Transcript: Webinar – Can you predict infection? - Joint HIS/IFIC webinar | 07 DECEMBER 2022

Watch the webinar

During this webinar our audience submitted their xxxx questions to our expert panel:

- Dr James Price, University Hospitals Sussex NHS Foundation Trust, UK and Chair of HIS Professional Development Committee
- Dr Ashleigh Myall, Imperial College Healthcare NHS Trust
- Mr Sid Mookerjee, Imperial College Healthcare NHS Trust

Chair: Dr Neil Wigglesworth, East Kent Hospitals University NHS Foundation Trust and Chair of IFIC Board

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Neil Wigglesworth 00:07

I think we'll make a start. So thank you for joining us. Welcome to this joint Healthcare Infection Society and IFIC Webinar. My name is Neil Wigglesworth. I am an infection prevention professional based in the UK. And I'm the current chair of IFIC - the International Federation of Infection Control. I'd like to say on our behalf that we're delighted to be partnering with the Healthcare Infection Society to present this webinar for you all out there.

I'm sure we're gonna have a fantastic entertaining talk from our panellists today. We're joined by a brilliant panel, James Price, Sid Mookerjee, and Ashleigh Myall. I'll let them let them introduce themselves in a moment or two they're going to be discussing a couple of questions covering the broad topic of can we predict infections, a fascinating topic.

We'll let them introduce themselves as I say but just to set the scene, they're all from different professional and academic backgrounds, all contributing to this topic, and all have been working together for some while now, trying to address this question of can we predict infection? So thought it would be great, excellent idea of bringing them together, to give their thoughts, to discuss this topic for us this evening. And hopefully generate some questions from you, the audience and you will be able to pose questions. You can put them into the chat function on Zoom not the Q, the chat function, please do put them in as we go along. And we'll come to those after we've had a bit of time for conversation from our panellists. So I'm going to ask our panellists now to introduce themselves before we move on to our discussion this evening.

James Price 01:43

Thanks, Neil. Good evening everybody. My name is James Price, and I'm a senior lecturer in infection down in Brighton, which means I spend about 40% of my time, doing clinical infection and infection prevention and control, and 60% of my time undertaking research to see how we can combat healthcare associated infections and antimicrobial resistance. And I'm particularly interested in applying new tools and technologies to optimize IPC. And I'm here today because I'm a prediction enthusiast, I suppose is the best way to describe myself. I've worked with Sid and Ash for a number of years now and we've been looking at ways that we can apply data and prediction tools to a variety of clinically relevant questions. So looking forward to discussing some of those, thanks.

Neil Wigglesworth 02:35

Sid, you're next.

Sid Mookerjee 02:38

So - hi there, so firstly, it is it is so nice to be here. I am Sid Mookerjee. I'm a hospital epidemiologist by trade. In my nine to five job I lead the antimicrobial stewardship epidemiology and surveillance unit at Imperial College Healthcare Trust, which is in London. Like James and like Ash, you will hear I am especially keen on two things which is charting the journey that our our friendly bugs are taking on the anti microbials, on the antimicrobial resistance journey but also looking at how we can put some little barriers in place so that we mitigate antimicrobial resistance and one of the things is what we

are here to speak about is what can you use for prediction mechanisms to help us understand what is a very fluid healthcare economy and system Yeah, so look forward to our discussions ahead.

Neil Wigglesworth 03:52

Thank you Sid that's great and last but certainly not least, Ash, I can't hear Ash can anybody else not hear Ash, Oh, there you go. We've got the technical Gremlins it was all working splendid a few minutes ago.

Neil Wigglesworth 04:26

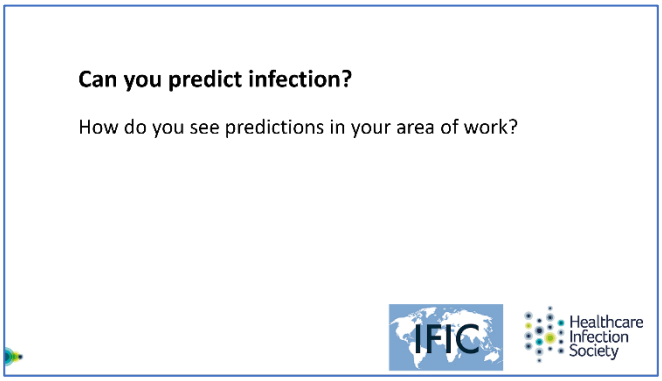
How about now. Now yes. Now, that's good. Okay, okay. Yeah.

