**LabMed Podcast Ep10 - Beverly Hird - FINAL**

MUSIC JINGLE

**VO - Welcome to *Life in the Lab*, brought to you by the Association for Laboratory Medicine. I'm Kamiljit Chatha, and I'm a Consultant Clinical Scientist at University Hospitals Coventry and Warwickshire NHS Trust. In this series, we bring you inspiring stories of clinical scientists and medics working in laboratories in the UK and around the world.**

**In this episode, we talk about newborn screening tests. Beverly Hird tells us about the journey she took to become the director of the Newborn Screening Lab at Manchester University NHS Foundation Trust.**

I enjoyed studying science at school. So, I think that's how I've sort of ended up in a scientific career. I also enjoyed learning French. I wanted to travel. I sort of felt like it would be really interesting to live abroad. So I ended up doing a degree in biochemistry with French at university. And that was a four-year course where the third year was spent living in France, studying biochemistry. And I went to Louis Pasteur University in Strasbourg. So, that was a really interesting experience.

And then after that, I decided to join the clinical biochemistry training scheme in the Northwest. That training scheme, you do a master's degree, but you also have a base hospital. There's lots of on the job training and one of my placements was at the Children's hospital and I really, really enjoyed it.

And I ended up with my first job, after completing my training, was at the children's hospital. And I've worked here ever since, just sort of working my way up, really.

I've been working in newborn screening for more than 20 years, and, yeah, I do find a lot of job satisfaction from applying scientific and clinical skills that I've developed over the years to try and improve people's lives.

**As Director, Bev is in charge of overseeing all the tests included in newborn screening, plus any trials that could bring new ones into practice.**

**But before we dive into that… let’s start with the basics - what exactly *is* newborn screening?**

So the Newborn Blood Spot Screening Program is the national program where we take some drops of blood from a baby on day five of life. So, age five days, newborn baby. The blood is collected from the baby's heel, another name for it is the heel prick test. And we test that sample. We're looking for abnormalities in the chemicals or substances in that blood that will help us to detect serious rare but treatable conditions.

MUSIC INTERLUDE

It's not a diagnostic test. We're just picking out babies who we think have a higher risk of having the condition. And then, when they go for their first clinic appointment, then it can be sort of determined whether they're affected or not.

**In the UK, babies are screened for 9 different conditions, all for which treatments are readily available.**

**One of these is congenital hypothyroidism, where a baby might not have fully developed thyroid glands. Thankfully, it’s a condition that can be easily treated if caught early, and the test has been in place since the 1980s.**

**There are also six metabolic diseases, which occur when the body has trouble converting food into energy.**

**Then there’s sickle cell disease, which has been screened for over 20 years. It impacts the red blood cells. But with early detection, antibiotics can really make a difference for kids.**

**And finally, since 2007, cystic fibrosis has been included too. It’s a genetic condition that mainly affects the lungs and digestive system.**

**The number of tests included in screening is always changing and evolving.**

We have a committee in the UK called the National Screening Committee. And their role is to decide which conditions we screen for. And what they do, they look at the evidence, and then based on the evidence available, they'll make recommendations to the government. There’s a large number of criteria, but essentially it's looking at things around the condition itself, the tests that are available to diagnose the condition, what the available treatments are, and how effective they are.

And then there's also measures that look at the overall effectiveness of screening, and then based on that they will make a recommendation to the government. So, then the government would make the decision, based on the committee's recommendations.

MUSIC INTERLUDE

Over the time that I've been working in screening, which is more than 20 years now, I'd say the biggest changes are that our equipment is more automated than when I first started. And also, the IT is more sophisticated. That really does help us to provide sort of a streamlined efficient service because with a lot of these conditions, we have what we tend to term algorithms or pathways where if you get this particular result, then this is the next action. So, for example, with cystic fibrosis screening, that pathway involves some quite complicated steps where kind of the top 0.5 percent of results then go on to have mutation analysis and that occurs in various stages. Some babies, depending on the results, require a repeat at three weeks and then, you know, the final result depends on all those previous results. So, we have these set sequences of actions, really, about what we do in various scenarios.

