Research and Development

Plus: Rare disease awareness and education

The rise of digital twins in life science research

Why VCs fell in love with pharma R&D in 2021

Inside the changing tides of life science research

pharmaphorum deepdive

February 2022

Contents

Deep Dive: Research and Development 2022

It's no secret that the life science industry has undergone a dramatic transformation over the past decade. Fuelled by an influx of advanced technologies and computing capabilities, scientists are slowly unlocking secrets to treating a wide array of conditions and expanding our understanding of biology.

With so much potential on the cusp of being realised, it's an exciting time to be working in life science R&D. In this issue of Deep Dive, we find out how a global pandemic became a catalyst for change in life sciences – pushing scientists to explore agile new ways of conducting vital research while the rest of the world slowed to a halt.

For the 300 million people around the world living with rare diseases, innovation in R&D is a welcome change. Rare disease communities are some of the most passionate and informed patient populations, yet they have long been an underutilised resource when it comes to developing new treatments. But, as AXON's Dr Emma Lemon and experts from IQVIA discuss, changing attitudes in the R&D space alongside improvements in medical informatics are a sign that a more patient-focused approach is on the horizon.

As we enter the third year of COVID-19, it is clear that there is no going back to the pre-pandemic ways of working. Reimagining a global industry is no small feat, but what is certain is that the groundwork laid in the R&D space now will determine outcomes for the next generation. For now, at least, recent progress hints at a bright future.

I hope you are staying safe.

Eloise

Eloise McLennan – editor, Deep Dive

Next issue:
Market Access
Plus:

- Developing unbranded HCP/ patient resources

Catch up on recent issues:

Digital Health – December 2021

Patients and Partnerships – October 2021

Communications and Commercialisation – September 2021

Oncology – June 2021

Seeing double: the rise of digital twins in life sciences

Little more than a decade ago, the concept of digital twins in life science research may have sounded more like science fiction than a viable model for research and development (R&D). However, with COVID-19 rapidly accelerating the adoption of digital technologies, the industry is warming to the concept of digitally aided biology.

Digital twins are a prominent figure in this movement, having already made their mark improving operations in the manufacturing sector.

So, what exactly is a digital twin? According to IBM, the technology allows users to develop an exact virtual replica of a physical entity or process. Connected sensors collect data from the physical asset that can be incorporated into the digital model. In other industries, this could mean creating a complex digital model of an electricity grid or spacecraft and using data to inform test scenarios to identify potential issues.

In life sciences, the use of digital twins is still in its infancy. However, as digitisation takes centre stage, companies are beginning to warm up to innovative new concepts.

"I think a lot of people can see the potential of digital twins," says chief scientific officer and co-founder of Synthace, Markus Gershater. "That possibility for us to be running better and more informative experiments that are transferable, from experiment to experiment and from experiment into the clinic."

For Gershater, the use of digital twins in life sciences research can be separated into two categories: biological and experimental. While the likelihood of realising a full biological model of a cell or human is still a long way away, experimental digital twins have the potential to revolutionise clinical research now.

Digitising the lab environment

It's no secret that life sciences are undergoing a transformative push to adopt digital technologies. For years, researchers have done their best to accommodate the evolving complexity of their field with the limited time and resources available to them, even as emerging areas, such as genomics and personalised medicine, significantly increased the process of discovery and development.

"There's a real mismatch between the complexity of what we're trying to do and the tools we have available," explains Gershater. "The way we currently work is mostly manual, and it often relies on quite simple experimental design and analysis. This is the kind of analysis that you'd be able to do in Excel and tends to be the common level of analysis across biology."

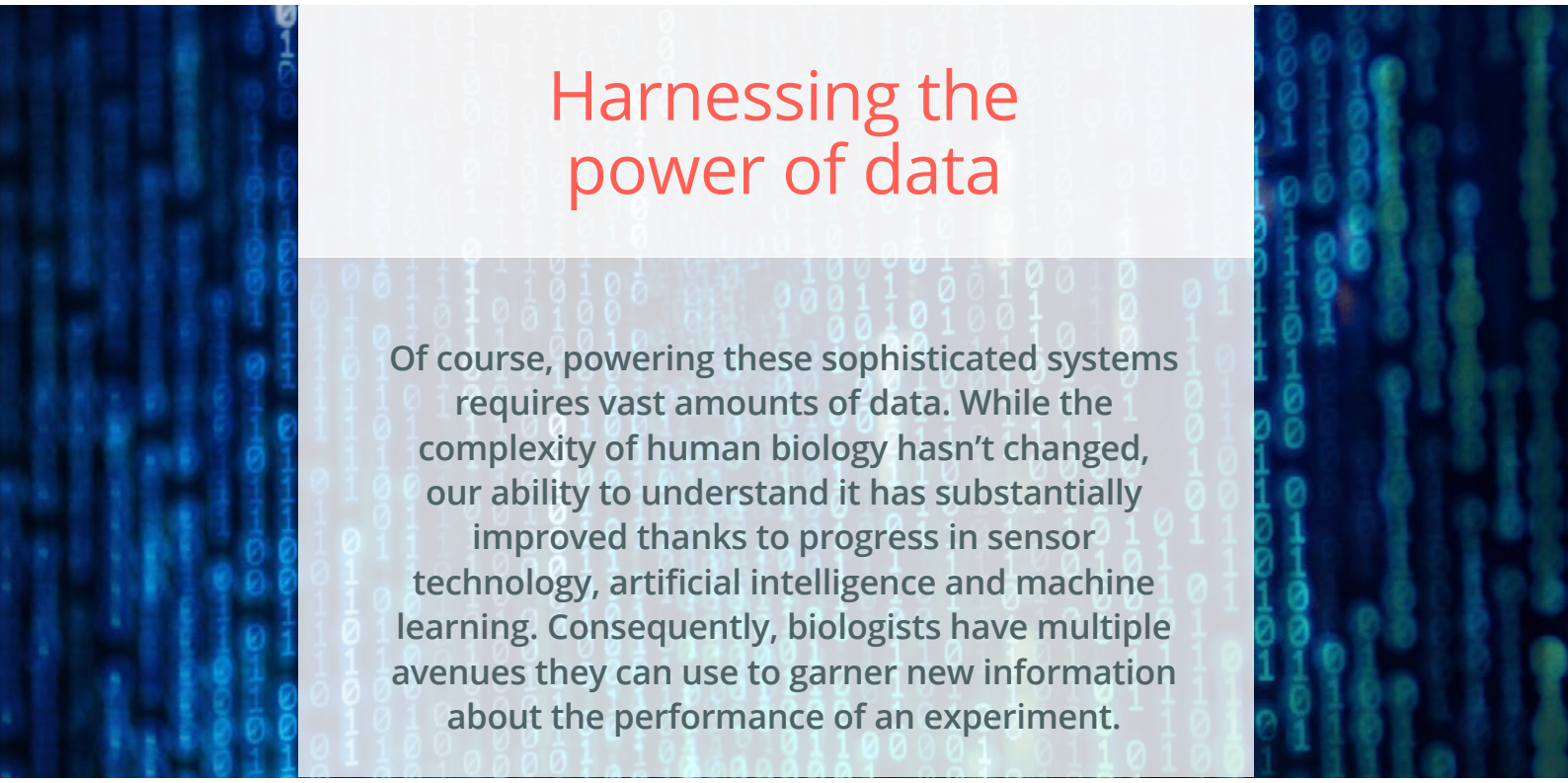
While much focus has been dedicated to using digital twins in manufacturing and modelling, for Gershater, the technology has significant potential in the experimental space.