Ashleigh Myall 04:31

I Ash. I'm doing my PhD between imperial and the Alan Turing Institute. And I have quite a quantitive background worked in several different areas, mostly aimed around disease prevention and preparedness. And in my PhD I've been really interested and worked on lots of questions around hospital transmission of disease, and I'm really keen to build new tools that can allow us to control and prevent further transmission of lots of different pathogens. And I've really enjoyed working with both Sid and James over the last couple of years during my PhD and happy to be here talking about some of the experience and thoughts going forward. So thank you.

Neil Wigglesworth 05:22

Brilliant, as you can all see a really, really fantastic mixture of professionals and backgrounds to talk about this subject so we'll get straight on with our panel discussion. We'll start with our first question if you see that coming up on screen now, that's the second question I think Helen. Is everyone else seeing the second question? There we go, first question, marvellous.



So we're gonna talk about this first question first. And the question is how do we see predictions in your area of work, and this obviously applies to our panellists. And, James, do you want to kick us off starting this discussion?

James Price 06:00

No problem. Thanks, Neil. So I mean, for me, this is a question that I suppose I've been thinking about a reasonable amount because it's something that, an area I'm interested in. I suppose it's worth starting with the fact that the concept of prediction isn't particularly new. It's something that we all do in our everyday life, in our clinical life. You know, from in clinical practice we have those patients with gram positive and a blood culture and a nasty cellulitis, we make a prediction about what that might be and act on it. We've got an elderly person on a ward who's being pumped full of a broad spectrum of antibiotics is on a proton pump inhibitor and develops diarrhoea, we make a prediction about what might be going on.

And I suppose what we have been thinking about, what I'm thinking about is, can we go one, two steps further? Use information that's potentially available to us or supplement information that's available to us to be able to predict things maybe with a greater sense of certainty, or be able to protect things that in the past we've not been able to do. And so we the audience, myself and the audience, we're all interested in infection and infection prevention.

So probably the key questions that really springs to mind are which patients are more likely to have an infection that's transmissible to others or carry multi drug resistant organism, and which patients are more likely to pick those up and develop an infection or develop carriage of multidrug resistant organisms.

So I think they are quite key, quite significant questions that we are challenged with in daily life. I think there are some other aspects, also the prediction and those abilities might be able to help answer I think we live in a resource limited world and I suppose that's very different from an IPC point of view, and that's both in high income and low income countries, but can we identify patients infection prevention and control risks earlier? To allow us to escalate things earlier de escalate things earlier? And I think that you know, in terms of how we might use and look after the health care resource, the the estate, use of side rooms use of PPE.

And can we, for example, use prediction to help us with how we sample and approach outbreaks in clinical situations where we all have those situations where a cross transmission or an outbreak occurs? And we feel that we have to approach looking at our contacts with blanket screening approaches, but can we do a more meaningful risk assessment of our patients, of our contacts, to be able to look at those? And then can we incorporate additional data to strengthen our understanding and support prediction, some things that we try to look at that I think could be useful as around patient movements, how patients interact with each other with staff, how we could incorporate those points of care testing to supplement these data? The new world is all about our whole genome sequencing again, I mean, I'm an enthusiast about that, but how we can incorporate reference lab data and sequencing data, maybe even human genomic data to understand and supplement how we can predict various things for our patients. And why might, why might we want to do this? Well, I suppose. I think it's fair to say that when we're looking at infection prevention and control, a lot of the work we do focuses on the control a lot of reactive approaches to infections to outbreaks. And I think part of this helps strengthen the prevention side of things.

I don't need to educate the audience about antimicrobial resistance and limited resources. I think we all know that prevention is a key aspect. And this is really about maintaining and improving patients and staff safety. But I think also it's about optimizing the resources available. In an ideal world it'd be great to have lots more resource lots more people. But I think we know that PPE resource has been challenging. We know our healthcare estate is challenged with side rooms and can we use data to help

support and optimize this and the end goal might be about developing some decision support tools to help IPC clinicians, more wider clinicians across the trust our site operation teams to make decisions around this. So is prediction possible? Well, yes. Is it easy no. And I think highlighting to me over the last few years that I've worked with Sid and Ash that actually a multidisciplinary team is absolutely essential for this. And we need experts from our data management and epidemiologists, our mathematical colleagues. So it probably that's enough of me talking and I think that leads nicely on to Sid and Ash's bit, but why don't I pause there. Thanks.

Neil Wigglesworth 10:52

Thanks James. Yeah, absolutely. Sid do you want to add your your views on the theme and this thread?

Sid Mookerjee 11:01

Absolutely. I mean, I think, well going back to to what you noted, James, that prediction isn't isn't something that is far away, but it is something that is here and now and you know, we don't need reminding of the fact that for example, if you look at how we quantify a patient's risk of COPD, how we quantify a patient's risk of diabetes. It's all based on prediction.

