

## Supplementary Materials

### Supplementary Table 1:

#### Quotes from Participants grouped into main and subthemes.

##### Main Theme: Functionality of device

Sub theme	Quotes
<b>Accuracy</b>	<p>R-DOT: 'If I'm leaving early in the morning then he's got no way of videoing. So, I was constantly texting you saying I'm working early this week, not going to be able to video. And I know he was taking it, but you had no data'. (NEMD1)</p> <p>'For me, recording, it's better because I can see how he's doing. Sometimes he doesn't do it properly when he doesn't have time. But if I record him I can see how he's doing it properly'. (NEMD2)</p> <p>Hailie: 'I think with the Hailie, it's quite black and white. You've either done it properly or you haven't. (NEMD1)</p> <p>'And I just feel like, there's less room for manual error'. (NEMD 4)</p> <p>Rafi-tone: with the Rafi tone, obviously if it's just attached to the spacer, the inhaler that they're using, it could be their preventer, it could be their reliever (CNS1)</p>
<b>Reliability</b>	<p>R-DOT: 'I took the inhaler just not the video'. (NEMD31)</p> <p>'And I think something that actually records when you've taken it, not when you've forgotten to film or something. with this you could still take the Seretide and it might not show up because you've forgotten to film it or something' (NEMD1)</p> <p>'Something happened with the Wi-Fi, (NEMD 31)</p> <p>So there is occasions where battery has died and you wake up and it's not coming on' (NEMD 32)</p> <p>Hailie: 'Because with the Halie it works if you take it, and if you don't take it, it doesn't work'</p> <p>Rafi-tone: 'if I'm away at the weekend my son doesn't come with me. So, because it's on my phone then he still uses the inhaler, but obviously, it doesn't record it because I'm away (NEMD 34)</p> <p>INCA: The problem is that you then have a very expensive device in a disposable form, yes? You throw away the inhaler afterwards. You've got to be able to take it off and attach it to your next one (CNS1)</p>
<b>Assessment of technique</b>	<p>R-DOT: one good thing about the R-DOT was the technique thing, which for me I felt was more important.</p> <p>Because when you're taking an inhaler sometimes, especially if you're not well your technique can be a bit iffy. Sometimes you can be hunched over or not take enough breaths or something like that. So that's quite useful'. (NEMD1)</p> <p>Rafi-Tone: 'It just makes me feel like I know how to do my pump more, and I can actually use it to help me out with my breathing'. (NEMD 34)</p> <p>I think maybe the Rafi tone would be good if we've got concerns about someone that's maybe a bit dysfunctional or has got issues with inhaler technique, I think that would be a good thing' (CNS 1)</p>
<b>Notifications and reminders</b>	<p>Hailie: 'So, when I was using the Halie I thought it was pretty good because when...on my phone there would pop up a notification saying I needed to take it. And then I'd take it because obviously I got reminded'. (NEMD 18)</p>
<b>Technical issue</b>	<p>Hailie: Yeah, like it was showing that he took three in the morning and none of a night, when he'd have two in the morning and two of a night (NEMD 18)</p> <p>R-DOT: It came up black and then it wouldn't use it, so when we pressed camera... So, we had to keep pressing... yes, so we had to do it three times (NEMD 32)</p>
<b>Data presentation and analysis</b>	<p>Hailie: 'I just think it's having it there and having my data there, would just help me remember to take it more. Like seeing what I've visually taken, would just help me to remember to take more...make me just, you know, remember to take it.' (NEMD 4)</p>

	<i>R-DOT: 'We couldn't view anything. This is what I'm saying, we couldn't see anything. All we got is that the video had been sent successfully. That was it. So, I had no idea. Well, I knew because I was filming him each time. But in terms of how many times I'd videoed him, how many times I'd missed, I had no idea'. (NEMD 1)</i>
<b>Aesthetics</b>	<i>INCA: 'Just because if you want to try and get it in a bag, then it was poking out, so it's not exactly ideal to have it poking out and then you try and sit on where it's poking A bit big to fit in my pocket, so I'd have to bring my school bag with me if I was to take it out with me, like at a sleep over, for example'. (NEMD 5)</i>