Issues with costs and resources often hamper research projects, as clinicians can only do so much with the tools they have at their disposal. As a result, when researchers embark on a new drug discovery project, the odds are largely stacked against them. Approximately 90% of drug discovery fails – a substantial amount given that the global pharma industry spent almost $200 billion on research and development in 2020.

"Physical experiments are hugely costly," explains Gershater. "If we can reduce the number of experiments we can run and make them more targeted, make them more effective, and less likely to fail, then that's a huge potential benefit."

This is where digital twins can be a useful asset in R&D. Whereas it may take life science researchers months, even years, of dedicated focus to sort and analyse data, advances in computing mean that digital twins can run multiple test scenarios simultaneously. Moreover, automating testing allows clinicians to rapidly recreate and reproduce trial scenarios, often conducted in highly controlled environments, across locations and personnel.

"It offers the possibility for a separation of labour," says Gershater. "Now you have people that can design and plan experiments, and then different people then run those and who are experts in the running of those experiments."



Harnessing the power of data

Of course, powering these sophisticated systems requires vast amounts of data. While the complexity of human biology hasn't changed, our ability to understand it has substantially improved thanks to progress in sensor technology, artificial intelligence and machine learning. Consequently, biologists have multiple avenues they can use to garner new information about the performance of an experiment.

High-quality historical data is far more complicated to source. One of the most significant issues facing life science researchers is that there is still a lot that we don't know about human biology, which means there is no existing data to inform digital twin models in specific areas. This issue is compounded by the small and messy data sets commonly found in life science research.

"What we need to make progress in modelling such a complex system is a large amount of exceptionally high-quality and deep data that can give us a lot of insight into that system," says Gershater. "A step to get there would be the experimental digital twin, which then aids in actually generating those complete and high-quality data sets."

Incorporating digital twins into experiments early on can help to boost the volume of usable data. By designing and running scenarios in the digital domain, researchers can gather both molecular data and metadata detailing the purpose and process of an experiment in a coherent and structured set.

Given enough historical, real-time and process data, researchers can leverage the machine-learning capabilities to understand not only how a target is performing, but how it will behave in the future. Ultimately, the ability to predict how certain molecules and drug targets will behave in the real world could prove to be a crucial element in pursuing personalised medicine.

Early iterations of digital organ models, such as Siemens Healthineers effort to develop a digital twin of the heart and Dassault Systems living brain project, showcase just how revolutionary these concepts could be if widely applied to medical treatment. Suppose clinicians could create exact digital replicas of individual patients, using real-time data to track performance and inform decisions. In that case, they could tailor each treatment to optimise the likelihood of success.

As Gershater explains, "The ideal system will be where we built up hugely sophisticated structured datasets, which have informed the production of true biological digital twins of cells of disease processes of tissues of human beings."

Entering the metaverse

Driven by the need to accelerate and improve the success of clinical research and drug discovery, life science companies are increasingly looking to technology to plug the gaps between physical lab work and complex data analytics.

Creating virtual replicas using digital twins is just one small part of the ongoing digital transformation. The idea of immersive computing experiences has already caught the attention of investors across the industry. Now with the buzz around digital still going strong, the hype around the 'metaverse' has reached healthcare as companies seek ways to improve processes

"Computer aided biology is essentially a vision of what would be possible if instead of these manual methods and more simple methods, we applied cutting-edge digital and automation technologies to our biology R&D," says Gershater. "That would be experiments and processes that can be designed and planned in the cloud, with digital help in designing and planning. Experiments can then be run in highly automated labs so that our ability to conduct research is augmented by technology as well."

Although metaverse technologies have not reached the mainstream consciousness of life science companies, according to analysis from Rock Health, there is growing evidence that investors are beginning to throw their weight behind immersive digital technologies. As the report notes, "2021's investors shelled out $198 million in funding for US digital health start-ups integrating VR or AR technologies across 11 deals, more than double the $93 million raised across eight deals in 2020."

In theory, a healthcare metaverse would combine the best elements of modern digital systems and traditional physical interactions. For example, using a virtual reality headset to practise surgical techniques using anatomical holograms – the physical training remains the same, but the virtual system allows for multiple attempts without creating waste.

"There are much more effective ways of working with biology. You don't even need to reach the giddy heights of supercomputing in AI; just running complex, sophisticated experiments can truly give you an insight into the complexities of biology," explains Gershater. "These technologies and capabilities have been around for a very long time and yet they haven't been adopted by biology."