Another word for prediction really, to make it more, well, cozy, is the probability of, is how do you we all work in healthcare systems that are, we see a certain part of, regardless of whether you're a nurse you see it from a certain viewpoint, a clinician sees it from a certain viewpoint, an epidemiologist sees it from a certain keyhole, a certain viewpoint a mathematical model from a certain keyhole.

And these are all views of, of what is a very continuous with healthcare system with a lot of people, a lot of contacts, a lot of beds, a lot of the patient's journey is in the community. Where we don't see these patients are in there pre patient stage so some prediction we do all the time, I mean, I can use the analogy of a rainy day. You want to catch the bus, you see the bus stop you you see the bus goes zooming by, the bus stops and you make a decision. What is the probability that if I run in my wet gear towards the bus that the kind bus driver will stop and give me a ride? So we do this every single day.

We predict, we predict the possibility of, right and I think from an epidemiologist point of view so let me lay out my nine to five which is a bit hard for me but I will relive it. It is a surveillance. It is how do we track this transmission. Who is this patient? Who is this patient we'll deal with and where is this patient? We have to communicate this now. And what about the stewardship and the IPC things that we should have thought about and we have to think about. In all of this the patient is central. And as an epidemiologist, you are asking the question in terms of who is this patient, a patient who for the most part up until that time to you is an unknown quantity. And all of a sudden this patient or these groups of patients have become known quantities, you have to understand them because they may be part of a transmission incident outbreak. So what prediction really does is, from my point of view with my hat on, is give me an early glimpse into this patient or this cohort of people. Because as a epidemiologist, really, if you ask me what the panacea is, like, what do you know, if you had a kettle of boiling water and you rub it, and a genie came out, what would you ask them? Genie? Well, I would ask them Genie that....

Please can I have a bubble on top of each of my patients heads, that gives me a probability that this patient is x y z , my probability as a patient of I've just come in for something but my probability that I might be in this hospital and acquire so Norovirus is x, so please take care of me or it or that patient

might say, I'm a asthmatic. I'm taking a lot of medications that do have an effect on my immune system. So I might be a little bit more likely to get a respiratory virus so please don't put me near that guy who's coughing

And it's those sorts of bubbles which would help to understand not just at patient level, but actually at the multiple patients levels. How do we take care of these patients? Do they need to be on a specific pathway? Are they do they have a certain sort of vulnerability profile? Do they need specialist care? Should they be with these other patients who might have also come in for, say for example, a hip replacement. No two patients are alike, is how do you group and of course we've all learned, you know, we've all got to know the hard way in terms of what prediction gives us through the COVID 19 pandemic. Ash me and James worked really closely through that whole period.

And like the world around us, and you know, the sample of the world who have joined us know that it was a unknown unknown, and we have to we have to understand that and a lot of that understanding in terms of how do we quantify the problem? Can we understand what might happen next week? And we have to because we have to understand, do we need more ICU beds? Do we need more general purpose beds? Does the government has to start a field hospital because we might need you know, so level two patients to be moved there. So the pandemic showed us that when it comes to understanding the world around us, especially when we are in pinch points, you need to sort of dig deep and look for hybrid built frameworks where you have the expertise of traditions of nurses, you know, of our doctors and allied health professionals. You then have our mathematical modelers or epidemiologists all coming together and providing a hybrid solution that here's what might happen. On that note, and I've said the word mathematical model a few times, which I hope, Neil helps you to segue neatly into our third but most important participant

Neil Wigglesworth 17:52

Very neatly indeed, so Ash from your expert perspective in this world of mathematics what do you bring to this thread?

Ashleigh Myall 17:52

I think what Sid was saying towards the end especially resonated with how I view predictions in my area of work and it's about understanding the fundamentals of what's happening. So for what I do, I'm not so lucky to sit directly in a clinician's role - patient focused, so what I try to do in my area of work is create models that reflect transmission that can start to give insights into underlying processes that can guide interventions. And the real key way that we can understand is, is this correctly reflecting reality or am I just waving my hands around? Does it have predictive information about the future? This could be instances of infection, it could be a whole other range of other factors that you are interested in capturing through a mathematical model. This is really important then because through these models you can start to link important features that contribute to someone's risk of infection and going through this whole process and building these models, validating that they can predict infection you could start to understand the drivers and tweak how you would handle patient management in a way such that you could control, prevent different pathogens, not so much just in the hospital. And actually a real key part in this whole process is around gathering data. So for me, my day to day operation works like I'm working with big data tables trying to fit in new types of variables, pull out different sources of information from data, from routinely collected hospital data,

not all of that is going to be as valuable for making decisions and part of this process around building these models and then saying do they work is identifying the right data sources that then could be used to guide, or more efficiently guide interventions, and give further insights in to our transmissions. Slightly quicker than both James and Sid's overview but predictions are a key part of my work which allows us to do essentially hypothesis testing.