So, that's why we need the sophisticated IT, really, because it's very complicated. But it means that you can tailor a program to get the best results that you can, really.

Another really great innovation has been a national IT system that we all refer to as the fail safe. And that basically makes sure that no baby gets missed. We want to make sure that all babies that are eligible for screening, you know, the offer of screening has been made to their families.

Parents have a choice whether or not to accept the offer of screening. So, one of the roles of those of us that work in screening is to make sure that we provide clear information to families so that they can make an informed decision. To my mind, it's a no brainer really that there's so much, you know, benefit to screening newborns for these conditions because they are treatable. And so, it can only improve that baby's life.

**But the benefits of infant screenings aren’t always as straightforward as they seem. While they aim to detect treatable diseases early, they can also lead to unintended consequences.**

So, there's a famous quote in our field from an eminent physician called Sir Muir Gray and it's: “All screening programs do harm. Some do good. Of those that do good, some do more good than harm at a reasonable cost.”

So, it comes around to a balance between those issues and making sure that we're designing a screening program where we're picking up cases that are going to benefit from screening.

The problems that we can have from screening could be false positives. We’d be worrying about the anxiety for that family. Then even if they're told they don't have this particular condition, does that stay with them, and do they always have that niggle, that worry that maybe there is a problem? And also just that initial distress when they feel like something's going to be seriously wrong with their child. It can be picking up very mild forms of the disease that wouldn't have caused a problem. Conditions that have uncertain significance, so then there's lots of uncertainty for the family and for the individual.

Another problem could be false negatives. So, it might be that people make assumptions that if a child had this particular condition, it would have been picked up on screening, which could perhaps cause delay in diagnosing a condition if it had been missed on screening. So, it's not just a simple screening test. It's the whole program and the whole sort of efficacy and the outcomes that you need to think about as well.

**Bev’s screening lab is one of six that have been trialling a test for a new condition and sharing the results with the National Screening Committee to decide if it should be added as a new test across the UK.**

**It’s a rare genetic disorder called Severe Combined Immunodeficiency, or SCID for short.**

Babies with SCID, if it's undetected, they tend to die before they reach their first birthday, because they have a real problem in fighting off infections. However, it is treatable. But the earlier the treatment is implemented, then they're more likely to get a good outcome.

So, this evaluation is really sort of to provide evidence for the National Screening Committee around whether screening is cost effective and practical in the real world.

It's been challenging for a number of reasons. One of them is that the technology that we're using is new to newborn screening laboratories. It's the sort of PCR techniques, which we haven't really used in screening laboratories before and that's been a big learning curve.

One of the other problems with the test for this particular condition is that sometimes babies have results that suggest they've got SCID, and then when they go for their diagnostic testing, it turns out that they don't have SCID. So, these false positives can be really stressful for families, and also it adds a sort of burden to the clinical teams.

And we do get false positives in the other conditions, but it's just that in SCID there has been a large number. It's possible that we can come up with a final algorithm which reduces the number of false positives. And that's all part of doing this study really, to work out the best way to approach it so we get the best screening program that we can.

It's been a huge amount of work, working on the SCID evaluation. We're all hoping that this large piece of work has been worth it, and it's going to be shown that we have made a positive difference to those families. We certainly have, for the cases of SCID that have been detected. But, as I mentioned earlier, there are sort of other aspects. There are children that have had abnormal results that haven't turned out to be SCID, and there's a lot of research looking into whether there's been any benefit in finding those cases. So, it's a complex area, but all the UK screening laboratories involved in this good evaluation have put so much time and effort into it. So, we do hope that it's been worth it and there's a good outcome.

MUSIC INTERLUDE

Another one that's going to be having an evaluation is a condition called spinal muscular atrophy, which is known as SMA, and that condition is interesting because new treatments have strengthened the case for screening. So, it really does make it important to consider screening because it has become more treatable.

For labs who are already doing the SCID screening, who have been part of the evaluation, adding SMA should be relatively straightforward because it uses the same technology. So, it might be that it's tried in those labs first, although nothing has been agreed yet. But that will be a really exciting project to be part of.