A future of personalised medicine

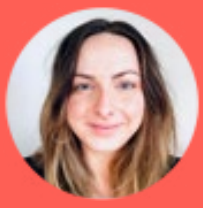
While the promise of data-driven research and medical treatment sounds like a promising area for innovation, it remains a hugely costly venture. The challenges associated with successfully developing digital simulations of these complex biological entities has been likened to the Human Genome Project (HGP).

It is not an unfair comparison, as both projects are highly ambitious undertakings. But, just as the HGP advanced our understanding of the human genome to 99.9%, digital twins can dramatically overhaul our abilities in discovery, research, and ultimately the way we treat patients.

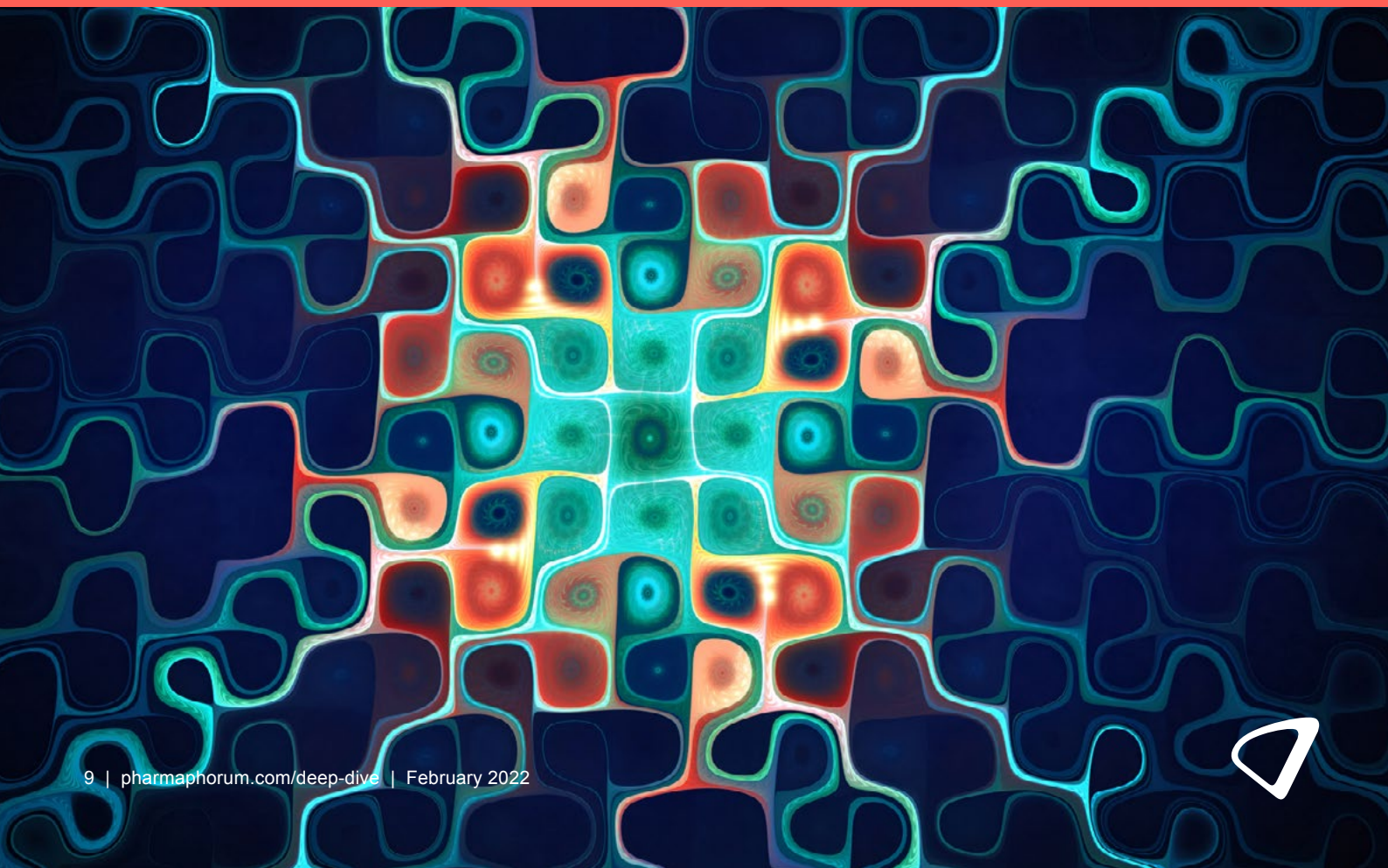
In an ideal world, digital twins would already be streamlining research projects worldwide. But unfortunately, the reality is far more complex than that. For Gershater, the process is more likely to comprise a collection of smaller steps, each building upon the success of the last until key decision-makers in the industry are convinced that digital twins and automation technology can live up to the hype – as well as the expense.

"It's the ultimate combination of personalised therapy," he says. "An experimental digital twin will be a massive leap forward. We've seen what happens where you have the basic rudimentary implementation. It changes the art of the possible quite dramatically, which is a massive step-change in our understanding of biology, human physiology and disease."

About the author



Eloise McLennan is the editor for pharmaphorum's Deep Dive magazine. She has been a journalist and editor in the healthcare field for more than five years and has worked at several leading publications in the UK.



Does the answer to advancing rare disease treatment lie in real-world data?

What do 300 million people have in common? They are living with rare diseases that are defined by their scarcity within the general population. In the United States, this means fewer than one in 1,500 people; in the EU, fewer than one in 2,000. That is 5% of the world's population.

The rarity of these diseases means information about them is scarce, as there are often too few people in a geographic location to inform experts fully or to complete a clinical trial. In turn, this may mean more patients will be under- or misdiagnosed.

While initiatives like the US' Orphan Drug Act of 1983 have provided incentives for progressing the research and development of treatments for these diseases, a deficit still remains in the number of existing treatments. This is due to several barriers that still stand between research and the results needed to develop further treatments.