Neil Wigglesworth

Thank you Ash, that was really fascinating. I don't know if either of you want to add anything else in before we move on. Both of you do, Sid you go first then James.

Sid Mookerjee

So I, I think what Ashley made a really good point about the data because I think it is it is core to a lot in terms of what this sort of prediction framework, some call it machine learning framework does. And I'll explain a little bit further. It's because the rigor of the data that forms the model has such a bearing in terms of how generalizable and how accurate the outcome of the model is. And that is so key because of course from my point of view, there is always this scare at the back of your head that I need to sell this to the clinicians I need to sell this to people who are working with patients. So isn't it so I guess a question, well back to you Ash right? It's so fundamental. And I guess, one of the things that I'd like to know your thoughts about it, as well. And after we have, we have James in is what can we do when not a lot of this data is available. And so, you know, I see the data as the cake. And this sort of model which helped with the decision making would give you the Minority Report, sort of, you know, sort of stone cruise food, swiping those windows aside, well cherry but what if you only want the cherry and you don't have much of a cake. What do you do then, but let's keep that in mind and then I will pause there.

Neil Wigglesworth

We'll come we'll come to that in a second. But I know James want to add something to the conversation so we'll do that first.

James Price

Thanks, Neil. I suppose I was just gonna reflect on a practical piece of work that the three of us did, using routine data to help predict or identify the probability of in patients developing healthcare associated hospital onset COVID infections. And I mean, this is a fascinating sort of application of all of these kind of assumptions and challenges and working our way through this. And I suppose we can go on to talk about the sort of the challenges that might come about but I suppose what what we identified through a variety of sort of trial and error is that actually we could rank the risk of patients developing a hospital onset COVID infection, and we found it actually threw up some really interesting outputs. I'm going to leave it slightly cryptic to try and encourage the audience to go and read our paper, but it's I suppose, just to show that we're starting to see these practical applications and thinking about how they could be translated into a real meaningful, real life situation, but I'll just pause there and leave that slightly cryptic. Thanks.

Neil Wigglesworth

I think that's a really interesting point for me as an infection question. I might come back to that. When I get the opportunity, But Ash I think the question for you was around the policy of the data sources. And what do we do if those are limited, I think, or low in quality, and forgive me if I misinterpreted what Sid has said.

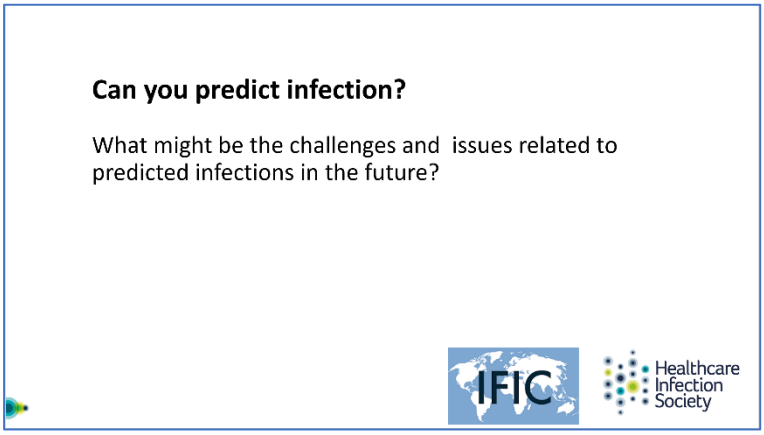
Ashleigh Myall

I think that was a good interpretation. And yeah, I mean, these kind of models the what you can get out really does depend on the quality of what goes in so if it's garbage in its its garbage out. But in different settings, where maybe the key variables that you want, that you think are related to what you're trying to predict are not available. The question is more about what kinds of proxies can you identify to get some of that predictive power and that could be from multiple different sources. And it will be an investigation into what different sources of data will be available. And you could go through and you can try to decide, you know, through this framework of predicting this outcome and evaluating how well you're predicting it. Is the data quality, good enough. I'll leave it there.

Neil Wigglesworth

Thanks Ash. Absolutely. And I think probably a good opportunity for me, first of all to say to our audience, don't forget you can ask questions. Please do put your questions into the chat function, hopefully our panel will be able to answer that for you towards the end. But in the meantime, we have got a second question for our panel to address, which is going to come up on the screen in a second. There we go.

So you got a sneak preview of this earlier. But our second question for our panel. What might be the challenges and issues related to predicting infections in the future? And I think that's a fairly open question so we can have quite an open discussion on this. Again, any of you are welcome to make a



start, James you went first last time do you want to carry on being the lead leading up on this one.

