R&D Disruption

Plus: Communication in rare diseases

Oxford University's Chas Bountra on crowdsourcing science

Innovative ways to detect neurological diseases

Social media listening brings RWE to rare diseases

pharmaphorum deepdive

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Deep Dive: R&D Disruption

With costs skyrocketing and return on investment plummeting, R&D arguably needs disruption more than any other area of the industry.

Luckily it seems pharma is starting to wake up to this fact, and some of the industry's brightest minds are focused on finding solutions.

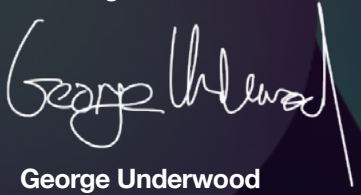
Much of this disruption, of course, comes in the form of digital innovations – such as TREND Community, which uses social listening to identify unmet needs in rare diseases, or nQ Medical, who are monitoring how people type on their smartphones to gather insights on Parkinson's disease. You can read both of their stories in this issue.

But R&D disruption can also come in the form of shakeups to an organisation's structure, focus or ways of working. This issue we hear from AstraZeneca's CVRM lead Joris Silon and Takeda's R&D COO Georgia Keresty about how their companies are evolving to meet new drug development needs. And we have an exclusive interview with Oxford University's Chas Bountra, who is spearheading an open-source approach to drug development by freely sharing discoveries with the wider life sciences community.

Elsewhere in the issue, Katie Lucero from Medscape explains how new approaches to medical education can help HCPs keep up with the rapid changes in lung cancer treatment; Professor Geoff Hall, patient experience expert Jacqui Gath and IQVIA's James Anderson look at innovative approaches to improving research with NHS data; and experts from OPEN Health discuss how to improve communications around rare diseases.

I hope you enjoy the issue.

Kind regards,



George Underwood
Editor, Deep Dive

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The power of crowdsourced R&D

Drug development is still dogged by attrition, duplication and waste. Chas Bountra, chief scientist & head of the Structural Genomics Consortium at the University of Oxford, thinks the answer lies in opening up discoveries to everyone and collaborating at all levels.

Bountra is a veteran of life sciences, having worked at Oxford University in the mid-1980s before joining Glaxo and staying on as the company became GlaxoSmithKline. He returned to Oxford in 2008, where his work at the Structural Genomics Consortium (SGC) has been focused on coming up with new targets for drug discovery.

"We're not interested in the targets that everybody else is working on," he says. "We're trying to open up completely new areas of biology. That's where the big breakthroughs are going to come."

Bountra says that one of the major challenges in drug development at the moment is the fact that many academics, biotech companies and pharma companies "are all working on the same few things".

"This is because they all read the same literature – they go to the same conferences, they talk to the same opinion leaders. Then they go back to their labs and end up working on the same things in parallel, in secret.

"When 20 companies are working on the same thing, if one of them fails the other 19 are going to fail as well. That is an incredible waste of money, of people's careers and, most importantly, a waste of patients. The way we're doing drug discovery today, we're actually exposing patients to molecules that other people already know are destined for failure."

In order to combat this secrecy, competition and duplication, Bountra wants to see all areas of the industry coming together.

"Drug development is risky. We can't do it on our own. We want people to come together and generate novel tools for novel targets, then make them freely available to the world."

Novel targets

To this end, a large part of the SGC's work focuses on generating novel, high-quality tools for tackling rare and genetic diseases.

"We all have around 20,000 genes," says Bountra. "Currently, we can only target about 1,000 of them with drugs. There are probably around 13,000 genes that we don't know anything about, and therefore there aren't any tools for them – no protein, no assay, no structure, no inhibitor, no antibody.

"If we generate tools for these genes, we can help the community to identify new drug targets for all the diseases that are out there."

Bountra adds that this work is particularly important in rare diseases.

"Most pharma companies are not going to work on most rare diseases. It's up to people like us, working in academia – working with philanthropists, charities and governments – to try and open up this area. Otherwise, in 10 years there will still be 350 million rare disease patients and 95% of them still won't have a treatment."

The SGC even works on protein targets that others think are intractable.

"Most companies are not going to work on a target they think is undruggable. I think the primary job of academia is to try and do things that other people believe are impossible. That's what innovation is."

He uses the example of the family of proteins called bromodomains.

"Many people told us that this family was intractable. But we worked together with the Diamond Light Source synchrotron at Harwell, who are using crystallography to identify low-affinity binders, and we were able to generate the first inhibitor for a bromodomain. Since then, we've generated probably another 20 inhibitors for different bromodomains, and now we're moving on to different families. That is exactly the kind of thing we in academia should be doing."

Crowdsourcing science

Perhaps the most interesting aspect of the SGC's work, though, is that they don't take out any intellectual property on the tools that they develop.

"We make them freely available to anybody in academia, pharma, etc.," Bountra explains. "That way we can tap into global academia, who can take those tools, test them in whatever disease model they want, and then publish."

He adds that everything the SGC does is released to the world immediately.

"We don't sit on it and keep it quiet for 12 months while we're writing up our manuscript, because in those 12 months there might be people elsewhere doing something that we've already done, and that's just a waste of time and resources."

Bountra describes the model as essentially "crowdsourcing science".

"That transparency creates a lot of trust, which is great for collaboration, great for science, and great for drug discovery. We're now collaborating with more than 300 academic labs all over the world, with 10 large pharmaceutical companies, and with seven different patient organisations."

This collaborative approach allows organisations to pool resources together to share risks and conduct larger, more expensive trials, Bountra says.

"Often, when pharma companies try and reproduce academic publications, they are unable to do it. The reason is that many academics are under so much pressure to publish that they try and get their study out there as quickly as they can, and as a result might not have big enough N numbers.

"By working together, we can have larger trials and can afford to make sure any data we generate is absolutely rock solid and easily reproducible. This way, we can help drive innovation."

Bountra thinks that this attitude is becoming more common across the industry.

"Many companies are realising that they can't do this on their own. Drug development is too difficult, too expensive, and takes too long, so it's incredibly risky. No matter how big they are, they're going to have to work with academic groups, charities, governments, etc."

Bountra also hopes such collaborations can address attrition issues that are driving up drug costs and creating massive affordability issues.

"I don't know any other industry where you can work on a target for seven years and still have up to a 95% chance of failure when you first take it into the clinic. I don't know any other industry that could survive that, and affordability is becoming a massive issue."

He adds: "Some people have said to me, 'Chas, you're just trying to help the industry.' I say to them, 'What's wrong with that?'

"I'm trying to help the industry discover new medicines for patients. I'm not helping the industry to help them make more money. I'm doing it because I recognise that we can't do many of these clinical trials in academia. We have to work with big pharma.

"Whenever you work with somebody you've got to give something to get something. We have to work together. If we don't work together then we won't get any new medicines for some of these horrendous conditions."

About the interviewee

Chas is pro-vice chancellor for innovation at the University of Oxford, professor of translational medicine in the Nuffield Department of Clinical Medicine, CSO for the SGC, academic lead for the Dementia Drug Discovery Institute and professorial fellow at Keble College, Oxford. Prior to coming back to Oxford in 2008, Chas was vice president and head of biology at GlaxoSmithKline. In 2012 he was voted one of the top innovators in the industry, in 2014 received the Rita and John Cornforth Award from the Royal Society of Chemistry, in 2017 and 2018 was voted Master of the Bench from the Medicine Maker Power List, and in 2018 was awarded the Order of the British Empire in the New Year's Honours List.

About the author

George Underwood is a senior member of the pharmaphorum editorial team, having previously worked at PharmaTimes and prior to this at Pharmafocus. He is a trained journalist, with a degree from Bournemouth University and current specialisms that include R&D, digital and M&A.

Artificial intelligence meets human intelligence to collaborate on addressing brain health

Researchers agree that early detection is the key to optimising the potential success of drug and device therapies – and that these therapies would work most effectively if they were administered when a patient first begins to develop a disease rather than waiting until when they are displaying obvious symptoms. However, it is extremely difficult to observe exactly when this process starts to occur.

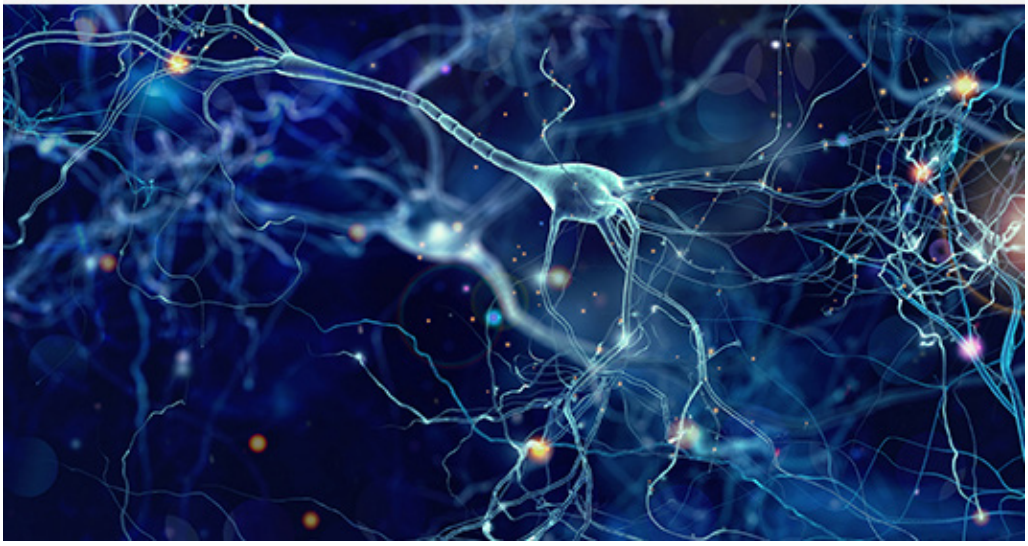
Neurodegenerative diseases, such as Parkinson's, for example, can currently only be detected by the presence of substantial and bothersome motor difficulties – but by the time a patient is exhibiting such symptoms, in some cases almost 70% of brain function may have already been lost. In contrast, subtle, often unseen motor symptoms manifest much earlier and offer the chance to detect patients at a more opportune time[1].