Poor understanding of the pathophysiology of rare diseases remains a significant one, and this is not only a challenge when formulating molecules to combat the disease: it also has the potential to create inaccuracies or errors in diagnosis, endangering patient health and causing downstream issues for clinical trial patient selection.

More data is needed. To better treat these diseases, we must understand their lifecycle, the impact of various treatments on them, and how to develop targeted plans to combat them. But given the difficulty of recruiting enough people with these diseases to complete a clinical trial, how can we gather this information?

Real-world data (RWD) is the answer.

What is RWD and how can it help us treat rare diseases?

RWD is the collection of data that lies beyond the boundaries of clinical trials. When this data is analysed, real-world evidence (RWE) is produced, providing real insight to clinicians, academia and other healthcare professionals to successfully understand and treat rare diseases.

RWD can come from a number of sources: healthcare databases such as electronic health records (EHRs); patient registries, which are valuable sources for showing the disease lifecycle, patterns of a disease, and variability of clinical progression; and even 'unstructured' sources like mobile devices and social media.

How RWD and RWE can spearhead innovation in rare disease

RWD and RWE are vital to advancing our understanding and treatment of rare diseases. With the expanded, varied data RWD can offer, we can better understand the overall patient situation, not just in a trial setting but in the broader context of their disease journey. This can not only help us to improve their treatment pathway, but also alerts us to safety risks and create trials better-adapted to the patient experience.

It also shows overall treatment effectiveness across a wider timescale than a trial otherwise would. Ultimately, the patient is at the centre of our work and RWE is one way to determine exactly how we are helping. For people with often-misunderstood diseases like pulmonary arterial hypertension, this is critical for development of medicines that can improve both their own prognosis and everyday quality of life. Many people also participate in follow-up studies to help advance the science further, to support the improvement of treatment and care for future patients.

In turn, these benefits mean that we are able to evaluate new molecules in real-world situations and better shape trial design to gather higher-quality data, as well as replicate real-world instances and measure the long-term safety and efficacy of medicines.

RWE is also central to the advancement of artificial intelligence (AI) and machine learning (ML). These complex, sophisticated algorithms rely on significant amounts of data to formulate accurate analyses – the more data fed in, the better the results. RWE is important when training AI and ML on rare diseases and allow it to generate data visualisations to assist clinicians in patient care.

Additionally, RWE can support traditional randomised clinical trials (RCTs) through the creation of external control arms (ECAs). Using previous trial and RWE data, a historic group of people can be found whose conditions closely matched trial patients but who did not receive the trial's treatment.

Mining RWE data in this way means no peer control group need be found, and no time is spent managing them. This is a significant resource burden lifted from RCTs, but can occur only with well-studied conditions where standard of care has changed little over time. With regulatory-grade ECAs, however, regulatory decision-making becomes easier.

Why do we currently not see full RWE implementation?

Despite the benefits of implementing greater RWD into rare disease research, challenges to full integration still remain. Due to its variability and unstructured nature, it is difficult to fully control and structure the collection and generation of RWD and RWE; the data, coming from so many sources, must inevitably vary in terms of quality, transparency, accessibility and extensiveness of coverage. For the same reasons, inherent bias can enter the data alongside other confounding factors.

While RWD can provide valuable and complementary information to RCTs, there are limitations to its use. As RWD sources are not designed for clinical research, there is a risk that potentially unobserved factors, such as a patient request, could influence a physician's decided course of treatment. This could prevent a direct comparison of outcomes between treatment arms or to RCT findings.

In addition, depending on the method used to collect it, intake of RWD can be complex. A survey will naturally be a faster and easier method of collecting data than, for instance, creating a patient registry or accessing EHRs. Overall, however, the collection of RWD is generally an easy and cost-effective way of gathering data. Generating RWE is significantly more challenging, and involves multiple bodies including patients, regulatory agencies, and clinicians.

Also, given the vast amounts of data which must be handled, it is critical that RWD processes are planned well in advance to ensure the right data is being gathered about the right populations, reducing 'noisy' data and establishing targeted, standardised approaches to RWD datasets.

How can we overcome these challenges?

Standardisation of approach is necessary: to reduce messy data that varies in content, structure and format, it is vital to plan well in advance of RWD collection, filtering out unnecessary sources and ensuring nothing extraneous is captured.

The Observational Medical Outcomes Partnership (OMOP) common data model (CDM), pioneered by stakeholders across the industry from regulators to data scientists, is a standardised data format for RWD assets that outperforms many other formats in terms of integrity, flexibility and coverage. Reformatting registries and clinical databases to the OMOP CDM format allows for standardisation with limited data loss. In addition, establishing OMOP CDM as a data standard will enable efficient evidence generation through federated data networks, like Janssen's own rare disease network, PHederation.

Another crucial element of RWD is collaboration. For RWE to reach its potential, the healthcare industry needs to harness its collective wisdom, reduce organisational silos and maximise the value of RWD for healthcare. This applies to research centres as well as pharmaceutical companies; it is vital that data is dispersed, not hoarded, and that authorities should support and lead these efforts within the community.

At Janssen we are spearheading this rare disease collaboration with the RWE Navigator, which supports and encourages knowledge-sharing across companies and academia while providing us with a holistic view of quality of life of those living with rare diseases. Because while industry collaboration is important, it is equally necessary to work alongside people living with rare diseases and patient advocacy groups. With their early input and collected healthcare data, unique insights can be gained on how to most efficiently gather important data.

This in turn can increase process efficiency and genuinely reflect the lives of people with rare diseases throughout the treatment lifecycle. Luckily we are also starting to see this now with the advances health authorities, such as the US Food and Drug Administration, are making by including RWD in regulatory decision making.

We are optimistic about the future of RWD and the potential it can bring to people that are living with a rare disease. As well as how it will support the healthcare industry to develop treatments and diagnose these diseases even earlier. Though challenges exist, the benefits of this method of generation far outweigh the risks.

With the knowledge that RWE insights bring, we have the opportunity to better understand not only the diseases we treat, but the journeys of the people we seek to help. We are excited to be part of the journey that is creating value from the next generation of RWE.