### Main Theme: Usability of device

<b>Sub theme</b>	<b>Quotes</b>
<b>Ease of use</b>	<i>R-DOT: 'But you can't film yourself, that's the issue. Because you're taking...you've got the inhaler in one hand, you can't then have the phone in the other hand or something. But I think it's quite tricky. So, mum had to film me every day, which meant it had to be a time that worked for both of us'. (NEMD1) Hailie: 'Personally, for me, it's just the easiest thing, as I said, fast mornings, I just take it normally and it's recorded (NEMD4) Rafi-tone: 'Yes, very easy. And even easy to send it over by email' (NEMD 34) INCA: 'We probably don't have enough kids on accuhalers to actually really justify INCA' (CNS2)</i>
<b>Effort</b>	<i>R-DOT: 'It wasn't the fact that it took time, it was the fact that we had to coordinate. So, I often leave for work just as he's waking up. And then if I go upstairs, I'm ready to leave, I'm sitting there screaming saying get out of the bathroom. Or get out of bed so that I can video you. Oh my god'(NEMD 1). 'I personally think we put a lot of effort in'. You can't do it on your own. We always have to do it together don't we. She holds the phone and I do it. You need two people' (parent of NEMD32) I think it's just another thing to remember. It's also really awkward not like, having to find the website and stuff (NEMD 15) Hailie: So, yes, if you want to do the bare minimum, the Smartinhaler/Hailie is good for that,(NEMD 4) 'I think the Hailie was more easy, you can carry it around. You don't need a phone to do it. And you could do it anywhere. I think it was quite better, more suitable'(NEMD 4) Rafi-Tone: "Yes, very easy. And even easy to send it over by email' (parent of NEMD 34)</i>
<b>Time</b>	<i>R-DOT: 'it's a huge amount of time, because it's a minute a day per person roughly, and then the time it takes you to analyse. So, if you have so many people doing that one, and having to watch all those videos' (NEMD 1) 'It's going to be a big time constraint, especially if you want to...if for instance, for example, you want to be able to show them, aside from the video, but like objective, like make a graph or something, you're really going to have to be methodical in what you do and it's going to take a lot of time to be able to make that graph up, which is a shame. They could tweak that on the platform, I think that would be good (CNS 1) Rafi-tone: 'Not long really, and now he's quite clued up he knows how to load it up on my phone as well, he quite often just does it himself' (NEMD 34).</i>
<b>Routine</b>	<i>R-DOT: 'So, mum had to film me every day, which meant it had to be a time that worked for both of us. Which meant that for me, when I have a set routine that I get up and straight away I have my inhaler, it doesn't work as well because then you've got to sort out a time that works for everyone' (NEMD 1). 'Especially in the mornings because you are trying to get ready for school as well, and it's downloading or something. We did have that issue, where I have just</i>

	<p><i>done it and left it and thought, I can't do it now I haven't got time'</i> (Parent of NEMD32).</p> <p>Hallie: <i>'Nothing changed for us. No routine changed, did it? Nothing changed. You just done it as normal'</i> (NEMD 18).</p> <p>Rafi tone: <i>'It's okay, it just annoys me how I have to get up earlier than I do. Because when I take it, I have to do it when my Mum's in'</i> (NEMD 34).</p>
<b>Cost effective</b>	<p>INCA: <i>'The problem is that you then have a very expensive device in a disposable form, yes? You throw away the inhaler afterwards. You've got to be able to take it off and attach it to your next one'</i> (CNS 1)</p>
<b>Independence</b>	<p>R-DOT: <i>'That's like what I was saying about showing my mum how I do it. I think if you are videoing yourself taking it, it's kind of like them needing to see you taking it, where I feel if it was to just record you as taking it, that's more like the trust and independence of them, saying yes he is taking it and we can trust him to do it'</i> (NEMD 5).</p> <p>Hallie: <i>I feel like it's better because at least I know I've taken it and I don't need...I don't need someone to keep reminding me, if that makes sense'</i>(NEMD18).</p> <p>'And you can't remind a teenage' (Parent of NEMD18).</p> <p>INCA: <i>I like the independence actor because the doctors and the nurses at the hospital is always telling me how, like, my mum and dad can be there to say to take it but at the end of the day they can't force me to take it. Like, I have to take that step. So, I think by getting rid of them telling me to take it and me just remembering myself or be reminded myself standing up for myself would really help me then to take the step forward and actually benefitting from the medicine'</i> (NEMD 5)</p>

### Main Theme: Perceptions and emotions

<b>Sub themes</b>	<b>Quotes</b>
<b>Big brother</b>	<p>R-DOT: <i>To fault parents to see if they are doing it wrong because I personally think that's what it is, to say, yeah, you are not doing this right. Because even with the Smartinhaler, that was there for a purpose and it was like, you are not doing this right and this one is more like personal, because that one they can't film you but this one you can and you are seeing it and it's to say, actually it's not us it's you'</i> (Parent of NEMD 32).</p> <p>INCA: <i>I felt like when you have a monitor you could be really good taking your inhaler but then as soon as you know someone is checking how you take it you start to panic and then when you are panicking about it you forget more, I think. Because you are wondering, have I taken it, then in your head, you are thinking, of course, I've taken it because they are going to check it but then you haven't actually taken it'</i> (NEMD 5).</p>
<b>Emotions</b>	<p>R-DOT: <i>And it's all that thing that I'm getting ready to leave for work and he's not quite dressed yet, so you're sitting there thinking I've got to get a headshot because he's not dressed. It's things like that. And his room's a tip and you're thinking oh crikey'</i> (NEMD 1).</p> <p><i>'I don't feel I look nice, and I don't want to be videoed. sometimes, oh my hair is not right. And then I think to my head, oh, it doesn't matter they know that sometimes in the morning having like crazy hair'</i> (NEMD 32).</p> <p><i>'I don't know, I just find it a bit weird. I think the video. I just found it a bit weird'</i> (NEMD 15).</p>

