to get to that level of function.

From the goal attainment scale, I haven’t got the results up there, she was able to use cutlery bilaterally, she could apply her makeup, but we needed to build up the grip still on the eyeliner and the mascara because they were just too fine, so she made some changes.

It wasn’t as good as it could be, but there were statistically some significant changes for her. So, that was an example of one patient’s story and before I go in to the research practice gap, I wanted to talk to you around some of the patients who we had come through the hand hub.

I think again, there’s a perception that technologies for young people, that some of our older patients or clients might not benefit from it and I think I also had that opinion myself, maybe I was a little bit ageist, I don’t know, but I was really wondering whether they would engage with it and if anything, I would say that our older patients probably got more from it or loved it, enjoyed it, engaged with it more than some of our younger patients.

I’d said that we’d had that 17-year-old chap who had a spinal injury, he thought it was a bit lame, some of the games, but the older population loved it.

So we found feasibility in terms of age, it wasn’t a barrier and nor was whether they could speak English or not, surprisingly, so our catchment, we have quite a high population from a non-English speaking background.

It didn’t impact on whether they could engage with it or not.

They were in there and they were working on it.

I mentioned that I thought the group context was important and I think in that setting, they were watching each other and they were wanting to compete a little bit, so what are you doing there? Why are they playing that game? Can I play that game? I can’t wait till I get on that, so there was this real, aside from being a reduction in social isolation, I think it really encouraged participation and drove more practice.

They wanted to be able to do what so-and-so did because it looked good, it looked cool and they were seeing others progress.

All right, so research-practice gap.

I think it’s really hard to change clinical practice.

It’s hard if you’re the person trying to introduce something new and it’s hard if you’re the person who’s receiving the instruction to do something new and we talked earlier on around some of the barriers.

They can be related to the organisation, whose got time to learn something new can be really tricky.

You’re back-to-back with patients all day, whether it’s private practice or public practice; we are really struggling with competing priorities.

There are also clinician-related variables, so learning something new is hard work.

We may lack confidence in: how am I going to use this device? I’m not great with computers, I don’t have time, I can’t be bothered, why would I even need to collect data? I’m here to be a clinician, I’m not a researcher.

**END OF TRANSCRIPT**