About the authors

Neil Davie is Janssen's global head of R&D and External Innovation, Pulmonary Hypertension.

Emmanuelle Quiles is worldwide vice president Cardiovascular, Metabolism and Pulmonary Hypertension at Janssen.

The pharma world at your fingertips

Daily News from pharmaphorum

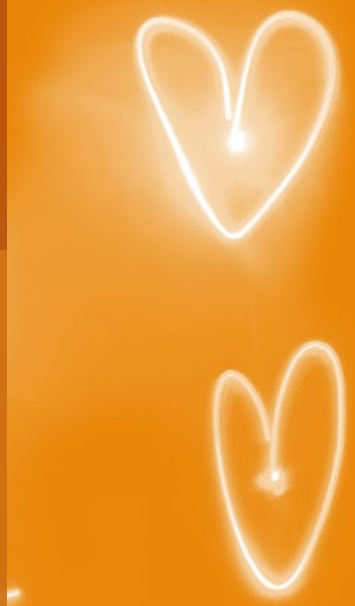
Direct to your inbox – insights and analysis on the big trends shaping healthcare and pharma, with a focus on:

- Sales and Marketing
- Digital
- Market Access
- Oncology
- Patients
- R&D

Sign up for our daily newsletter, visit https://bit.ly/33IccAB

Why VCs fell in love with pharma R&D in 2021

For many years, those inside the pharma industry have been telling the same old story about innovation: pharma is big, slow, and risk averse. Start-ups move fast and break things. That culture clash makes it hard to innovate the world of pharma at scale and with any rapidity.

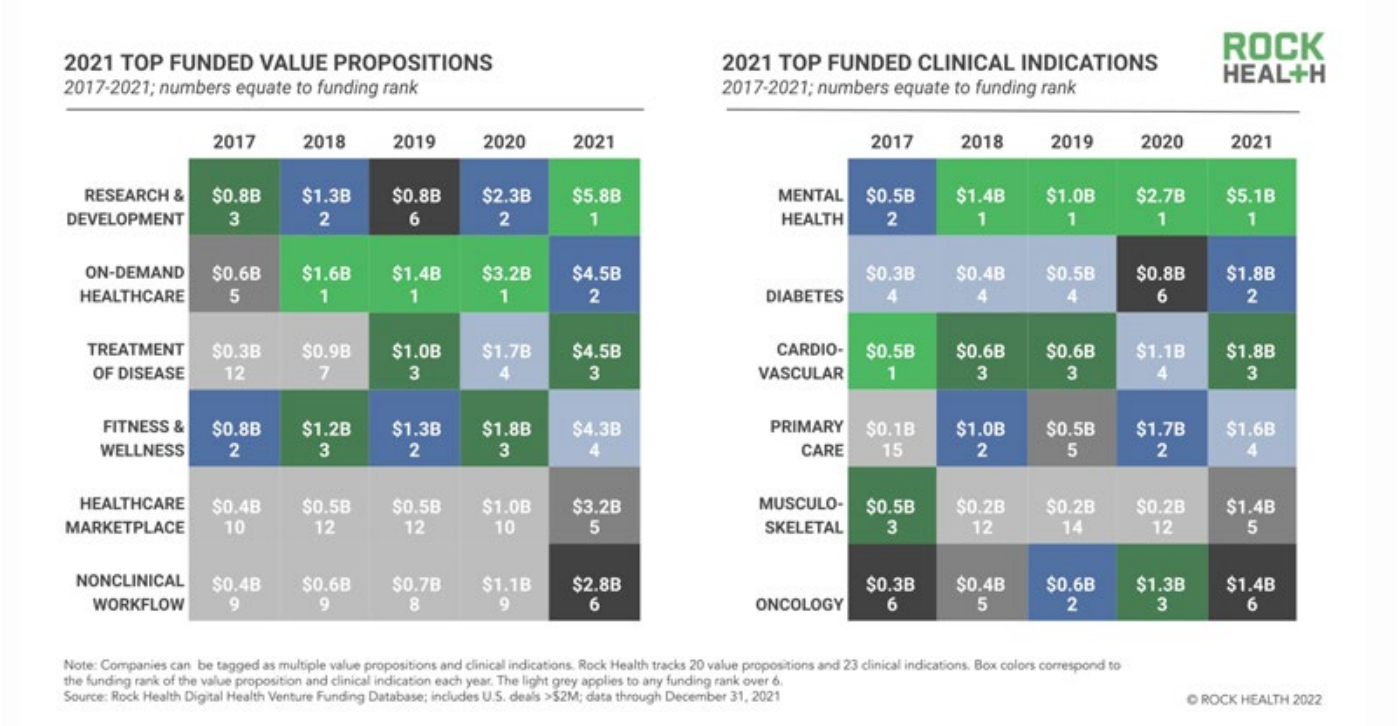


And investment in pharma followed suit: pharma companies were looked at as stable assets — reliable but unlikely to balloon in value like a tech company might.

But like so many paradigms, COVID-19 bowled this one right over. The risk equation changed for things like decentralised clinical trials, with companies that lacked the capacity for these trials falling behind. And the search for a COVID-19 vaccine opened the industry's eyes to the idea that innovation could happen quickly, and their processes needn't be sacrosanct.

"When you stand back and look at that overall context, what seems to have happened is that pharma and investors have suddenly gone, 'You know what, maybe you can do these quicker and faster without breaking things'," says managing director of life sciences and healthcare for Silicon Valley Bank UK, Nooman Haque. "If you look across the entire R&D value chain, there are tools you can bring to bear to speed up particular instances."

Data from SVB, as well as from digital health consultancy Rock Health, shows that pharma R&D was a major area of VC investment in 2021. Rock Health tracked $5.8 billion raised for digital health companies enabling pharma R&D, noting that it was the top-funded category of those Rock Health tracks.



Graphic courtesy Rock Health, from Rock Health's report "2021 year-end digital health funding: Seismic shifts beneath the surface".

SVB tracked $8.2 billion in funding for R&D tools in the US and Europe, up from $5.7 billion in 2020. In Massachusetts and Northern California, the US's top regions for computational biology, investment in that subsector more than tripled.