James Price 26:40

No problem. And I'm always happy to moan about the challenges and it's always easier to highlight the limited the challenges that you have. And I mean, it's been a fascinating process for us over the last few years to try and understand what what we need to try and navigate through the system. So I suppose as we've alluded to, and I'm keen to get Ash's and Sid's involvement in this. This is around the data. We've alluded to this already that the quality of data is incredibly important. I think we're in a unique situation where we are, I think as a nation, transitioning more to an electronic patient record situation. Some trusts are very much on the forefront of that some are coming up behind and I know there's national action plans about the transition of all trusts in the next couple of years to have that. And I think obviously that's great for this kind of thing and for lots of practical aspects across healthcare institutes. I think we recognize that many healthcare settings are work at single sites nd so there's that ability to generate electronic data within a site, but also that exchange between sites as well. And so no matter how much you want to predict kind of thing be it may be limited depending on what data is available. I think the data between both primary and secondary care is a challenge as well. And I think there are lots of great works going on about how that could all be harmonized and brought together but I think without that there will always be we will always be blinded to certain aspects, we'll have to make as Ash alluded to, a variety of assumptions about things that are going on. I think we have clearly we have a lot of routine, a vast amount of patients, about clinical management about microbiological routine data that that is collected and understanding which parts of those would be most robust to be used in these kinds of systems.

But as I alluded to earlier, what are what Supplementary Data would be valuable to help optimize our infection. A lot of this is going to be iterative processes about understanding what adds things and that's where Sid and Ash come into sorting these things out. But again, it's for me, I think, from a clinical point of view, it feels a lot about blurring the boundaries between primary and secondary care. We it seems to be that you get screened for germs when you're in hospital and for example, from an IPC point of view, you get vaccinated when you're in the community. And I know there's lots of funding stream issues, but actually, if we really want to be able to support our patients as best as possible, getting these screenings done before people come into hospital understanding their microbiome using that so we can improve and optimize their IPC approaches. As soon as they come into hospital, whether they need side rooms, what is the appropriate thing I think is has got to be a kind of key component to this. And as I alluded to earlier, there's a lot your high resolution technologies, particularly from our reference lab data coming through and how we effectively communicate and bring that in and what that means. I think some core issues which kind of span all of this, which we've we've found, I think is around language. We all come from very different backgrounds, which is fascinating, and we've spoken a lot, but understanding how we communicate and in the language that we use and how we adopt that. I mean, it's been fascinating working with Ash about the mathematical side of things. I'm not a mathematician. As I said, I'm an enthusiast but understanding how how those processes happen, I think has been really fascinating. I think as well we need to recognize it if we're going to start adopting and utilizing new technologies, there are cultural approaches within healthcare systems and behaviours towards this we need to help support people to see how things might be adopted and how their approach is.

We know that infection has a lot of history and involved in things, we still continue to use the Gram stain as a core point in our in our whole diagnostic algorithm and that is over 100 years, you know, this is all how we can bring in these new technologies which really changed things and so addressing cultures and behaviours is important. And I think finally for me the key thing is understanding what the impact is, does prediction lead to actionable changes in IPC and how we manage things? It's great

to say that we've found two related isolates that we would want to do something about. But if we can't actually do anything, we, we just need to understand what are those and I think really this comes down to starting to think about and encouraging robust trials in these kind of translational work to get those on the shop floor, see whether they work and as we all know, there's big challenges with IPC research because understanding impact and outcome is always difficult. It's not a kind of so helping support researchers, clearly I have a conflict of interest in this so I'm just naming that, but I think that's really important, but I'll pause there and perhaps Yeah, leave Ash and Sid to talk.

Neil Wigglesworth 31:59

Who wants to come in next. Sid do you want your follow up on that point?

Sid Mookerjee 32:03

Yes, I think so James, It's a challenge, isn't it? I mean, I think to say the least I think, in my mind, with any with any sort of technology, let's call it that with any sort of decision of a tool that helps us helps clinicians nurses make decisions. You need to think about things like what is the clinical what is the relevance of this output? And it's an easy thing to say, it is hard for those on the ground, to understand if they are facing a incident, or they're facing a patient who is complex. What do I do with this outcome of this prediction tool? So there needs, you need to embed faith. It has to be sensitive enough. It has to be be specific enough. It has to be trustworthy enough. Lots of big words that, often used words, but a lot of that is communication.

