



Malcolm Chalmers 00:51  
Christina became a professor in 2018, having become director of the clinical operations research unit in 2017. Having joined it in 2005, I think, yeah, definitely in a long time. So having obviously done our research before this podcast, we were looking up Christina's Wikipedia entry, as well as being a winner of the LYNN THOMAS impact medal, and a former Harkness fellow, we discovered that, after an undergraduate BA in maths from Oxford University, Christina has an MSc in mathematical physics and MA in classical civilization, an MA in medieval history, an MSc in Applied Statistics with medical applications, and a PhD in space physics. So to begin with the PhD

Yeah. And interplanetary electrons is what I was doing, how they scatter between Sun and the Earth. And then while I was there, the space shuttle Columbia blew up. All space flight kind of came to a halt for a number of years. of no astronauting for me. And then I kind of had to decide what I wanted to do. And in that time, the bit of physics that I was studying my interplanetary physics wasn't really funded anymore in the UK. So it was kind of do I stay out in America forever? Or do I come back and you know, my family's here and, and actually, by that stage, like doing space physics gets you to a lot of really cool conferences, because they're all were telescopes. I say Hawaii, you know, Chile, you know, but I realized that I was working on a really obscure problem. That didn't actually matter. Like it didn't affect anyone's life. If I did it wrong. If I did it right. There may be 10 people even in the world who would care about the papers that I wrote, wow. And I kind of realized that I wasn't one of them anymore. So I thought, well, what can I do? And I knew I wanted to come back to London and I kind of selected all the universities and found UCL found where I work now the clinical operational Research Unit applying maths to healthcare. So I kind of stopped them worked out what their CVS or I was like, hey, a lot of these people are ex physicists. So, yeah, so then I emailed them, and I was like, give me a job give me is amazing. Have you asked me, but I kind of like then

Malcolm Chalmers 05:32

this is turning into careers advice podcast. This is amazing. Absolutely. This is not the kind of history you would usually expect. I did a level maths, and then I did a degree in maths and then a master's in math. This is inspiring, honestly.

Christina Pagel 05:53

Well, so then, I mean, it wasn't quite like that. So they had to obviously advertise. And then I was obsessive checking them a page, When are they going to advertise and advertise because my job was coming to an end in the States. And eventually, I am, director, I said, Look, I'm not saying you have to give me the job. But if you don't advertise it, at least, I'm going to have to take this other job offer that but when I did have another job offer, and then sure enough, the next day, pops up, and I applied, and I got it. I'm still here. So that's kind of how I got into this. And it has been, like, I've never regretted that decision at all it has like since I started what I believe being an academic as a bar has changed in response to my work. And I have a very different philosophy now than I did when I joined. But actually the work I do and, and I love the fact that what I do matters to people. So that is definitely keeps inspiring me, but I also haven't forgotten history. So then in 20, no 2008, I did another medieval history, one at Bir° at Bt i en in

challenges you to think in a really different way. And I found that maths was quite useful, because what math teaches you is to look at what's not there. So when I'm looking at the evidence, you're always thinking about, like, what isn't in the evidence? What don't we know about why do we know about it? And you get , a tte



dying, given that you know, what's wrong with them, how old they are? Are they underweight, they're premature, all these things that really make a difference to your chances of a good outcome. So it started off with us building this risk model, this formula in 2010, to 2012, where we work with conditions from Great Ormond Street. And we developed a good model now work pretty well, that finished in 2012. And then straightaway, we're thinking, Well, you know what, next, we actually want to help people use it, because often, things just end up publication. Yeah, but just publishing a formula doesn't make something happen. So then we got a bit of extra money from the National Audit body to actually worked with some hospitals to develop Excel software. That meant that they could just take the data that they're collecting anyway, stick it in there, do some cleaning, checking, run the formula, and then tell them how they're doing compared to what the formula expected.



Malcolm Chalmers 13:14

Was it a deliberate choice to choose something that would run in Excel? Because it's so common? The software?