Deep Dive spoke with Haque, Rock Health's COO Megan Zweig, research associate Adriana Krasniansky, and investor and entrepreneur Risa Stack to get to the bottom of these funding trends and find out why venture capitalists are suddenly so interested in pharma R&D.

How clinical trials are changing

As mentioned above, COVID-19 was a major forcing function for decentralised clinical trials, which various pharma stakeholders have been trying to get off the ground for a decade.

Remote trials open up lots of opportunity for start-up innovation, from remote monitoring to data analytics and processing, to bespoke telecommunication platforms. But innovation in clinical trials hasn't been limited to making them remote.

"A culture change or a process change starts to get people thinking 'What else can we change?'" Haque explains. "Drug trials can't be done more quickly, right? Except maybe they can. Maybe recruitment can be done more quickly and more smartly as well. When you think about recruitment, it's still done pretty primitively. It doesn't look too much different than it did 20, 30 years ago with all the attendant issues."

Recruitment is a huge challenge for pharma, especially recruiting diverse study groups that accurately reflect larger populations, a cause that's accelerated by growing societal awareness and intolerance of systemic discrimination.

"I think pharma is getting more interested in addressing those inequities," explains Zweig. "They know it's smart from a business standpoint to test efficacy in a more diverse population and a population that's reflective of who is suffering from the ailments that they're trying to treat.

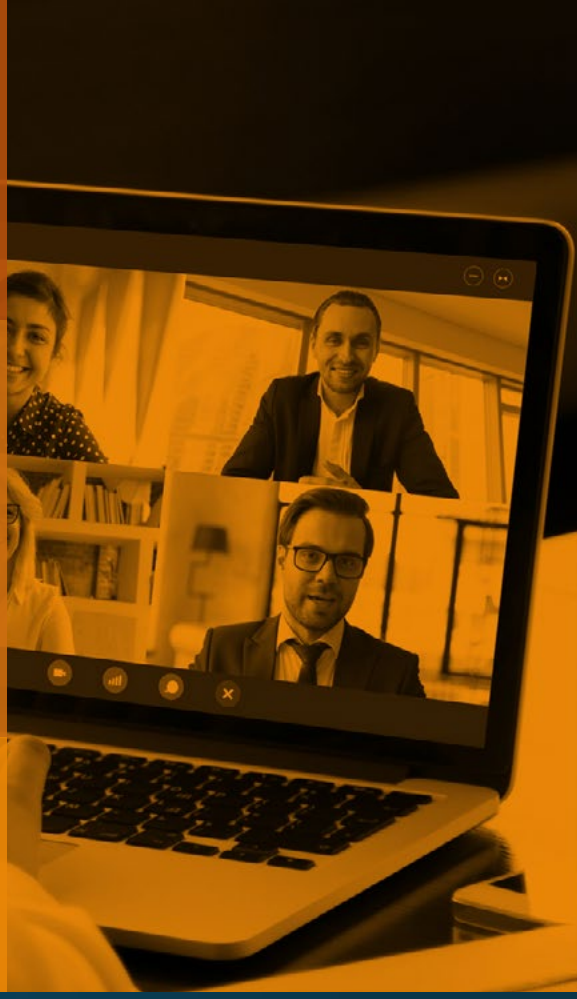
"That's tough right now because we can see all the trust issues that have bubbled up around healthcare and delivery and medical consent in this country. So I think some of these platforms that are emerging that help reach, build trust, create access for these populations that historically haven't always participated in clinical trials is really interesting."

As decentralised trials become more common, a feedback loop emerges where patients start to expect digital participation to be an option.

"Anecdotally, consumers, particularly those who might be participating in clinical trials, their relationship to what that process looks like is very different," explains Krasniansky. "So being matched to different trials looks very different in a post-COVID world. Participating in them, searching for them. And then also thinking about how you're accessing different therapeutic regimens, working with specialists, getting in contact with a treatment that you might need."

Remote collaboration meets pharma

Like everyone else, pharma researchers had to learn to collaborate remotely during COVID, not only because pharma companies were also working from home and observing lockdowns but also because of the global nature of the pandemic.



"One of the really interesting things that happened during the COVID pandemic was the emergence of collaborations of labs located around the world," says Stack. "There were these papers that had almost 100 authors on them because one group could isolate a key viral protein and another group could make small molecules to the protein. These collaborations of labs across the world showed that you can work together to generate data. It doesn't all have to be in one place."

Again, this change and realisation opened up opportunities for start-ups who then sucked up available investment dollars. In this case, these companies were working on the technology to enable and smooth out this collaboration.

"What's interesting now is you're seeing more sustainable investment and more thoughtfulness around the underlying infrastructure we need to invest in for these things to work long-term," Zweig says. "How do I think about interoperability? How do I think about integrating with EHRs? How do I think about models that are going to address physician scarcity and talent shortages?"

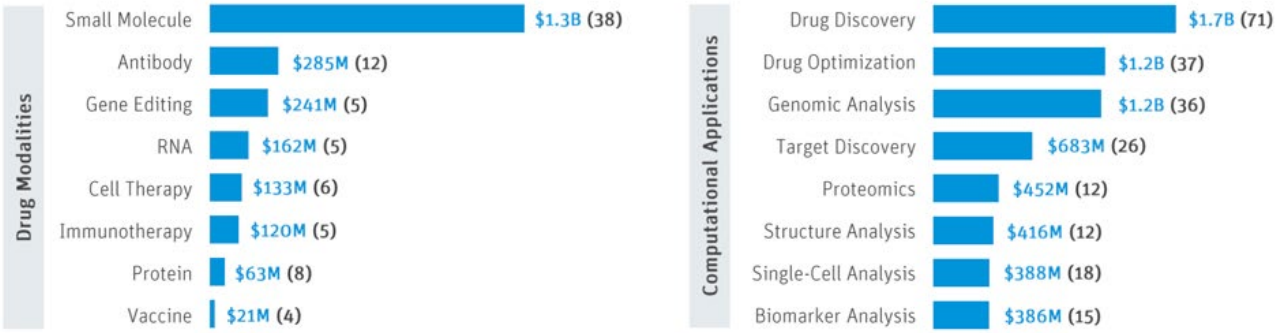
AI changes the drug development game

Finally, one of the most significant investment areas in pharma R&D this year was in technologies that bring AI to bear on drug development.