There's a lot to say about bias and so fairness. We, you know, Ash as you alluded to both pearls in and pearls out, well garbage in, garbage out. There's a middle ground as well in terms of, you know, if the data that is feeding a model is not representative of the population, that this model is being used in, the outcomes, then can be biased, they can be unfair to use the term and can guide clinicians and nurses and those who are looking after patients, bed managers, you know, to make decisions that that that favour some and don't favour others. We live in a world where we have all heard of the phrase intellectual property we need who owns the intellectual property when a model goes mainstream, we are we developed a we develop something say you make it open source it then starts to feed itself it becomes you know, more it gathers more and more so data it becomes more and more accurate. If a decision is made at the end of it at the end of the pipeline by someone based on that and the outcomes are negative, who's liable. So I think that needs to be kept in mind. Safety. So safety is a concern. But I'm being a glass half empty. On the glass half full. I'd say that we're coming back to our points earlier. The hybrid solutions are the future we use it we need a diverse multi professional view of the world. None of us can do this alone. And I think it's the way in which you can think about these models. Is it it is part of the puzzle so machine learning, predictive technologies.

The decision making tools are a part of the puzzle. They are part of the arsenal that we as we as people who work in the healthcare sector can use and it is your choice to use it. You can you retain control and you retain choice. I think that's it. It is important to say but what it gives you really is focusing your view, in focusing actions, it focusing resources, where resources are scarce. How do you make most of your money if you if you had to put your money on those that are most vulnerable well, you can run such a model and you can and you can identify Okay, so these are my most vulnerable cohorts. I should put money on them. I think healthcare systems those are the front end need us as those who work on these models to communicate the advantages and disadvantages. The ups and downs are

quite clearly so that they can make they can make an informed decision and to work with them so that they feel they feel well part of the process so that they own it as well and they see it as a tool that doesn't supersede them. That works with them. I'll pause there, thanks.

Neil Wigglesworth 37:45

Thank you , Sid. Really fascinating. And I have lots of questions, but I'm sure our audience have got some already now. But we'll just see if Ash has got anything to add before we think about whether we move on to questions from our audience and me because I want a go.

Ashleigh Myall 37:59

Yeah, hard one to follow Sid. I guess the translation issue is like I have been well stated before me and the translation issue, they are a big barrier to overcome about how do you convey that information to decision makers at the right level of detail and in a timely, timely matter. Those are going to be massive burdens, massive questions to properly answer before these kinds of things can be deployed. There's already work that's going forward on that but yeah, there needs to be a lot more but perhaps where where I would see a lot of issues is around, well issues but also room for opportunity, is around the data and trying to bring in more data, more data in real time. So probably more than current systems electronic health records can support. I think it's about understanding that not all settings will be as data rich, as many hospitals in the UK and trying to develop solutions that are that can work in both high resource and low resource settings, quality, already been mentioned identifying new proxies that could overcome issues of quality around bringing new types of data. So I know for healthcare acquired infections we can look you know readily at patient records and patient movements but questions around staff data around should we bring that in around privacy around both of patient and staff? I think these are key questions that really should be considered and could push forward the modelling. But yes, needs to be properly considered. So I'll end it there and yeah, that's my thought on that. Thanks.

Neil Wigglesworth 40:25

Thanks Ash. Anybody wants to add any other comments before I have a look at the questions we've received. If not I've got a question from from Lasantha Rajic Karuna, I hope I've said that properly. And I think what the question is, so the question is, what are the what are the indicators of predicting infections? Are there any? I interpret that as what are the … why would we do it? I think I interpret that as why would we try to predict infections, what will be the opportunities, what will be the indications if you like to doing it? If I'm wrong Lasantha please correct me either in the chat or we can unmute you and you can rephrase your question, but if I'm right then we'll carry on that assumption for now. But James or Sid or Ash why would we use it? What were the opportunities I think is the question. James?

James Price 41:16

Happy to field this one to start with. I mean, I think that at the moment, a lot of our approaches quite rightly, are reactionary, to situations in clinical care and a lot of that and that is to do with resource

that's to do with the just probably a lot of things around resource. And I think part of this is about focusing and strengthening the prevention and getting on top of things. So can we So in an ideal world, what would an ideal scenario be that we could identify as early as possible even before an infection has even happened, who's more likely to get them? Who's more likely to become colonized with certain organisms? which patients that are having surgery are more likely to go on to get that surgical site infection in the community that we would maybe not necessarily pick up? And I think a lot of this would be around understanding whether targeted changes optimization of IPC practices could go on to help prevent that. Clearly, there's some challenges around understanding what the impact is and understanding how understanding the impact of those because trying to identify people that don't go on to get infection that normally would have is a really challenging situation. But I think this is a lot more around strengthening the preventative side of things, the capturing people at the point even before they come into hospital, you could see a scenario where you're looking at emergency sorry, elective patients coming into surgery, when they see their GP they're clearly at the point of seeing a GP because they've got arthritis in their hip and they're going to be put towards, they're starting to be referred to the orthopaedic surgeon for their hip operation.