Likewise, in diseases such as Alzheimer's, cognitive decline in certain subtypes can begin as early as age 45 and it is often ignored and/or labeled "Old-Timers Disease" until such time as the person becomes incapacitated in later stages.[2]

As with many other unmet needs in healthcare, there are now several emerging digital innovations that hope to drive breakthroughs in neurological disease detection.

Digital health tools are not uncommon in other therapeutic areas. The app BiliScreen, for example, uses a phone camera to measure the bilirubin level in a person's eyes for early diagnoses of pancreatic cancer. Meanwhile, ResApp Health uses the phone's microphone to analyse coughing sounds to accurately diagnose pneumonia and other upper respiratory diseases.

Nevertheless, neurology remains one of the more difficult disease areas in which to develop any kind of tool.



“One difficulty in neurology is that even severe ongoing pathology in the brain may initially cause only subtle patient symptoms that are not outwardly obvious,” says Rahul Mahajan, MD, PhD, neurologist at Massachusetts General Hospital. “There is a definite need for reliable biomarkers for brain maladies. Tools or solutions that can precisely measure and uncover more about disease onset or disease progression will be critical in developing new cures and better managing patient treatments.”

Currently, HCPs and researchers mostly rely on clinical exams and medical imaging to diagnose neurodegenerative diseases with very few other diagnostic tests or markers available to establish diagnosis early, quickly, and accurately. This is contrary to many diseases in other areas where specific biomarkers allow us to diagnose with more certainty the condition of the patient.

“Neurology is a very attractive field to work in because there is so much potential for digital solutions to address these huge unmet needs,” says Teresa Arroyo-Gallego, a researcher in the biomedical engineering lab of the Massachusetts Institute of Technology.

“But it’s also a challenging area because we often can’t compare what we are developing to anything else to ensure the validity of the outcome. Most gold standard tools are subjective in nature and without data to support specificity and sensitivity. At the same time, people are very aware of the unmet needs so tend to be quite welcoming to new solutions.”

Digital steps up

As one might expect of any challenging field, researchers have come up with some unconventional but exciting solutions that show promise.

For example, researchers from Universidad Politécnica de Madrid, Massachusetts Institute of Technology (MIT), and Johns Hopkins University have been testing voice recognition as a potential way to identify Parkinson's disease at an early stage.[3]

Algorithms may be able to detect specific variations in sound vibrations linked to vocal tremors, breathlessness, and weakness, all of which are associated with neurological degeneration.

Their machine learning models learn the common differences in typing patterns between patients with neurodegenerative disorders and healthy controls.

"When your motor function is not affected by Parkinson's, you tend to be more rhythmic in your typing. We see that the distribution of the metrics we're evaluating are very stable over time. In Parkinson's patients, distributions tend to be more spread out. They also show some unusual characteristics – for example Parkinson's disease tends to affect one side of the body more than the other, and this asymmetry can be picked up in their typing.

The challenge, of course, is that most voice recognition software in consumer products isn't of high enough quality to compare with voice recognition performed in a lab – and is likely to pick up more ambient noises in everyday life than one would find in a clinical study.

Meanwhile, research by the neuroQWERTY team at MIT, where Arroyo-Gallego developed her PhD research, took a similar but perhaps even simpler approach – monitoring people's typing on their phones or computers to detect the early signs of motor decline in diseases such as Parkinson's[4].

"We're analysing keystroke dynamics – information on how you are pressing and releasing keys or touchscreen touches," she explains. "Sometimes Parkinson's disease patients are unable to release the key quickly even when the fingers are getting the signal from the brain to do so. This is one of the very clear manifestations of PD-related motor decline in the typing patterns."

"At the beginning, we decided to focus on the analysis of hold time, the time between pressing and releasing a key, since this kind of metric is more likely to be controlled by subcortical processes. It's not something that you can consciously control and certainly not something that can be 'faked' for the seven to ten hours a day most of us interact with our personal devices."

The technology spun out from MIT in 2016, into a company founded as nQ Medical. But rather than rushing the computational biomarker to market, nQ spent two years meeting and interviewing the various healthcare stakeholders in neurological care – providers, payors, clinicians, patients, caregivers, and industry – to best understand the value proposition for the technology.

"We found that it was perfectly applicable to Parkinson's, where there is an underserved population who might only see a clinician once or twice a year and where patient outcomes could be improved," says the company's CEO, Richie Bavasso. "The gold standard for assessment is patient self-reporting during that limited clinician intervention. nQ can show clinicians, quantitatively, what is happening to patients between those visits, thus optimising the opportunity to provide the patient better and more precise care."

The steps for successful digital health

Not every digital solution can rise above the hundreds of thousands of apps on the market and make a true impact on outcomes. Bavasso has his own thoughts on the key factors for making a successful digital solution and how this might apply to neurology patient care.

He says it's important that the technology only uses existing devices, like the person's own smartphone, laptop, desktop, and/or tablet.

"There are so many devices out there, with more being introduced every day, that it's overwhelming for all of us," he says. "You can easily enable health solutions on hardware that is already used by people. Requiring patient (or clinicians) to buy a proprietary device gets in the way of them participating and benefiting from technology."

Secondly, everyone in healthcare knows that patient adherence is a huge issue in delivering quality care and outcomes. Requiring patients to perform tasks each day (or in some case throughout the day) is a recipe for non-adherence.

"I am 100% compliant in my own daily ritual and routines," Bavasso explains. "If you want to have me as a participant in your digital healthcare solution, you have to adhere to me. I'm not going to adhere to you. The devices we touch every day can all be medical devices.

“Our nQ platform requires no active participation on the part of the user. You just live your life and perform any task that is unique to you in the course of a day. Eliminating the number of ‘unnatural tasks’ asked of the consumer leads to much greater adherence.”

He adds that passive technologies like this can also be useful for clinical research.

“Most diagnostics and measuring tools are episodic. A reading is achieved only when the patient is in front of the clinician. Digital technologies can record clinical readings many times a day, every day. In nQ’s case, we record a score every 90 seconds for the several hours a day a person’s personal devices are used.

“nQ can be used for trial recruitment, determining if someone is eligible for a clinical trial from their home by having them type something on their device from anywhere. It provides real-world data during the course of the trial, and immediately measures the impact of the drug or device that is being tested and how it changes over time.”

Using passive data collection, one can detect presence of disease at the closest date of phenoconversion, remotely track disease progression over time, and measure the impact of therapy, drug, device, or other.

The importance of engaging clinicians in supporting digital health

Bavasso stresses the importance of ensuring digital solutions are useful for clinicians.

“You need to ask if you have a tool that the clinician needs and will use. As part of our SaMD application for clearance, the FDA required us to articulate and demonstrate how clinicians will use our tool in everyday patient care.”

“While use of passive versus active patient participation addresses issues with adherence, it is also important that the measurement data is meaningful to clinicians and presented in a way that helps them efficiently and accurately interpret results,” adds Dr Mahajan. “Integration into the EMR which physicians are already using and ability to contextualise with other clinical data would be preferable.

“Like any other clinical tool, digital clinical applications should be appropriately validated with clinical testing and real evidence. This important bar separates clinical digital tools used to inform important healthcare decisions in a doctor’s office or a clinical trial from more recreational health applications.”

Bavasso adds: “At nQ, we have chosen the longer, harder path of seeking clinical validation via true trials supervised in appropriate academic environments, regulatory validation via the appropriate government authorities, and market validation to ensure clinician and patient adoption. I think it’s the right path to choose for technologies like this.”

An evolving market

Bavasso believes that the pharma industry has matured in its evaluation of digital technologies and is now more thoughtful and demanding about what these technologies can deliver. Referring to the Digital Health Alliance, he states that the industry itself has come together to better define and establish standards for digital technologies.

He expresses hope that simpler digital health tools will help the general public embrace health monitoring to ultimately improve outcomes.

“I often start my presentations by asking how many people in the audience know their blood pressure. Everybody raises their hands. Then I ask how many know their cholesterol level. A large number of people raise their hands. Finally, I ask how many people know the state of their brain health, and no one raises their hand. We hope to change that.

“The state of Massachusetts has actually passed a law requiring primary care physicians to assess any patient over the age of 55 for neurodegenerative disease, but they don’t tell them how to do it. In fact, most primary care physicians are not equipped to assess neurological disorders. We need simple tools that provide a brain health score that clinicians can rely on with confidence that the patient and their caregiver can also understand.”

Arroyo-Gallego is also positive about the future of adoption of digital solutions in neurology.

“People are willing to use it,” she says. “The main constraint is that physicians have limited time during clinical evaluations, and it is hard to integrate a new task or tool in their routine exam, so they don’t want to have to look into multiple platforms. They need something that can fit into their daily routine and easily integrate with existing electronic health records.