**Here’s something interesting to note: the number of conditions that babies are screened for not only fluctuates as treatments evolve, but they also vary from country to country, depending on international differences in policies and practice.**

In the U.K. many people might think we've got quite a conservative panel. We do have compared to some European countries, that have more than 30 conditions screened - for some, some less. And it could be to do with differences in the level of evidence required or differences in the way that cost effectiveness is assessed.

In the U.S., they have very large panels of more than 60, usually, it just slightly varies between states. But I think it's thought over there that there's more emphasis on expert opinion perhaps than the evidence. So, that could account for the difference there.

The problem with rare diseases is that it's hard to gather the evidence because those diseases are rare. But recently the National Screening Committee have been using a different approach, a sort of modeling approach where they'll take evidence from different sources and also take into account expert opinion as well.

So, things might happen a lot more quickly than maybe they have in the past in terms of gathering and reviewing the evidence.

MUSIC INTERLUDE

There's a European group of rare disease patient organizations, I think there's more than a thousand. It's sort of an alliance of these rare disease patient organizations. They came up with some principles for newborn screening. And these have been compared to the UK newborn screening criteria, which is really interesting.

One thing I found really interesting was that with the European criteria, it's sufficient for the family to benefit from the positive screening result. Whereas, with the UK criteria, it's very strongly the individual needs to benefit. But to my mind, if the family benefits, then the individual also benefits. Even if the condition might not be so readily treatable, the fact that a family can make decisions about future children and about their practical circumstances, having the knowledge that they've obtained from the screening result.

I remember I went to a conference years ago now, a screening conference. And that had a big impact on me, because there was a session from a mother of a child with Duchenne Muscular Dystrophy, which is a condition that we don't currently screen for.

And she was arguing the case for screening. Yes, for early treatment, even though it's not a fully treatable condition, but there could be benefits from early treatment. But her argument was around trying to dispel the notion that by screening, you would be reducing this carefree time that parents have before a child is diagnosed with a condition like that. And her argument was that there was really very minimal carefree time because the health worries started very early about missing milestones and that sort of thing.

So, again, it's about empowering families, having that information so that they can make plans and make decisions for their family regardless of whether the condition itself is treatable. So, that's a really interesting argument as well.

Yeah, there's so much to consider when thinking about which conditions to screen for and how to deliver the screening program.

**Another big question in newborn screenings is whether we should identify carriers.**

**Carriers are people who are not affected by a condition, but can pass it on to their future children.**

Carrier detection can be a bit contentious. We do report carriers for sickle cell disease. Carrier results are quite obvious with the methods that we use. Although, more recently our current method could be set up to avoid carrier detection… but that's not the current national policy.

The philosophy of screening is really about detecting conditions where the individual can benefit from early treatment. And that's obviously not the case for carrier detection. So, you could argue that reporting carriers goes against that philosophy. There is an argument for sort of providing information for future reproductive choices, but obviously that's not really relevant in the newborn period.

So, there's a lot of debate to be had really about that.

**With so many discussions and a field that’s always evolving, screening services is an area Bev is excited to keep contributing to in the future.**

It's quite cross discipline really, in terms of working with hematology on the sickle cell disease, and working with genetics in terms of the techniques we use in SCID and some of the follow up testing that we do for cystic fibrosis.

So yeah, it's a really interesting, varied area. It's a privilege to be able to intervene in these family's lives and in a positive way where we can enable institution of early treatment for these severe conditions. Which, although they're rare, collectively, probably not as rare as you think.

I feel like in newborn screening when we're making those referrals for those babies that we've picked up as potentially having one of the conditions that we're looking for, it really feels like, you know, we could be improving that baby's life.

**VO - For a transcript of this episode or for more about Beverly Hird and her work, visit our website at** [**www.labmed.org.uk**](http://www.labmed.org.uk)**/podcasts**

**This podcast is brought to you by the Association for Laboratory Medicine. Produced and edited by Caroline Bacle, sound mixed by Daniel Fletcher. Special thanks to Avi Surskas and everyone in the LabMed team.**

**And we’ll be back next time for more stories of *Life in the Lab.***

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