"I see tech investors coming into biotech, investing in companies that are focused on novel uses of data or modelling because data is something they've used in their world for a long time," says Stack.

One thing that's changing is that pharma is awakening to the amount of data that's already out there – for instance, from past failed trials – and devising ways to use it to improve trial efficiency.

Comp Bio (129 Seed/Series A Deals): Top Modalities and Applications
US and Europe, 2019-2021



Graphic courtesy Silicon Valley Bank, from SVB's report "Healthcare Fundraising and Investments".

But simulation and modelling can also shave years off the early stages of R&D, Haque says.

"The challenging problem at the start of any pharma R&D project is you know your target; you know the part of the body or the cell you want to have an effect on. You have a library of things you can test against it," he says. "The promise of faster and more intelligent computing, as opposed to just library screening database screening of targets against molecules, is what's changed here. It's almost giving biochemists and drug developers – not giving them the answer, but taking some of the work out of that validation stage for sure."

The amount of investment in this space may even be overstated because there isn't a clear cut delineation between service companies and small pharma or biotech companies. For example, some start-ups that develop novel computing tech sell it to pharma, but others use it to get into the game themselves.

Rather than seeing those upstarts as competitors, big pharma has entered into a symbiotic relationship with them, where the small companies take on early risk, and the big pharma companies either partner with or acquire them when they've come up with a promising therapy.

"One way of looking at this is, as pharma internal R&D budgets have slimmed down, it's almost like they've externalised the R&D," says Haque. "It's all being done in the biopharma industry, which is where all this VC money is going."

The rise of small pharma, itself enabled by new technologies, has interjected a new spirit of innovation in an industry that is still somewhat risk averse at the end of the day.

"The early-stage companies are really entrepreneurial," says Stack. "It's often a scientist in a lab saying 'I have this great idea for a new chemistry or a new modality to edit genes'. I think if you were a pharma executive, you might say, that's a nice idea, but it's too far out there, whereas there's permission in the biotech world to go for really big ideas."

About the interviewees

As chief operating officer, Megan leads the Rock Health Membership, research, and operations teams. Through thought partnership, the power of community, and market-leading research, her teams support enterprise clients advancing their digital health strategies via the startup innovation ecosystem. Prior to joining Rock Health, Megan worked at The Advisory Board Company, where she led the Physician Executive Council, a best practice research membership supporting Chief Medical Officers at over 1,300 hospitals and health systems. Megan received an MBA from Berkeley Haas, where she graduated valedictorian of her executive MBA class in January 2020. She also graduated cum laude from Duke University, earning a B.A. in Public Policy Studies with a focus on health policy.

Nooman Haque is the Head of Life Sciences and Healthcare at Silicon Valley Bank for EMEA. He leads a team supporting early, growth-stage and established multinational businesses in all sectors of life sciences. Nooman is responsible for expanding the bank's business across Europe. As part of an international team he helps clients with innovative financing solutions through the bank's broad platform of investment & commercial banking, asset management and capital connections.

Risa is a Venture Partner at RA Capital. She has played a significant role in the early operations, financing, and development of over 25 companies. Companies include: Veracyte (NASDAQ:VCYT), Foundation Medicine (NASDAQ:FMI) Trius (NASDAQ:TSRX, sold to Cubist), Pacific Biosciences (NASDAQ:PACB), Corthera (acquired by Novartis), Quantum Health (acquired), and Menlo Microsystems. Most recently Risa created and led the GE Ventures New Business Creation team which founded seven new businesses across multiple industries including healthcare, aviation, and energy. Prior to GE Ventures Risa was a partner at Kleiner Perkins Caufield & Byers where she founded and developed therapeutics, tools, and molecular diagnostics companies. She began her investing career at J.P. Morgan Partners where she sponsored venture and growth investments in healthcare companies and supported international healthcare investing. Before joining the venture capital industry, Risa worked as a derivative specialist on the Chicago Board of Trade, where she traded futures and options on government securities.

About the author

Jonah Comstock, Editor-in-Chief

Jonah Comstock is a veteran health tech and digital health reporter. In addition to covering the industry for nearly a decade through articles and podcasts, he is also an oft-scene face at digital health events and on digital health Twitter.

Inside the changing tides of life science research

Astellas Pharma chief medical officer Bernhardt Zeiher talks about the evolution of R&D in life sciences

Research and devolvement (R&D) scientists in life sciences are constantly on the lookout for innovations that will improve the likelihood of a successful end result. Over the past few decades, advancements in computing and technology have dramatically transformed the capabilities and capacity of life science R&D, a shift that has been fundamental in the emergence of concepts such as personalised medicine.

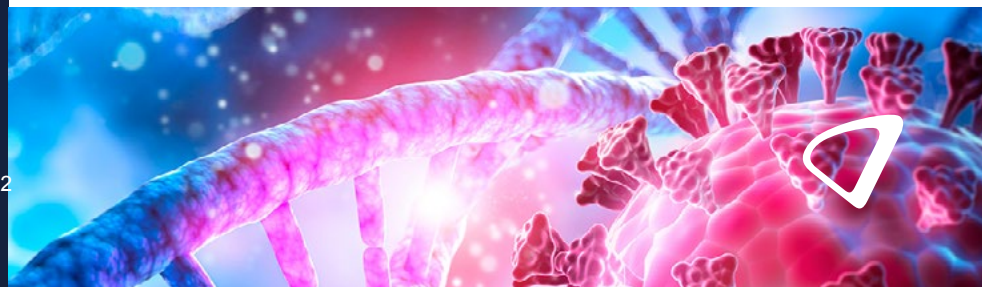
Patient-centricity is now a central pillar of innovation for many leading figures in life science. As such, scientists are beginning to adopt new processes in the lab, which reflect the changing needs of patients and health care professionals.