“You can still come across a lot of conservative people in the industry, but when we talk to movement disorder specialists who are dealing with these problems every day, we get very positive responses.

“One thing that makes it easy to convince clinicians that there’s potential here is that it’s simple to understand how typing could be a powerful source of information for them, because we are looking at an activity that involves a high degree of fine motor and cognitive control. It would be different if we went in with a mystery box and told them, ‘You input this, and you output that, and you have to repeat like this.’ No. They want to know what is in that box and they want to understand why your technology is working.”

It’s clear that simply throwing technology at a problem doesn’t work – these solutions have to be vetted by clinicians and proven in controlled clinical trials to be effective, and this is perhaps truer in neurology than anywhere else.

Luckily, it seems that healthcare and pharma now understand these imperatives, and with the drive of digital developers growing stronger every day we could soon see some real breakthroughs in our most challenging diseases.

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About the interviewees

Teresa Arroyo-Gallego is chief data scientist at nQ Medical and a machine learning and signal processing researcher. She is a visiting scholar at the Massachusetts Institute of Technology (MIT)’s Institute of Medical Engineering and Science. Her work focuses on the development and application of artificial intelligence methods and systems to solve problems in the biomedical field. In 2019, she was included in the MIT Technology Review’s Innovators Under 35 list.

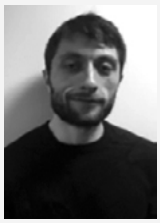
Richie Bavasso is co-founder of nQ Medical. He is also senior executive consultant, digital health and medtech for Scottish Development International. Bavasso is one of the early pioneers of use of digital media, devices and the web as tools to support pharma/medtech strategies and tactics. Since 1999, he has worked with top 25 pharma/medtech clients globally to support appropriate assimilation of innovation and technology into clinician and patient care challenges.

Rahul Mahajan, MD, PhD is chief medical officer at nQ Medical, a neuroscientist and clinical neurologist. He is an engineer and biophysicist by training and focuses his work on bringing quantitative methods and solutions to clinical strategy and modern clinical trial development as well as to research in brain physiology and the care of patients with neurologic illness. He is a Neurocritical Care Fellow at Massachusetts General Hospital and Neuroscience Innovation Fellow at Third Rock Ventures.

About nQ Medical

nQ Medical is a computational biotechnology company that focuses on digital phenotyping through AI-aided analysis of personal device interactions. It has developed digital biomarkers for sleep inertia and Parkinson's disease in both early and newly diagnosed/untreated stages of disease and for later stages of the disease. In addition to PD, nQ is currently completing a number of separate clinical trials to develop digital biomarkers individually relevant to multiple sclerosis, ALS, MCI/Alzheimer's disease, and mTBI with industry partners and academic centres. Its AD trial has advanced to yield early and promising results measuring cognitive decline and delineating PD and AD symptomatology.

About the author



George Underwood is a senior member of the pharmaphorum editorial team, having previously worked at PharmaTimes and prior to this at Pharmafocus. He is a trained journalist, with a degree from Bournemouth University and current specialisms that include R&D, digital and M&A.

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AstraZeneca on expanding its diabetes research franchise

AstraZeneca is hoping to build a strong focus on cardiovascular, renal, and metabolic (CVRM) diseases. Richard Staines spoke with Joris Silon about this increasingly important part of its business.

One of Pascal Soriot's first big decisions after taking over as CEO of AstraZeneca was to take control of a long-standing diabetes alliance with Bristol-Myers Squibb.

The deal signed in 2014 gave AZ full control over what is turning out to be one of its most important drugs – Forxiga/ Farxiga (dapagliflozin), an SGLT-2 inhibitor that was initially used as a way of controlling blood sugar in patients with diabetes.

But as science has moved on, it emerged that the drug was far more versatile than this – and data under review by regulators shows it can be used to reduce risk of hospitalisation for heart failure in patients with type 2 diabetes, and even those without diabetes and certain other risk factors.

It is also being reviewed by the FDA to reduce risk of cardiovascular death in heart failure with preserved ejection fraction, and those with reduced ejection fraction, and to prevent worsening of the disease.

With every new indication, sales are mounting, and the versatility of Farxiga in a highly competitive market has set the tone for the rest of the franchise.

Trial results from the DAPA-HF trial released last year were a real turning point, showing the effect of reducing death and hospitalisation in heart failure patients, with or without diabetes, said Joris Silon, head of AZ's CVRM biopharmaceutical unit.

It's still not clear exactly how the drug is producing this effect, but the results outlining the versatility of Farxiga form the bedrock of AZ's strategy to look at CVRM as a series of inter-related diseases.

Silon said: "I think it's a testament to our people in R&D that have really followed the science, and also taken a risk because at the time we were designing these trials there was no clear proof that this would work.

"I think by pushing the boundaries of science we have been able to show that this SGLT-2 solution in Farxiga can help patients outside diabetes too. It was a big revelation when we showed the results at ESC (European Society of Cardiology)."

AZ has not stopped at diabetes – the company is also trying to extend Farxiga's use into chronic kidney disease.

The FDA has granted Fast Track designation for the development of Farxiga in this extended use, meaning AZ will get extra support during development, and a faster six-month review of trial results if things go to plan.

"If that delivers we will have created multiple indications within one brand, we will be working in prevention for type 2 diabetes patients for cardio-renal diseases, but it will also treat cardio-renal diseases and I don't think there are so many classes out there that can have that."

But AstraZeneca will have competition, as it's not the only SGLT-2 on the market – Boehringer Ingelheim is looking to expand the uses of its rival Jardiance (empagliflozin), including in CKD where it has begun work on the EMPA-KIDNEY trial.

AZ is already in talks with regulators over results of DAPA-HF, and the FDA is due to make a decision on whether or not to approve a label expansion in the next six months after granting a fast priority review.

“We hope to bring those innovations to patients as soon as we can,” said Silon.

As well as Farxiga there are several others that are already approved and established in the company’s CVRM fold.

From the same deal with Bristol-Myers Squibb, AstraZeneca has the weekly GLP-1 class drug Bydureon (exenatide), giving it a presence in a market that is also hotly contested by Novo Nordisk and Eli Lilly.

Outside of diabetes is Brilinta/Brilique, a blood-thinning drug used for coronary artery syndromes and to reduce the rate of cardiovascular incidents in patients with coronary artery syndrome, or a history of heart attack.

And from a separate deal where it acquired ZS Pharma, AZ has Lokelma, approved for treatment of adults with excess potassium in the blood, or hyperkalaemia..

In the pipeline there are a host of other drugs in development, many of which originated from the biopharmaceutical firm MedImmune that AZ bought in 2007 for $15.2 billion.

Diseases targeted include non-alcoholic steatohepatitis, cardiovascular disease, hyperglyceridaemia, and diabetic kidney disease.

Silon is quick to point out that while these medicines are viewed separately by regulators, AZ’s mission is to look at these chronic diseases as a whole and try and meet the health needs of the world’s population, particularly in emerging markets.

Diabetes and other non-transmissible diseases are becoming problematic in these countries as people become richer and adopt Western lifestyles and AZ is hoping to address this with this range of different products.

Silon said: “These diseases are inter-related but are still distinct disease areas. The unmet need is huge. I think we need to continue to underline that cardiovascular, renal, and metabolic diseases are a driving force behind that.”

About the author

Richard Staines is senior reporter at pharmaphorum. He has been a journalist since the 1990s and has written for websites, newspapers and magazines. He has always had an interest in health and has been focusing on the pharma industry since 2010, interviewing industry leaders and covering stories on topics including regulation, mergers and acquisitions, and the latest clinical developments.

Bringing social media listening into R&D

After her daughter was diagnosed with Prader-Willi syndrome, Maria Picone used social media listening and AI analytics to find out the best ways to manage the rare disease. Now the insights her company is gathering are helping pharma and regulators fulfil unmet needs in difficult conditions. We spoke to her to find out more.

As pharma comes to understand the importance of real world data, it has started looking for insights in all kinds of places it would never have considered before – especially in rare diseases, when information is usually scarce.

Social media listening company TREND Community thinks that some of the most valuable insights into rare disease can be found in private social media groups such as those on Facebook.

“The conversations that are happening in private groups for rare diseases are often much more informative than in public social media spaces,” says Maria Picone, TREND’s co-founder and CEO. “A group of people who have been talking together about their experiences for five to ten years can tell us a lot about a disease even when there is very little published research.”

TREND partners with these communities to gather insights using qualitative research and AI algorithms, identifying unmet needs amongst patients and caregivers.

"We give them the tools that they need to explain to their community members who we are and what we want to do," Picone says. "We make sure that we're sensitive to issues around privacy and security – when we're working with a group on a public forum like Facebook, everything we do is anonymised."

She says that the information they are gathering can be useful for patients and caregivers looking to understand how to manage a rare disease, and has also garnered interest from pharma.

Hope for rare diseases

Picone and her husband had worked in data analytics and digital health for several years before their daughter was born with the rare disease Prader-Willi syndrome in 2012.

"When you have a child with a rare disease that you know nothing about, life just freezes," she says.

"Fortunately, because of my experience in clinical research and our connections, we had the resources to dig into the literature, connect with leading specialists, and understand the standard of care.

"Even so, it wasn't until I joined a private group on social media of other caregivers that I understood how much hope there was for a child born today with Prader-Willi syndrome. That was when we realised there was a huge gap between what our doctors knew and what was actually happening in these patient communities."

At that point, Picone and her husband realised that their daughter could have a much better life than they had previously thought possible.