Christina Pagel 13:19

Yes, because that's what people use. And so I think one of the things we've learned is that any barrier, even a barrier that adds two minutes to your day doesn't happen. So yeah, it was always a deliberate choice to do in Excel and, and I worked with them quite a lot to make sure it was as easy as possible. So the order of the columns is the same as the order they put it in. It gives them extra stuff, like I would clean all their data and sort it and highlight it nicely. Give them nice error messages, because then actually help them with their own data. They could keep that up today. So we developed that software. And the National Audit buddy wanted to use it for the first time for their public reporting. And they put quite a lot of pressure on us and said, you know, can we have it? Can we have a monochrome? It's not quite ready, and then eventually it was ready. And originally, we plan to give it to the audit body and all the hospitals at the same time that we were just licensing it through UCL business, right. So we were just that said that I said, Okay, you can have a prototype week earlier. And then they were testing it internally. And what happened was that deliberately, I designed into it, that if you are missing, if some of the patient records are missing really important information, like age weight, it won't calculate a risk for that patient. It says it's, it's meaningless. Yeah. And you have to go back and you have to update that record on the grounds that the hospitals wouldn't know, you know, what the date is, and you know, what, the ages and all that kind of stuff. The National Audit body when they tested, it, obviously couldn't update any missing data. And they didn't without going back to hospitals, which they would do if they were actually publishing it, but the

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or carrying that matter. So they don't really see the use of a website, which actually makes an effort to include people who

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Christina Pagel 22:38

also had, like an experimental psychologist from King's working with a, and that was great. But he's he that we literally had, like experiments where we would test the use of the word chance versus probability versus lung and see how people reacted to it. How is it appropriate not appropriate, like talking about like, talking about deaths from heart surgery? very inappropriate. So we couldn't use that word, for instance?

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Maymana Arefin 23:03

That makes sense, because the subject matter is so emotive, exactly getting

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Christina Pagel 23:08

that language, we shifted the whole frame from mortality to survival. Because partly what wasn't being emphasized in any of it was the UK has some of the highest survival rates in the world. It's like 98%, now of children by the month of surgery, and it was used to be, you know, back in the 1990s, you 80% I mean, it's gone. Massively huge amount to improve. Yeah. And so we kind of did that. And it completely changed the content of the website, like Originally, I thought, all we're going to do is just show them what the audit body does. And just explain that we know with a bit of cartoon bubbles, we didn't understand what the body was producing. It kind of did things in terms of ratios. But it turns out, people don't know what a ratio is. Or even things like they would describe the ratio, this is actual slash predicted, people didn't know what the slash was. And it was things that I would never have realized. That is it's my because my life female, and kind of what was a plot of dots with some confidence intervals around it. People when as a bar chart, because of how it was colored. And it was things like that, that made you realize you can't present it as settle things. Yeah. So important time. And then the parents are saying that we didn't know survival was that high? Why not? Right? Yeah, they presented as a ratio, there is no absolute numbers there. Right? So we presented things as absolute numbers, and we changed the look of everything. And then they said, right, we need some key messages. You know, you keep telling us You shouldn't compare hospitals to each other, you should compare them to what the formula tells tells us to expect. So why are you putting everything in a table? Because that just invites comparison, like, Oh, good point, it's changed individual to say all those kind of little decisions

Maymana Arefin 24:43

They all add up to how its recieved yeah

Christina Pagel 24:47

kind of went all the way down to we kind of develop animations of of how risk formulas work for people who are interested in that kind of second layer information. But in it, you kind of have to show CINAHL rays of what can happen either lots of different realizations of what can happen. You know, we're really stuck because we're going to have to show cartoon children dying. What is the sensitive way of doing it? And it was kind of literally like, do we fade them out? Do you put a black square around them? Do you ~~fade~~ them? Do per

involved right from the start. But do you feel you made that decision as a response to kind of seeing that the priorities were different? And those experiences from parents were really important? Or was it something you had in mind from the start that you kind of then followed?