At that point in time, could we not start the screening process the data gathering process, start to understand rather than potentially reacting to the MRSA swab that's taken the pre assessment clinic that is positive on the day they come into hospital, this those kinds of things? That's just one example of how we might be able to and then we monitor them as they go through hospital and see whether they have factors which we gather about what might strengthen or reduce their risk of developing an SSI but a lot of this is around continuing to gather data and continuing to respond to data. It's not a static process. It's about using more information and more tools that become available, point of care testing that comes in, reactionary to biochemistry to microbiology, things like that. So I suppose it's from from my point of view, it's about rationalizing resources, its the potential about financial changes as well. But obviously this sort of capture overall, the overarching issue is around improving patient safety and preventing all preventable infections. But I don't know if Sid or Ash you've got anything you'd like to add to that.

Neil Wigglesworth 44:10

Sid or Ash to you have anything to add to that?

Delegate

Note: this section was largely inaudible:

Can you hear me? It's a very, very beautiful lecture. Thank you all for the excellent lecture. So I'm asking you not to perform surveillance and you do. Be you know that you know, but in practical situations, you know, how we do that. How do we say so we know that, you know, patients I know that bugs so like, you know, that kind of virus is the main problem in hospitals. Have you identified and, you know.

Neil Wigglesworth 45:15

Thanks okay I'm not sure if we got all of that. It wasn't the clearest for me the audio and but I don't have the best hearing, I don't know if my colleagues might have heard that it's not perhaps we might

arrange if you could send us a note afterwards and we'll try and pick that up. But Sid, if you didn't get that, feel free to comment.

Sid Mookerjee 45:36

I don't mind, so it's a really good point. I didn't catch your name. But um, so I think the question was, you know, in resource limited settings, with the, with the, you know, with the impetus being, you need to do the best that you have with the resources that you have, you have persistent bugs. You know, how does, you know, how can these sort of prediction tools, help? Have you had experience of it? Do let me know if that's not the question, but I got that from it. I mean, the answer is yes. I mean, you only have to look at a group of bugs called CPE's which are carbapenem producing and Citrobacter rallies. And the beautiful thing about CPE's is that that you can, you can, you can you can have a patient who has colonized the CPE. So say you have a rectal swab, and the rectal swab for this patient is CP positive, which essentially means that they have to be isolated in a a in a side room because of course, CPE is, is highly likely to, to be transmissible. Also, of course, makes the potency of antimicrobials that are given to this patient, such as a dimmer, but this patient might come back to the hospital and might be on say next month for a routine elective and the CPE screen might be negative.

So what we know from the work that we've done, similarly using prediction models is that there is a in some patients, often a rapid colonization decolonization, re colonization re decolonization status change, which of course makes these sorts of models, you know, for anyone for that matter will quite feel confused. And it confuses us as people who are who work in healthcare settings. So I think there are some things that will be will be that these models can help you understand. So now we we are sort of getting to a point where we used to say that once colonized once positive for CPE always positive for CPE. But is that really true? So some of these kinds of models have made us question that that actually, what is the probability that this patient will be colonized with CPE in the next six months in the next eight months in the next 12 months? Do we have to always side room isolate this patient? Or is there a probability that we do not have to isolate these patients? These are these are these are questions being asked. And it doesn't matter if it qualifies in a research paper, you know, a resource limited or resource full in fact, in a globalized world with you know, with people seeking healthcare everywhere, I will say that we are all on health care systems are resource limited but we have to be smarter about the way that we use our money.

Neil Wigglesworth 49:19

Thank you Sid. And thank you for the question.

Delegate

Thank you very much. It answers my question. Yeah. So like the beta data and you know, with analyzing and put it into the flow, thank you very much.

Neil Wigglesworth 49:25

I'm gonna move on to the next question. Just give the rest of our audience the opportunities. Our next question comes from Naomi Cope-Selby, and Naomi has written what parameters will be used and

how will they be varied to different communities? I'm gonna get I'm gonna make educated guesses that might depend on the question you're trying to answer but perhaps one of you has a view on that on what type of parameters you might be using in these models. There was a hand up from James although Ash was thinking about it.

James Price 49:59

I've always got an opinion. So why don't I just talk briefly? I mean, I think, as the as the question suggests, that I think that a lot of this is I think we need to think about things in terms of core data and then those bits that might be more specific to specific scenarios, but it's worth recognizing as well that a lot of this particularly at this stage, and inevitably is going to be a learning process about understanding what additional variables could and should be used, including someone seeing what they change. I'm not the expert talking this I really want Ash's opinion on this, but I think depending on what the question is for example, do we want to know about antimicrobial resistance? Well, that will be very much probably needing the requirements of microbiology results and things like that. Risks of surgical site infections, well we might need a bit more about patient movements, about procedures about risk, about patient risk factors and things like that. So I think as the question alludes to, it's likely to be quite variable depending on the question, but there's likely to be some core elements that are needed but Ash I'd be interested to get your thoughts.