"But we had to figure out how to give that to her," she says. "The original idea for TREND Community came about because we wanted to take the technology that we had been building for our clients – like clinical trial tools – and share them with our new patient community."

The initial goal was simply to understand what Prader-Willi patients and caregivers were doing, what was working, and why some things worked for some people and not for others. This was done by collecting anecdotal experiences, such as how caregivers managed diet, what drugs they were trying off label, and what outcomes they were seeing.

"It wasn't a startup idea," Picone says. "We weren't getting paid. We really just thought that we could use this technology and this approach to collect data that could help us figure out how to treat our daughter.

"It was really successful. Our daughter and our family have benefited directly from the work that we've done. For example, we put her on a ketogenic diet, which has helped her tremendously in terms of cognitive development."

Along the way, the team learnt some important lessons about when and how people are most likely to provide data.

"We learned that people were more likely to share data if they felt like there was an immediate benefit to them – not just participating for the good of someone else in the future.

"We experimented with asking questions in different ways, and even boiling it down to just five questions they had to answer once a week. People still struggled with that, but we noticed that they would nevertheless write everything about their week in a journal or in private groups. Everything we wanted to know, they were sharing – they were just doing it organically in private discussions."

In 2016 the US passed the 21st Century Cures Act, through which the FDA began to embrace the idea of bringing patient perspectives into drug development – through mechanisms such as drug development meetings where patients and caregivers are invited to take part.

The TREND team therefore thought that they could develop the technology to capture information about patient experiences from social media conversations. In 2017, TREND Community was born.

"We want to make it possible to gather more perspectives from patient communities, and to validate what patients are saying one-on-one with industry and with FDA," says Picone.

"The FDA can use our data to demonstrate that there is an unmet need in the community, and it is a problem that patients and caregivers are talking about. On the pharma side, there are opportunities to use the data to identify new indications."

Bringing the patient perspective to R&D

One example of TREND providing insights for an FDA drug development meeting was with the Friedreich's ataxia community.

"In advance of the meeting, they asked us if we could analyse their private social media group to generate some evidence for the FDA," Picone says. "The FDA was interested in learning which symptoms affect patients and caregivers the most, what treatments they've tried, and what their unmet needs are."

These kinds of questions are where TREND focuses their AI analytics algorithms, and where Picone believes the most useful insights can be gathered.

"We're looking at what people are talking about around disease burden and disease management. We then identify the other concepts that are trending and see if there's an unmet need that we can identify. We started out using an existing database called the Unified Medical Language System to guide our engine, and continue to train it in that way, developing a taxonomy that understands and defines which terms fall into those three buckets."

She gives an example from their work in Prader-Willi syndrome: "Prader-Willi is most commonly associated with two major things – hyperphagia, which is chronic insatiable hunger, and obesity. Most clinical trials were focused on finding treatments for those two symptoms. In fact, for many clinical trials, hyperphagia was an inclusion criteria.

"My daughter, however, doesn't have hyperphagia. That doesn't mean that she won't ever have it, but there's a misunderstanding that every person with Prader-Willi syndrome is in hyperphagia. That means she wouldn't qualify for most of these trials."

Through social media listening on private groups in Prader-Willi syndrome, the team found that issues around sleep trended highly – even more so than conversations around hunger and obesity.

"That tells us that this may be an issue that a lot of caregivers are dealing with. At that point, our engine was looking for phrases like, 'I'm tired', 'I'm sleepy', 'I'm fatigued'. It's smart enough to know that there are a bunch of terms that can be grouped together that are all related to issues of sleep."

TREND then partnered with paediatric neurologists Daniel Glaze and Ameeben Patel at Texas Children's Hospital/Baylor College of Medicine, who helped describe what disordered sleep looks like from a clinical perspective in this patient population.

"We were then able to create a codebook and use that to train our engine to look for things beyond 'I'm tired' – such as head bobbing, imbalance issues, narcolepsy or cataplexy. Then we went back out to social media and looked for conversations where people were talking around this new definition of disordered sleep. We used that as a way to quantify the problem in the community.

"We also helped community members access a drug called pitolisant that was recently approved in Europe for the treatment of narcolepsy through FDA's personal importation programme. Scientist Lara Pullen identified pitolisant as a possible treatment for her son who was experiencing episodes of debilitating cataplexy. We asked caregivers to track their children's experiences while taking this experimental treatment on our data collection platform."

This work has led to a pharma company that acquired the US rights to pitolisant, Harmony Biosciences, connecting with TREND and pursuing an indication for Prader-Willi syndrome.

“In this example the drug company already had a treatment for narcolepsy, pitolisant, that they thought could help in Prader-Willi syndrome, but there was a lack of evidence and literature on sleep issues.

“I requested an informal meeting with the FDA and asked them how our data could support or accelerate the approval process. They suggested doing a PK study on the children we had identified to have a baseline in Prader-Willi syndrome and better understand the safety. I brought this idea back to the sponsor and they proposed it in their application to the FDA, the FDA approved the protocol and they opened their investigational new drug application with the study.”

Picone says that TREND would like to publish as much as possible with the communities on the insights gleaned from their shared stories and experiences, so that they can become part of the scientific literature.

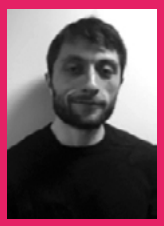
“In that way, doctors and researchers have access to the information and can consider it when trying to identify therapeutic targets or choose their next community to focus on.

“Our goal is to really understand what is happening right now in these patient communities and what their most pressing unmet needs are. Then we can use social insights to empower the community members to drive forward initiatives that are important to them.”

About the interviewee

Maria Picone is the co-founder and CEO of TREND Community. After more than ten years managing operational and strategic ventures in the biotech and pharmaceutical industries, Maria and her husband, Christopher DeFelice, started a consulting company that built custom digital health platforms for biotech/pharma, research organisations and health systems, and provided strategic and publishing services for FDA regulatory submissions. In 2012, their daughter was born with Prader-Willi Syndrome; their family’s journey was the inspiration for TREND Community.

About the author



George Underwood is a senior member of the pharmaphorum editorial team, having previously worked at PharmaTimes and prior to this at Pharmafocus. He is a trained journalist, with a degree from Bournemouth University and current specialisms that include R&D, digital and M&A.

OPEN HEALTH

Delivering change through better rare disease communications

OPEN Health's Richard Jones, Gemma Allen and Charlotte Richards discuss how pharma can utilise tools, channels and stakeholders to deliver change and enable better outcomes.

Many innovative therapies are being launched in rare disease following years of research that has been driven by the emergence of new technology and regulatory incentives. This brings high levels of hope and expectation to the rare disease community. Consequently, it's vital that biotechnology and pharmaceutical companies cut through the noise to bring real understanding and informed decision making about the next generation of orphan drugs. Doing this requires communications that encompass the right mix of tools, methodologies, channels and people.

Exploring the challenges in rare disease through better communication strategies

OPEN Health recognises that there are multiple challenges in commercialising new therapies in rare disease and is leading future practice in communications by placing emphasis on a 'patient first' approach. This includes supporting Benjamin James's recent analysis on what the future could look like for outcomes driven communications in this space. Benjamin is a trustee and patient advocate for DMD Pathfinders and has recently completed a Masters in Scientific Communications. This provides us with a valued perspective on how improvements can be made for the benefit of patients. A summary of his findings can be found here.

Benjamin commented: “Rare disease patients present unique healthcare challenges including delays in diagnosis, lack of expertise about the disease, limited data and poorly defined patient pathways. The unique nature of these rare diseases means communications require innovative approaches to ensure the needs of the rare disease patient are met.

But, he added, communications are complex with a number of challenges that need to be overcome if patients are to access the life-changing therapies that are coming to market now and in the future.

This complexity can be overcome to deliver better outcomes for patients and the pharmaceutical industry through the application of integrated communications and tools. These can be used to connect HCPs and patients across broad geographic, diagnostic and treatment pathways, while enabling the patient advocacy community to be partners in positive change.

Capitalising on opportunities with digital technologies

Digital technologies have huge potential in rare disease to support connectivity and drive collaboration, improve route to diagnosis, quantify impact of a condition on quality of life, and increase both access to treatment and recruitment into clinical trials.

Connectivity: In terms of adding value within rare disease, the internet and digital technology are the ultimate networking tools, helping people to connect, share information and generate new ideas and possibilities. That is also true for HCPs, who may need to connect to expert peers for advice on managing rare disease patients who are often geographically and clinically diverse. Furthermore, digitally enabled access to information and community support is so important in rare disease, with virtual ad boards, webinar programmes and virtual centre of excellence communities among the ways digital platforms can effectively connect HCPs to share and learn from each other.

Route to diagnosis: Digital health technologies can also empower families to understand their conditions or symptoms more broadly, help to connect the dots and hopefully reach the point of diagnosis much more quickly. It can also be valuable to discount certain conditions as diagnosis by exclusion is often how rare diseases are eventually identified. It is in this space that artificial intelligence can be used effectively to see patterns where perhaps humans, either patients or healthcare professionals, can’t. That might be because they either don’t see the volume of patients with that condition or they’re just unable to see the broader holistic picture. However, for AI to be more effective, the number of patient registries and access to data needs to increase so that there is sufficient scope to develop and train the algorithms.