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Christina Pagel 27:18

No, it was a response to seeing or Firstly, to what happened? Yeah. And but then once I had worked with families and parents and patients, I just thought, what do we do, like if we're not measuring the things people care about? And we can't communicate what we're measuring? And so what I mean, that's, that's really kind of how it came to me. So I do and I have now do a lot of work with parents. I don't want to particular training and it's not something a mathematician would do. Exactly. But for me, it means that I know that what I'm doing, I'm giving people the information that they want. And it's my job as mathematician to make sure that information is right. Yeah, meaningful. No, I mean, it definitely has changed how I approach

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Maymana Arefin 27:55

No, I find that I find that really admirable. I think the thing that really stood out to me from that that article and from what you're saying is that it really seems you don't kind of view your role in academia is just, it doesn't end as you hand over kind of this magic formula. And that really comes across because there's so much work to do before that that formula is devised, and then afterwards as well with the communication. So

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Christina Pagel 28:16

I think there are kind of different ways of being an academic, right, you can be an academic, because you absolutely love your subject, and you want to find new results move forward the frontiers of science, I'm not doing that I don't invent new mathematics, I want to have an impact on society, and make a contribution in my own way. And the way that I can do that is through academia. And so for me, academia is a vehicle, okay, rather than the fundamental goal, and there's a place for all of it. Yeah. So that, to me, is what kind of drives me and if I felt that I would make a better contribution outside of academia. And then I leave,

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Maymana Arefin 28:48

I was wondering, actually, on that note, can you think of a moment that's actually really stood out to you as kind of driving you to stay in this particular field in inspiring moment,



wanted to let you know, and I just thought Actually, yeah, if that helped, like one family, that's part of it, then that that means a lot to me. And that's not mathematics, but that is communication, and it's about having a responsibility for your work and, and caring about what's done with it.

Maymana Arefin 31:20

I wondered as well, I guess, being involved in the NHS for some time. Now. Definitely my experience. I've seen how the NHS is under a lot of strain at the moment. And I wondered whether you saw an effect on on how your work is being delivered,

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Christina Pagel 36:06

Yeah, of course, like, I really wanted it, but I have to get money to do it. Yeah. And the thing is, like survey data like this, you can't do it as a research grant. I mean, you can't have a year long lag, you just have to do it. And then so you kind of they don't cost that much money. It's like between five and 10 grand ago, but trying to I'm not gonna spend my money. Yeah, but it's kind of who will give you that. And luckily, you know, we had found people at UCL gas money, grand challenges, some from King's College, actually, their European unit, we have a little bit of money from the people's vote campaign wants you to say things like that. But that is a real struggle. And it's how do I fit that into my day job and but one thing I'd be really interested in now his identity, and this idea of how people's identity shapes what kind of relationship they want with Europe in the future. So one that we had, like my friend and I, who is not UCL, but we did all our Brexit work together. Yeah, she has this hypothesis that people who hold multiple identities already, like, say, minority ethnic and British, yeah, Scottish and British. I don't know me, I'm German and British, you might find it easier to have also European identity. But we don't know, you know, that's just the hypothesis and interesting, but you're all you know, is it different? If you have identities that you choose, like, say, Londoner, or identities that you're born with? Like ethnicity? Like, like, it's kind of like, how do they shape our future and how we want to have relationship because I think if we don't understand what people actually want, now, you've kind of got this idea with Brexit to that. And it just gets to be the government that decides what that relationship is that actually what other people want it to be, it's something I'd be really interested in understanding. It's not.

Malcolm Chalmers 37:50

No, of course. So with all of the process that you went through, with your research we were discussing, and all the processes that you went through with the surveys to try and get accurate information from leavers. If you were to talk to an early career researcher right now, or someone doing a PhD, or somebody who is at that very initial stage of doing their research, do you think there's any kind of general freaall ll Li lk went th Sonhea



what I think needs doing. So for instance, I'm just starting, I'm working on a project with the Health Foundation all about periods. And we're trying to quantify the burden of menstruation on women, which I think is this massive one. I have I don't know anything about what I know about periods. I have them, but I don't know anything. I know exactly. But it's that Well, actually, you know, it doesn't seem that this particular bit where it's been done. I think we should do it. And how do we do it? And who do we need to involve n