Ashleigh Myall 51:13

No, that's how I would see the problem depending on the different populations that you're looking at the different types of infections that you're trying to look at risk in those populations. It's going to likely require some difference in what goes in to the models. Maybe there will be a significant overlap or maybe there won't be but actually, part of the analysis is doing that and finding out what is contributory and what isn't a contribution and then comparing those between the different populations and gaining more insight about the differences. Yeah.

Neil Wigglesworth 52:00

Thank you. Both. Yeah. Really fascinating question. Thank you, Naomi for that question. Just checking you haven't followed up on that. Thank you for that. Selvin Joby if you could expand on your question, I'll ask a question next and if you could expand what you've put into a question that would be helpful. I'm not sure I can ask it in the way that it's been phrased a couple of words but if you want to expand that into a question whilst I asked one of my own I will, I will catch up on that afterwards. I was going to this may or may not be read sensible, but I've heard you say three different things amongst you whilst I have been listening. One was about human genome data. One was about the microbiome. One was about the clinical presentation of somebody in a clinical setting. Are we are we potentially moving towards a notion of sort of personalized prevention, individualized, personalized prevention based on modelling risk characteristics is that possibility, and any of you please I'm happy to hear a response to my question. James. Yes, please do.

James Price 53:06

I think it's fair to say we could see a situation in the not too distant future where we have bespoke pathways for patients if the right data, the right information were available in these types of models. For example, we have empirical anti microbial policies for each individual trust, and that's based on very broad macroscopic resistance data. Whereas actually, there's no you could see a situation where we could develop bespoke anti microbial policy or antimicrobial guidance for patients that come in to hospital based on their microbiome based on their results in the past, how we might optimize their surgical prophylaxis, rather than waiting for, to reactive sampling that's coming through. You can see a situation where as I alluded to before, you've got that elective surgical patient that's coming in. We understand exactly what they're what's going on what organisms they carry. We know whether they should go straight into a side room when they come in, or more particularly whether they don't require it because we've got a good grasp of their microbiome. And I think we've also got when we're managing outbreak situations, we can start to if we're utilizing maybe high resolution technologies like genome sequencing, we can rapidly rule in, rule out patients, potentially deescalate people from an outbreak situation. So there's those kinds of situations where I think we're starting to absolutely look towards these kinds of bespoke precision medicine for our patients. And I think that's an you could argue probably that that would like maybe to improve patient optimization changes and resource allocation, financial implications to trust. I mean, we need the studies. We need the proof around this, but that might be the theory rather than the empirical blanket approaches, which I think it's fair to say that whilst IPC approaches are very robust infection still happened through these whenever we put in these Broadcom IPC measures. So we still need to understand what's going on understand what the factors are, but I'll pause there thanks.

Neil Wigglesworth 55:14

Sid I think you want to say something.

Sid Mookerjee 55:18

I wanted to add to what to what James noted, I think the way that even a large hospital deals with its patient it is it comes down to quite individual. And if I want to sort of, again, cozy the idea as we all are in terms of what prediction models do, and the fact that we do it anyway, is the fact that we base individual patient care on on a large amount of of data, but you can also use the analogy of a clinician treating a patient doing that patient care based about based on a large amount of of experience. And what is experienced if not data. What happened when I gave X How did the patient do did Y and so you know, I wonder sort of from my perspective that when people leave going for prediction is not alien term. It's actually a very well cozy term that we do this every single day. I think in terms of personalized care. I mean really good point. I think in a globalized world where information is being more readily available to more and more people. The fact that our patients will get more and more informed of all of their health status and as the nation's we want the people to take control of certain things that have an effect on their health outcomes. So we want informed people and citizens who then become patients so when they need more help from healthcare settings. And this might be something that we are asked for that, that we are asked for personalized care that I have had this I went to this school, I went to this gym. So so it's so so I think it's already there, and it is the future.

Neil Wigglesworth 58:00

And we're just running out of time. I can't believe an hour has gone by already that we're almost at six o'clock and people obviously will have made plans. So we're gonna have to wrap it up. Thank you for that and thank you for those final comments from everybody. What an absolutely fascinating hour we've had , it feels like five minutes have gone by. Thank you very much to our panellists, James Price, Sid Mookerjee and Ash Mayall.

And thank you all the members of the audience for attending and participating, for those of you who put questions in chat hopefully all got the answers you were looking for.

There will be certificates of attendance sent out after the event, and also recording and a transcript will be available after for those who want to catch up. And all the past webinars are available on the Healthcare Infection Sociey website. So it is six o'clock. So thank you all thank you all for attending thank you all of our presenters, look forward to continuing this collaboration between Healthcare Infection Society and IPIC, it's been fascinating. Thank you all very very much.