Impact of condition and value of treatment: Quantifying the impact of a rare disease condition on someone's quality of life can also be supported by digital technologies. Some rare diseases can manifest themselves uniquely in each patient, so trying to quantify the difficulties and symptom severity can be a challenge for healthcare professionals and researchers. Wearables and other digital tools that provide an objective view of a patient's life can collectively build a picture of the rare condition across multiple patients. From this baseline, the impact of a treatment can then also be measured, adding critical real-world evidence (RWE) data to the value proposition of a product.

Access to clinical trials and improving RWE data gathering: Developing new treatments requires researchers in rare disease to overcome the challenge of finding and recruiting patients into clinical trials, who are by their nature, rare. It is also common to see long-term follow-up being a frequent hurdle. Patient advocacy groups can be instrumental in connecting researchers to patients, and this is more evident in rare disease. Improving awareness by providing online information to people looking to access clinical trials, many for conditions where no existing therapy is likely to be available, and connecting them to researchers is critical to the development of treatments in this area. Once involved in research, there are also opportunities to improve patient engagement in clinical and RWE studies through gamification theory. This uses the same powerful principles that are central to the gaming industry and brings them into data gathering applications. This can encourage patients to maintain engagement over the longer term, helping to gather more data on these rare conditions.

Ultimately, digital technologies are providing the tools and platforms to empower patients and HCPs to overcome some of the many challenges associated with living with, and treating, rare diseases. The hope is that this continues to drive research, access to treatment and the emergence of new therapies to address the significant unmet need.

Data, evidence and communicating value

Early communication with clinicians and payers is vital to ensure that clinical development programmes meet the needs of these stakeholders. Pharmaceutical companies must engage with patients, clinicians and payers as early as possible to best understand evidence and educational needs. By doing this pharma companies can build a robust aspirational value proposition that resonates across stakeholder groups, identify data gaps and develop plans to generate evidence in order to support this positioning and secure positive HTA outcomes.

Affordability of orphan drugs – and consequently payer acceptance of the value proposition – is a challenge within rare disease. Due consideration should be given to not only what evidence may be needed to strengthen the clinical data package and support a new medicine's reimbursement dossier, but what long-term data collection requirements exist and how a data collection programme can be optimised in order to meet requirements and further strengthen the data platform.

Patient reported outcomes data are important in demonstrating that investment in a therapy will provide value beyond a clinical trial. One of the key questions to answer early on is which patient reported outcome measure may mean the most to patients and will also resonate with payers and clinicians. Pharmaceutical companies also need to know which of the endpoints payers will consider most important, what the comparator for cost-effectiveness at the time of launch will be, and what impact this has on comparator selection for the clinical trial.

At the same time alternative value and payment models should be considered. Several pharmaceutical companies are now considering innovative funding mechanisms. These include:

• **Annuity based payment model:**
This model involves payment by reimbursement agencies to manufacturers for a high-cost drug over a set period of time, which can be many months or even years. In a simple annuity model, there is no link to drug performance.

• **Subscription models:**
A 'Netflix' model, or subscription model sees reimbursement agencies and pharmaceutical companies negotiate a contract whereby an upfront fixed fee or a fixed monthly fee is paid for unlimited patient access to a specific treatment for the duration of the contract.

• **Value-based pricing:**
Under value-based pricing agreements, risk is shared between payers and pharma companies. An agreement is made to link payment for a medicine to value achieved, rather than volume. What constitutes value needs to be carefully defined and agreed by both parties and measured through a registry in order to collect the data needed to execute the agreement.

Whatever payment model is agreed and implemented, it's important to gain insights from payers around its acceptability and the ability to implement the model within different healthcare systems. The requirement for registry and long-term outcomes data should also be considered, including how to engage patients and clinicians in the process.

Patient advocacy groups are often experts in their disease and can be an active part of the HTA process in many European countries. Therefore, elevating the patient voice is critical to help ensure reimbursement discussions around a particular therapy truly represent patients' needs.

Tools and communications to engage the rare disease patient

Special consideration needs to be given to communication in rare disease and the tools used to achieve effective engagement. It goes without saying that when working with such a small patient population your communication strategies must be compliant and have transparency of intent at the heart of any engagement. Here are two examples of how patients have been appropriately partnered to inform better communication solutions:

Co-creation in an ultra-rare condition: Developing clinical study protocols in rare and ultra-rare conditions can be extremely challenging. Low patient cohorts that are geographically dispersed mean that you need a study protocol that you know will engage patients and retain them for the duration of the study. We worked with patients, their siblings and carers, and partnered with the patient advocacy group to co-design a clinical trial application to assist in educating patients and caregivers and improve retention. For an ultra-rare condition affecting just one in two million people the engagement was astonishing. Patients travelled the length and breadth of the UK and even flew in from Europe to take part and give their time to try and help improve outcomes for others affected by this condition. We are continually moved by patients' willingness and desire to give of themselves to help improve outcomes for future generations. Co-creation provides a valuable mechanism to receive their feedback and provide them with a platform to share their views.

Patient registries in gene therapy: One of the core challenges with rare disease gene therapy is that patients are treated by a small number of specialist centres and then often referred back to their local care centre for ongoing treatment and monitoring. However, there's no mechanism to capture patient outcomes across different care settings. A patient-led registry that encompasses the whole data ecosystem was developed, allowing both centres of excellence and local care centres to input data, and give patients the ability to input quality of life data. The challenge of achieving long-term patient engagement is fundamental to the success of any registry. It's an interesting challenge; a patient receives a potentially life-changing treatment of gene therapy which allows them to lead a life less restricted by their disease, but then we ask them to participate in a long-term registry to collect important health data and ask them frequently about their disease. We worked with behavioural health psychologists to develop an engagement programme that ensured participation by patients and clinicians in a gene therapy registry over an extended period.

Across its healthcare communications and value and access practices OPEN Health has significant and long-term experience in rare disease but has taken its investment in better patient outcomes much further. The company has invested in a director of rare disease, Gavin Jones, who works across its practices to ensure solutions truly meet the needs of clients and in turn the patients they are striving to serve.

Gavin said: “It’s a real privilege to work with in-house experts like Gemma, Charlotte and Richard, and I also truly value working with committed people like Benjamin across the patient community, industry and healthcare. Harnessing the combined efforts of these individuals will be essential to delivering better outcomes for patients at a time when there are many reasons for hope within the rare disease community. World class communications, and the appropriate tools and channels to facilitate these, will be required to enable change and lead to rapid and sustained patient access to innovation.”

Navigating today’s rare disease landscape requires moving beyond existing ways of working to better translate, and communicate, the potential value of orphan medicines and truly inform decision making across stakeholder groups. In parallel with this, the use of digital tools has an integral role in communications strategies to alleviate the isolation that patients, their caregivers and HCPs may feel when treating or living with a rare disease.

Each rare disease has a unique commercialisation journey and patients’ priorities and needs will differ according to the condition, or conditions, they have. Consequently, elevating the patient voice is critical for ensuring that rare disease patient needs and expectations are met. This in turn will help inform the value story and decision making on treatment and reimbursement decisions which will ultimately lead to better patient access and outcomes.

About the authors

Richard Jones, Managing Director, Patient Engagement, OPEN Health
Richard is a highly successful, commercially astute leader and problem solver with a proven track record in senior roles in the pharmaceutical industry and healthcare agencies. Richard combines 20 years’ commercial pharmaceuticals knowledge from GSK, Astra Zeneca and Pfizer with 10 years specialist agency experience. This unrivalled pedigree enables Richard to quickly understand his client’s business and offer innovative, differentiated and effective solutions. A senior executive, comfortable at operating strategically, above practice and respected by C-level customers. Richard has a passion for crystallising issues on patient engagement and developing innovative and effective solutions.

Gemma Allen, head of digital communications, OPEN Health
Gemma has over 12 years' experience working in the pharmaceutical industry. She has worked closely with a number of the top 20 pharmaceutical companies to deliver their digital projects. Gemma has specialised in digital healthcare for the last 7 years of her career and has delivered internal data sharing platforms, multichannel campaigns, interactive iPad presentations as well as digital training. She has been responsible for building digital market access tools and educational HCP online communities as well as implementing content and engagement strategies for several web platforms. Gemma has a strong scientific background, previously working in R&D for GlaxoSmithKline and as a consultant in Market Access.

Charlotte Richards, Customer Strategy Director, OPEN Health
Charlotte has 12 years' experience in the pharmaceutical industry spanning pharmaceutical marketing and sales, medical communications, strategic consultancy and real-world evidence and market access. She has a keen interest in rare disease and gene therapy and has supported development of a number of integrated programmes across OPEN Health to drive access to these important interventions and improve patient outcomes. Charlotte is a strategy director for OPEN VIE, our value, evidence and access practice.

About OPEN Health

OPEN Health is a global healthcare communications, value and access company with extensive experience and expertise in rare disease. Its best-in-class practices work together seamlessly to provide bespoke solutions that meet the unique challenges in rare disease and deliver world-class communications and tools that deliver better outcomes. OPEN Health is fully invested in this space with a dedicated director of rare disease working across all of our practices to inform its solutions. Gavin supports all of our value, medical and patient and brand communications practices in delivering programmes that truly meet our clients' needs in rare disease.

Please contact gavinjones@openhealthgroup.com or visit openhealthgroup.com/rare-disease to find out more.

Breadth versus depth in R&D management

Takeda's Georgia Keresty is one of the only chief operating officers (COOs) for R&D in the industry. She tells us what the role involves and why it has been important for Takeda's R&D strategy in the wake of the Shire acquisition.