<b>Behaviours</b>	<p>Hailie: <i>'When I'm taking my inhaler sometimes, I realise that I'm being monitored. So that gives me a little boost and just try and do it properly. Because I remember oh, they're monitoring me, so I want to get good results. I think that's why I do it.'</i> (NEMD 10)</p> <p><i>'I don't remember forgetting it, but I mean, I'm sure I do. I mean, yes, but if I'm waking up, if I wake up late and I'm late for school or something. But yes, I'm sure there will have been times when I have forgotten it'</i> (NEMD 4).</p> <p><i>'He's saying he doesn't change, but I think he changes when I'm monitoring him'</i> (Parent of NEMD 10).</p> <p><i>'I could say to him though before don't forget, and you'd forget, wouldn't you? Within a minute he's forgotten. By the time he's gone back into the bedroom he's forgotten'</i> (Parent of NEMD18)</p>
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### Main theme: Enhancement, improvements and preferences

Sub themes	Quotes
<b>Enhancements and improvements</b>	<p>Hailie: <i>'notification that he took it well or didn't take it well'</i> (NEMD 18).</p> <p><i>Yeah, the technique one, definitely, because then you know if you haven't... You might be taking it for several days with the technique not being great, it's not really being that useful, is it, to him then. So yes, so the technique thing, if it flashed to say yes, tick, that he's taken it properly, correctly, he's got the correct dose. That would be brilliant actually'</i> (Parent of NEMD 10).</p> <p>R-DOT: <i>'Maybe put in an app, so all you have to do is click on the app and then you've got everything there, and you kind of video it or just say that you've done it. So, they can see when you've done it, and if you've done it Yeah. I think it would be quite useful to see how often you do it. So, it gives you a percentage of how often you do it'</i> (NEMD 15).</p> <p><i>'Maybe it could give a message on the phone saying you have taken this'</i> (nemd 31)</p> <p>INCA: <i>'But I guess, something that you can either connect to your phone or tell you itself, like on a reader saying, for example, taken one out of two, so I know I have taken it in the morning or I haven't taken a second puff today, or just something that you can connect it to...I know you guys can connect it to your computers here. Maybe if we could use a general charger we could connect it to our laptops, for example, and then open up a programme that we download and it shows the graph on how long we have been going'</i> (NEMD 5).</p>
<b>Preferences</b>	<p>Hailie: <i>'Yeah. I think the Halie is a better choice because if it's programmed and you know you've got to take it, and if you've forgotten it, it will remind you, you know you've got to take it, and you...because you've had a condition so you can't not forget to take it. And I think this is a better one'</i> (NEMD 18).</p> <p><i>'Really good, I like them. You can get a lot of data from a single device, not just, have you used it, yes or no, not a total...you can see kind of patterns of when they've done it, have they done...is it a morning person, is it an afternoon person, whether they've dose dumped, you can get just the biggest scope of information. However, the ones that we've got at the moment can see the biggest disadvantage, you can't see flow, it is re-actuation, so if you've got someone that's clever then they could just conveniently just do a twist and not do it, I don't know'</i> (CNS1).</p> <p><i>'personally, I would say the Smartinhaler is already a pretty good system. And there obviously could be some tweaks made to that, I can't say completely what they should be, but I think it's so far, pretty good'</i> (NEMD 4)</p> <p><i>'So, I preferred the Halie to the normal smartinhaler, despite the problems, because it's I think individual personalities. I like to keep an eye while he's still young, that he's taking it properly'</i> (Parent of NEMD 10).</p>

	<p><i>'I think it's good, especially with the teenagers, they like to have gadgets and apps, and if they've got that ability to have Bluetooth, they can see what they're doing, I think that's good. Parents, if they want to, can also log in if the kids don't mind, they can see what's going on. If it does flow and actuation, bonus. That would be great' (CNS 1).</i></p> <p><i>R-DOT: 'I don't like the video idea' (NEMD 32).</i></p> <p><i>I don't know, I think it's...for people my age, I think they just wouldn't do it because it's kind of, like, weird. But maybe for younger people, because then it's like showing how they do it (NEMD 15).</i></p> <p><i>Rafi-Tone: 'I think it's a bit better, because he sees what he's doing with it, rather than just it sitting on the pump, he's just a bit more interactive with it' (Parent of NEMD 34).</i></p>
<p><b>Personalised adherence monitoring</b></p>	<p><i>If we've got a choice of maybe more than one type of adherence, like one might work better for someone and the other work for the, so I think if they've got more choice, then they're able to make that choice, it's probably a good thing, especially with the teenagers and the adolescents, they do want a bit more independence and they don't want to be...because they're obviously always getting supervised and adherence, and it's quite key, and obviously if you're like 14, 15, 16 years they don't want their mum or dad kind of looking over them making sure they're going to do it (CNS 2)</i></p> <p><i>I think probably depending on the patient as well, so initially I think probably some of them would be easier, I mean for children who are most...for parents who kind of want to distract them more into taking their...and some of them probably like the Rafi tone, from a parents' perspective, and then for those who are independent, are getting a bit older, the Hailie is the way forward, and for those, it all depends on their age, I think, is the biggest things, what would work.(CNS 3)</i></p>