By virtue of overseeing several different departments across the drug development process, the role of COO of R&D requires a breadth of skills uncommon in an industry that typically focuses on specialisation. Keresty, though, says this path was a conscious choice for her.

"Early on in my career I had to choose whether I wanted to be a deep expert, taking every opportunity to hone my craft in one area, or developing breadth by understanding the entire process," she says. "I've focused my entire career on understanding the industry end-to-end from discovery research through to product development and manufacturing as well as all the functions that support that, such as Quality and IT."

Now Keresty is in a role that requires understanding of how the entire complex pharma machine works.

Although such COO roles in the industry are scarce, Keresty notes that they are becoming more prevalent – particularly with the increasing number of startup life sciences companies, where a small number of employees need to take on a wide range of roles.

"As companies become more complex, and as they look to make quick decisions to focus on things such as operational excellence, they need a leader to be the glue of that entire complex internal process," she says.

She adds that Takeda made the decision to implement an R&D COO for several reasons. One key driver was its acquisition of Shire, with Keresty now being responsible for the full integration of both companies' R&D efforts.

Moreover, Takeda was looking for a role that could tackle the challenges involved in moving towards increasing levels of outsourcing and partnerships with other companies.

"When you have such a large part of your operation externally placed, you need experience in how to manage that and ensure that, operationally, we continue to be flexible, and continue to make adjustments as needed," Keresty explains.

It was also partly driven by Takeda's plans to move from a regionally based R&D organisation to a global organisation, and the need to be able to "function globally in a streamlined manner", as Keresty puts it.

"The role involves ensuring that our regional R&D centres – Asia, Europe and Japan – stay connected with the global centre in Boston to make sure that the work they do in the regions is fully aligned, contributing to, and supportive of our global programme."

Keresty also has three business functions reporting directly into her – the Global Portfolio Strategy Group, the Partnership Office, and the Centre of Operational Performance (CoOP) – as well as other functions that facilitate R&D.

"One part of the role is being the interface with enterprise functions that we rely on in order to do our work every day, including Procurement, Quality, Legal, IT, Healthcare Compliance and the Intellectual Property group," she says. "I'm their liaison and I work with them to ensure that the programmes and support structure they're putting in place to support R&D is appropriate and fully staffed, and that they're aligned with the goals and objectives we have to help bring new products to the pipeline.

"Then there is a component of representing Takeda R&D externally to professional societies and academic institutions. I help lead some of our governance functions, such as our Extended R&D Management Committee, our monthly and quarterly pipeline reviews."

Last but by no means least, Georgia acts as a resource for talent across R&D.

"I have been in pharma for a long time, and I want to help the women scientific leaders that are making their way through a really exciting and important industry. I make my mentoring and sponsoring activities available to all of our talent and sponsor programmes, and some of our mentoring programmes as well."

All that said, Keresty notes that the broad nature of the role means that there could easily be something else it needs to cover in the near future. To keep adaptable, she says, it's important to maintain external connections.

"It's so easy with a large, complex organisation to become internally focused. Whether it's with academia, professional societies, or other thought leaders in our industry, making those external connections is essential, as is mentorship and having talent ready to step up when opportunities arise to take on key roles.

The advantage of this wider focus, she says, is being able to quickly identify where things aren't working and where opportunities are presenting themselves for improvement.

Keresty therefore says she sees roles like this becoming more and more critical in how complex organisations work over the next few years.

Looking to the future, Keresty says her main goal is making sure the operation side of Takeda runs "flawlessly".

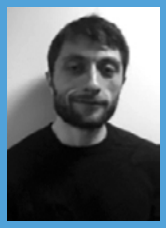
“I would like to see that our operating model is strong and flourishing and that we continue to improve – because there are always going to be opportunities to improve operational delivery and effectiveness.”

Keresty says that her decision to focus on breadth over depth has certainly paid off.

“People often wonder why I made the decision, and perhaps it took many years for me to really see the benefits of it. But more and more people are seeing it as an exciting career path, one that keeps people engaged and motivated. I’ve even heard people connecting it to how millennials think in terms of wanting to do new things, and always wanting to be challenged.

“You need both kinds of people in an organisation to be successful – those who prefer to work broadly and those who prefer to be the deep experts. If you get that balance right, it could be a winning combination.”

About the author



George Underwood is a senior member of the pharmaphorum editorial team, having previously worked at PharmaTimes and prior to this at Pharmafocus. He is a trained journalist, with a degree from Bournemouth University and current specialisms that include R&D, digital and M&A.

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Medscape
Oncology Global

Staying on the cutting edge of oncology advances

Rapidly-changing treatment landscapes in diseases like lung cancer pose challenges for medical education providers, who need to be more adaptable than ever. Medscape's Katie Lucero tells us about the needs of modern healthcare professionals and how a more personalised online approach to education could help them navigate a complex environment.

Sometimes it can feel as if cancer treatment goes through a paradigm shift every few months – and that feeling is perhaps most acute in lung cancer, which has seen advances in recent years that have transformed this once almost-untreatable disease into one where patients can have real hope.

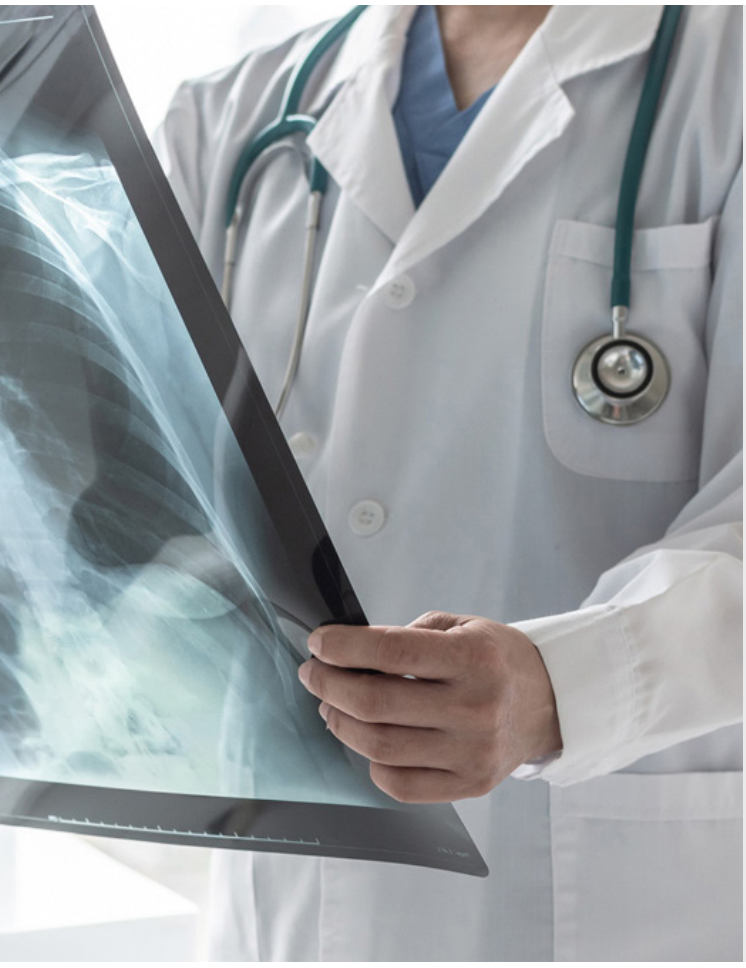
Treatment for lung cancer already varies widely depending upon the type of cancer (small cell or non-small cell) and its stage. The new, innovative therapies emerging every year – from precision, biomarker-specific medicines to immunotherapy and gene therapy – only add to this complexity.

With so many developments coming so rapidly, it is more important than ever – but also more difficult – for oncologists to stay current with the latest information on how to achieve the best outcomes for patients.

“Lung cancer treatment involves a multitude of decisions that must be made by the clinician and patient, including testing for biomarkers, determining best treatment (from surgery, radiation, chemotherapy, and targeted therapy), and managing potential adverse reactions to treatments,” says Katie Lucero, PhD, director of outcomes research at Medscape.

“Diagnosing different targetable mutations requires specific knowledge about how and when to test for these. Or, if a broad way of testing becomes standard practice (e.g. NGS) distilling the targetable mutations from the non-targetable ones might become more difficult. Which therapy do you begin with? The one targeting X or Y?”

According to Medscape, over half of healthcare professionals report that their most recent practice change was related to treatment, and they therefore see medical education as one of the most valuable sources of information for improving their knowledge of medicines – as well as diagnostic assessments, screening and prevention, and communication to patients and the larger care team.



But in an environment as varied as lung cancer, there’s a risk that traditional medical education approaches could fall short, and more adaptable methods are needed.

“Learning about these changes requires a lot of case-based educational activities that would help physicians practice the newly acquired knowledge in a virtual space, receiving guidance from experts to build and reinforce their knowledge and practices so that they can provide optimal management decisions in their clinical practice,” says Lucero.

She uses an example from Medscape’s MedSims virtual patient simulation platform:

“This platform simulates patient visits and the use of an electronic health record system to order tests, view test results, and make treatment and other patient management decisions. This allows the clinician to make decisions in a consequence-free environment and get real time feedback on those decisions.”

Continuing medical education

Lucero thinks the solution could lie in embracing online continuing medical education (CME) techniques like MedSims.

Online CME personalises learning by identifying gaps in knowledge and skill through pre-activity assessment of participants, and then delivering independent, accurate, unbiased, scientifically rigorous educational content via formats that are clinically relevant and interactive in nature.

These can be anything from live events to written publications, online programmes, audio and video content or immersive simulations.

“During congresses there is a great deal of new clinical data coming out regarding different therapies in different stages of development,” Lucero says. “It is important that physicians receive evidence-based, unbiased information from thought leaders who can distill and educate physicians on this new data and its implications for clinical practice.

“This prepares the physicians for when these new therapies become available in clinical practice so that they are used efficiently and in a safe manner. Furthermore, having experts share patient cases in light of the most recent data helps the clinician put clinical data into practice, and this is done through CME.”

Professor Sanjay Popat, consultant thoracic medical oncologist at The Royal Marsden Hospital, has backed this up, saying that in an age of “increasing complexity” for the treatment of lung cancer, timely summaries from key experts are “excellent” for helping to place new data into current context.

CME aims to be evidence-based, current, objective, and free from commercial bias. In addition, it is designed in such a way that it will meet learning objectives that were developed from a needs assessment that defined the healthcare gap, the practice gap, the desired outcomes, and the needs of the target audience.

“CME means that the education was developed using evidence-based instructional design principles that maximise the chances the target audience will actually learn from the education,” Lucero says. “CME is effective because it meets certain standards that must be upheld in order to be certified by an accredited CME provider, like Medscape.”

An analysis of cancer immunotherapy activities from Medscape has shown that timely continuous education designed to meet the learners' needs is impactful, resulting in an average 33% relative improvement from pre- to post-education from 2014 and 2018. However, on average, about a third of participants still needed more education on the topics covered.

Lucero adds that another reason CME is effective is that clinicians trust it. A recent Medscape global survey showed that for 33% of physicians, the source of information for physicians' most recent change to practice was CME.

"The landscape in thoracic oncology is rapidly changing," says Enriqueta Felip, head of the Thoracic Cancer Unit at Vall d'Hebron University Hospital in Barcelona. "We can characterise tumours much better and offer much more individualised treatment strategies. For all these advances to flow, independent CME is fundamental in helping professionals to maintain, develop or increase their knowledge."

"If an audience isn't going to use it, then how can it be effective?" Lucero adds.

"There is no disadvantage to offering certified medical education except that not everyone needs the credit it offers, so sometimes there may not be an incentive to the healthcare provider to take it if they feel they are getting the information they need from published studies, colleagues, and clinical news.

"The disadvantage of CME from a pharma company perspective is that they cannot have control over the content in any way. Credibility of content is possible due to the fact that pharma/biotech companies do not have control."

A scientific approach

Lucero notes that the scientific rigour underpinning CME is a key advantage – particularly when it comes to using these scientific processes to personalise content to best suit each user's needs.

"The closer the content is to the specific need of the learner, the more likely it is to make an impact," she explains. "We utilise tailored learning to assess where one is prior to any education and then serve content based on responses to that assessment.

"We then provide custom feedback that is dependent upon one's decision in an open-ended patient simulation. We also serve personalised content to our members using artificial intelligence (AI), making it more likely that our members have the content they need when they need it.

"Our registration-based membership allows us to track, longitudinally, individual members and their learning path. We can examine within the same learner what happens from one activity to the next. This allows us to do more robust analyses that minimise errors and increase statistical precision."

This rigour and personalisation comes in before the company even begins designing the programme, when Medscape uses a scientific process to identify the outcomes users hope to achieve based on what is relevant to the current challenges in lung cancer.

"We keep the end in mind when developing the content and assessment techniques, designing the format, and delivering to the target audience. This maximises the chances of us assessing outcomes that matter for patient care in lung cancer."

The company has a variety of methods for measuring these outcomes, including repeated-pairs pre/post assessment using multiple choice questions, assessing intended and actual changes in practice after education, and assessing decisions made through case vignettes, and patient simulation. They also assess confidence using Likert-type scales.

"Another important point in thinking about measuring outcomes is that sometimes education serves the purpose of confirming what the learner already knows or is doing, especially in a fast-paced field like lung cancer," says Lucero. "Therefore, it is important to assess who has their knowledge and competence reinforced as a result of education."

The challenge is, of course, that as the lung cancer treatment landscape continues to change rapidly CME tools need to be ready to adapt at any time. Lucero says that this, too, is made possible by continuous improvement processes.

"Adaptation can be based on plan-do-study-act (PDSA) cycles where we utilise what we learned from the previous programmes in a therapeutic area to make adjustments to the next set of programmes," Lucero says.

"For example, we may learn from one programme that utilised video and also had downloadable slides that the slides were accessed by 60% of the learners, so in the next programme, we will make sure slides are available.

"We may also learn from that programme that 40% of oncologists still need education on a certain topic as evidenced by 40% not answering a set of questions correctly. This will help focus the content of the next programme."

Lucero hopes that, ultimately, CME programmes like this underpinned by scientific rigour will improve knowledge, competence, and performance among HCPs.

“We are using AI-aided technology to deliver the right education at the right time so that we can ultimately improve the impact of that education on patients,” she says.

“Mostly, I hope that these knowledge and performance changes will translate to better patient care and patient health.”

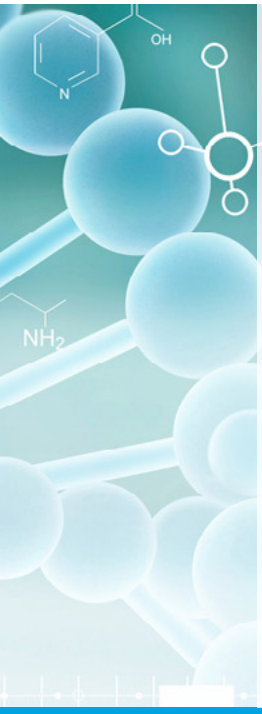
About the interviewee

Katie Lucero, PhD, is director of outcomes and insights at Medscape Education Global. She has nearly 20 years of experience in research and evaluation in developmental psychology, public health, health outcomes, and education (K-12 and CME). At Medscape, Dr Lucero oversees and leads strategy in all endeavours where data is used to tell a story. Prior to that, she was director of research and evaluation for McREL International where she was responsible for designing, pursuing, and managing education evaluation and research studies, including government projects. Finally, she directed numerous quality improvement and health outcomes studies during her tenure at a contract research organisation and evaluated public health programmes at the Centers for Disease Control and Prevention (CDC) in the US.

About Medscape

For over 25 years, Medscape Education has been a trusted and essential resource for healthcare professionals throughout their careers, growing into the global healthcare provider it is today, reaching 4.4 million physicians worldwide with the news, resources and education they need in over 30 therapeutic areas. Medscape Oncology enjoys a unique and unparalleled relationship with its vast, active member community of oncologists around the world. With a shared commitment to improving cancer care, Medscape provides ubiquitous access to learning resources across multiple channels, offering a variety of personalised, evidence-based, and clinically relevant educational solutions to support the entire oncology care team and improve patient outcomes.

To learn more, please contact Stephen Dunn, executive director, Medscape Education, Oncology at sdunn@webmd.net / +44 (0)203 802 1146



An innovative approach to improving research and patient care with NHS data

Understanding how patients are treated in routine clinical care has great potential to improve treatment and enrich academic research. An innovative collaboration between IQVIA and the Leeds Cancer Centre is pioneering a practical approach to unlocking this potential.

The breadth and depth of information held by the National Health Service (NHS) has given the UK some of the best healthcare data in the world, but until fairly recently its latent possibilities for improving patient care and clinical research had yet to be realised.

That is now changing. A national institute for health data science, Health Data Research (HDR) UK, was established in 2017 to make the most of large-scale data and advanced analytics to improve people's lives. Its capabilities were extended last year with seven new centre-of-excellence hubs. Last year also saw the launch of NHSX, which combines government, NHS and industry talent to centralise responsibilities for digital, data and tech, and pull the health service out of the pre-internet age in which it often languishes.

At the same time, the value of NHS data is starting to be realised. One report last year found that in terms of operational savings, better patient outcomes and wider economic benefits, leveraging the NHS' data could produce an impact of £9.6bn. The situation was put more starkly in a February 2020 report from Imperial College London. It said that, as society struggles with the twin challenges of an ageing population and the rising costs of new, innovative medical treatments, the NHS' unique long-term health data assets would be transformative for health. "Ensuring that we maximise the benefits of this opportunity is non-negotiable," warned the report's authors, among them consultant surgeon Lord Ara Darzi and Lord James O'Shaughnessy, a former health minister.

It's a clear direction, and yet, as anyone who works with large datasets will know, easier said than done.

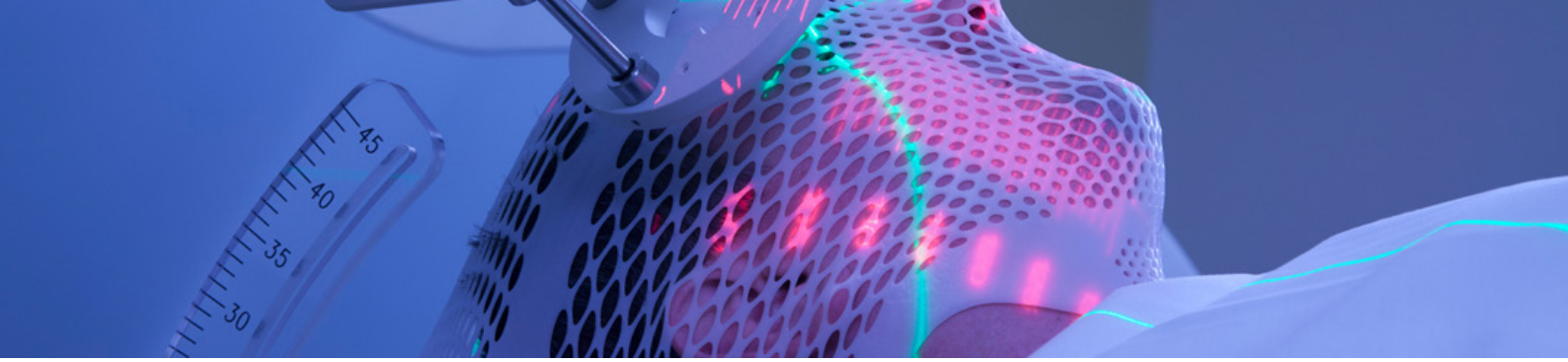
Addressing data challenges

James Anderson, a senior principal at IQVIA, notes: “Even the best, greatest real-world data is still not perfect. Data is missing, and you may find that some clinical teams are much more robust than others in the way that they retain and organise information within the medical records.

“Often there isn’t the data that we need to answer research questions in the place that we need it. We may need to go back through individual notes manually, perhaps finding text that’s in an unstructured form. For example, a pathology result or hospital letter saying the patient smokes, but that smoking status wasn’t entered into the database. So there is a process of data curation, to make sure that all the data required, whether in a structured or unstructured format, is noted and organised within the structured data of the electronic medical record, with the data then de-identified for analysis.” But the requirements for structured and unstructured data often depend on the level of intricacy for a particular piece of work, with more complicated analyses often requiring additional understanding – for example, results of a particular genomic test – that can be combined with electronic medical records.

Meanwhile, information governance and transparency of operations, and having them aligned with hospitals’ research oversight committee as well as national and international regulations, such as GDPR and the July 2019 DHSC Framework for the Value of NHS Research, need to be taken very seriously. As James says: “Effective governance is not something that happens overnight. It takes time to build up trust and there’s a journey to follow to demonstrate just how seriously data privacy and security are taken, as well as demonstrating a track record of compliant and appropriate behaviours. It also requires privacy-enhancing technologies and safeguards to protect individual privacy while generating insights that help healthcare stakeholders identify disease patterns and correlations with the best treatment pathway.”

Explaining what is expected from his institution, Professor Geoff Hall, a medical oncologist and chief clinical information officer at Leeds Teaching Hospital NHS Trust, explains how de-identified, patient-level data never leaves the organisation without the explicit consent of patients. “Analysis of anonymised data is performed within secure areas within the Trust and limited to individuals with contracts that bind them to the strict information governance standards of the hospital.”



REAL Oncology

Situated in the north of England, Leeds Teaching Hospitals NHS Trust is one of the largest Trusts in the country, covering a local population of almost one million and a regional population of 2.7 million for whom it provides specialised services. It is also one of the largest integrated cancer centres in Europe and leader in collecting detailed oncology data thanks to a system that holds records on more than four million patients and detailed data on more than 300,000 patients with cancer.

Avoiding many of the problems typically associated with large healthcare IT projects, the Trust continues to successfully design and build its own, electronic health record known as PPM+. In doing so, it began collecting and collating relevant and robust data that now provides a new, innovative source of real-world data to help researchers better understand the care cancer patients receive in multiple ways, including through a new collaboration with IQVIA.

James explains: “REAL Oncology facilitates access to the insights from Leeds’s real-world data, while protecting patients’ anonymity in a way that supports compliance with information governance, GDPR and the DHSC Framework for the Value of NHS Research.”

Geoff adds: “The collaboration we have developed allows the Trust to work with IQVIA in a way that protects the privacy of our patients’ information, but enables us to allow IQVIA analysts to extend the capabilities of the in-house team who analyse our local data.”

In practice, this means there’s an IQVIA team on the ground in Leeds and the collaboration is overseen and sits within the hospital’s own governance hierarchy for research, with full transparency about what the team is doing. James says: “The team comprises data scientists, a project manager, a medical writer and an oncologist for the clinical engagement and interpretation of the results. They’re really the engine for what REAL Oncology does and they’re embedded within the hospital and its wider research infrastructure.”

Moreover, there are a series of strict conditions in place for the collaboration. The REAL Oncology team will not generate work for the exclusive use of an individual commercial organisation, with any report generated placed in the public domain – ideally within a peer reviewed journal, with each project based on a master contract between the Trust and IQVIA. "In addition, the IQVIA-funded analysts divide their time between projects determined by IQVIA and those defined by the Trust to ensure fair value is delivered to the Trust and the patients it cares for," says Geoff.

Analytic outputs from any of its projects all have to be reviewed and approved for information governance by the Trust before anything is allowed to pass outside the NHS firewall. Having all of these arrangements in place makes the REAL Oncology collaboration a practical demonstration of how an NHS organisation, academia and industry can work together on patient data to improve patient outcomes.

Delivering value to the NHS, patients and clinicians

"My view," says Geoff, "is that when you give clinical teams a better understanding of the care they deliver and the results they achieve, it allows them to provide better care to patients. That is certainly what drives me and motivates me." Sometimes these improvements can come just by giving clinicians insights into the outcomes they achieve. Other times, detailed curation of datasets is needed to facilitate the additional analyses required to provide the insight. Geoff says: "At the clinician level, I have not yet met an oncologist who doesn't want to see an analysis of their data. It's a very research-focused specialty."

Consequently, there are further benefits for the Trust in terms of its own reputation and opportunities for its clinicians to present research. James says: "These data will also be able to help, at the patient level, to rapidly screen people against trial inclusion and exclusion criteria – so that it's quicker to identify the right patients for the right trials. And there's a clear aspiration that we will be able to involve more patients in clinical trials – giving them access to the most innovative and novel medicines."

Jacqui Gath, a cancer survivor and advocate, provides some additional thoughts on what matters to patients. She says: “Real-world evidence studies reveal the real effect of medications and procedures on the people taking them. These effects may be beneficial as intended, or not. People will forget to take their medicines, or they may not take them as indicated, or the drug may be a generic which does not have the same bio-availability as the original.

“Drug studies do not routinely disaggregate results by biological sex, despite FDA requirements, yet for example, women have different symptoms of heart attack and different responses to drugs. This big data approach may be able to show different effects of medications in men versus women. We already know that harm can be caused by assuming one size will fit all so having separate insights by sex is critical.”

Together, these benefits for the NHS, patients and clinicians should ensure that treatment advances are made available more quickly to those in need.

Outcomes from REAL Oncology

Studies to date from REAL Oncology have variously examined changes in lung cancer outcomes over the last 15 years, healthcare resource utilisation for bladder cancer, and treatment patterns for different stages and grades of lung cancer.

James says: “Beyond these interesting insights, some of the outputs from Leeds have helped submissions to health technology assessment bodies by providing robust data from the real world to strengthen cost models. We also know that the findings from the real-world studies in Leeds have helped either confirm or even inform changes to clinical trial design, making sure that researchers have got the right sub-populations in clinical trials so that they actually reflect practice in the real world.”

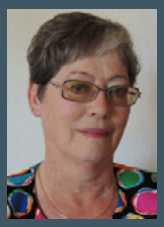
The hope with REAL Oncology is that more can be learned from cases of cancer in the UK to improve patient health. Looking at the present-day place for the work, Geoff says: “We will never replace a randomised controlled trial, but I see REAL Oncology as a highly complementary additional source of information, with real-world evidence enhancing the insights derived from clinical trials.”

As REAL Oncology has developed and grown, Leeds Teaching Hospital has been considering how it can get involved in national and international programmes to drive patients' health improvements through clinical data. Leeds Teaching Hospitals NHS Trust is a founding member of DATA-CAN, the Health Data Research Hub for Cancer, which supports researchers to access anonymised patient data, and whose other founding members are UCLPartners, the University of Leeds, Queen's University Belfast, Genomics England and IQVIA.

The collaboration is one of the seven HDR UK hubs set up to speed up research for new medicines and treatments, working in partnership with patients and the public.

It's a perspective that resonates with cancer survivor and patient advocate Jacqui Gath. "Patients want the best possible treatment and care and are usually more than happy to donate their data if that data can help them get that for all. For that to happen it's critical to engage with them in a trusted and a sustainable manner."

About the interviewees



Jacqui Gath, PPI patient advocate
Jacqui started out as a metallurgist and moved into information technology as a second career when she realised its potential. Her interest in health topics became very personal after a diagnosis of cancer in 2003 and since then she has been actively engaged in many cancer research studies, and joined an ethics committee and funding panel. Her particular interests lie in nutrition, genetics, and the interplay between the two and she is also involved in the DATA-CAN hub.

Professor Geoff Hall, medical oncologist, chief clinical information officer (CCIO), Leeds Teaching Hospital Trust and Professor of Digital Health and Cancer Medicine, University of Leeds
As a medical oncologist, he treats women with gynaecological cancer. As the CCIO for Leeds Teaching Hospitals NHS Trust, he provides clinical leadership to the wider informatics strategy at the Trust including the development and delivery of PPM+, the Trust-wide electronic patient record and the Leeds Care Record, the integrated digital care record for all health and social care providers for all Leeds patients. He also serves as clinical lead for DATA-CAN, the HDR UK hub for cancer.

James Anderson, senior principal, IQVIA
James has worked at IQVIA for over three years, overseeing large real-world data projects globally, and is the IQVIA lead for REAL Oncology. Previously he worked in the NHS as an operational manager, and a managing director for an academic health science partnership (Anglia Ruskin Health Partners).

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