With 25 years of experience working in the pharmaceutical industry, Astellas chief medical officer, Bernhardt Zeiher, has been in a prime position to witness the transformation of R&D. As the industry lays the groundwork for a new era of health care, Zeiher explains how a global pandemic became a catalyst for change, putting patients at the heart of life science research.

During your experience in the pharma industry, what has been the most significant catalyst for change in R&D?

I think it really comes down to a tremendously greater understanding of the pathophysiology of disease. For example, in oncology, understanding driver mutations for different malignancies, or the role of immune surveillance and cancers evading that immune surveillance, because that's really led to then identifying targets.

The other driving force is probably technological advances. Cell and gene therapy, some of those things were almost like science fiction when I started my career. Now it's coming to fruition and we are really seeing the advances there. I think those have been really the biggest drivers of change in R&D.



With clinical research now recovering from the disruption of COVID-19, how do you think the pandemic will influence R&D moving forward?

COVID was a tremendous catalyst for change. Just figuring out how you continue to run trials because patients are told they're not supposed to go to the hospital. What do you do with clinical trials if it's not for a COVID indication?

It changed a lot of our thinking. Now it opens up to saying, "Do we have to run our trials the same way? Can't we run them differently? Can't we make them more patient-friendly? Can't we give broader access to clinical trials because of what we've learned?" Some of these things were already happening, but it has happened much more quickly because of COVID.

Patient-centricity is becoming increasingly important for clinical research, but how does patient involvement impact the direction of life sciences research?

One of the things we've tried to do with clinical trials is to make them more patient-friendly and engage them throughout the life cycle. Sometimes when you get into rare diseases, the patients or the caregivers know much more about it than anyone else.

Too often – and as a physician, I can say this – we've taken a rather paternalistic view that this is what people want. But maybe they value different things. Understanding patient and caregiver needs is important because, even though it might not be an endpoint that the regulators want, it could be an endpoint we still want to measure and make sure we're demonstrating that value for patients.

Enrolment is always a challenge in trials. One of the most costly things that can happen is if you have to change your enrolment criteria – there's a lot of evidence that amendments are very expensive and delay the timelines. Getting patient input earlier can help with a better design study that will aid recruitment and retention.

Getting patient input on what they're willing to do in a clinical trial also matters because the other thing that can happen in trials is that patients enrol and then say, "Well, I didn't realise I was going to have to come back to the office so much or have this done", and then they drop out.

There are more trials than there are patients in some cases, and we need to make them more accessible to individuals so that they enrol and participate and hopefully, we can bring therapies to patients faster.

The issue of diversity in drug research has become a heated subject in recent years. How can we ensure that patient-centric R&D is inclusive and does not neglect the needs of minority patient groups?

This has been a problem for quite a long time. It's very important that we do address diversity in clinical trials because different populations could have different pharmacokinetics, safety, or efficacy. That way, if there is any difference, we're aware of it.

There has often been some mistrust of institutions among some underserved populations. Our approach has been to go to sites where you're going to be able to recruit a diverse population. We also try to get institutions to commit to offering this more broadly.

One thing is the site selection; the other is that we can make our trials more accessible. Some things, like allowing virtual visits or transportation back and forth, at least make it more feasible for people. If they have to pay for a taxi ride every time and they don't have the means to do that, they're not going to want to participate in the trial.

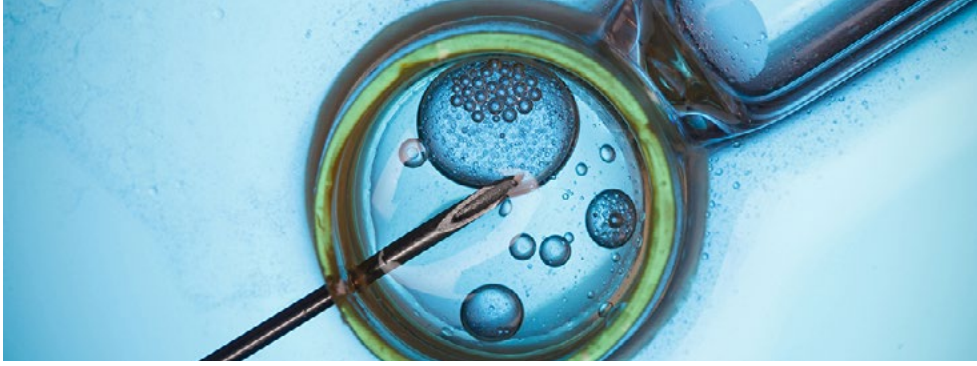
We also support the Pharmaceutical Research and Manufacturers of America's (PhRMA) industry-wide principles on enhancing diversity in clinical trial participation, and trying to educate about clinical trials. In some of our trials, we also try to partner with community groups. There isn't an easy solution, but I think that's why we're trying to at least take a multi-pronged approach.

The pandemic accelerated the adoption of digital in life sciences. How is new technology being used to drive R&D?

What you really want to do is retain all the good things that have come out of the pandemic, like the ability to run studies more remotely and make them more patient-friendly. A lot of it is just changing your mindset to think about what's going to be easier on patients upfront. Sometimes it takes more time because you may have to engage with a patient group or get more input from other people.

That's where I think the pandemic served as such an accelerator because the usual way we do it would be, we'd say, "Oh, we're really interested in running a decentralised trial, let's run a pilot".

Well, the timeline to do that is a couple of years because an individual trial takes a year – often, it's longer than that. There's planning upfront, and then there's rollout more broadly. There was no opportunity to do that with the pandemic, and all of a sudden, we had no choice. You couldn't do the pilot. You had to do everything on every trial now. I think there's a much greater willingness to try new things because we did it in a crisis situation. So, why can't we do it now?



Interest in rare disease research is growing rapidly, what role has technology played in supporting R&D in this space?

When you can think about digital in helping drug discovery using machine learning and artificial intelligence, as well as the ability to handle big data even in our clinical trials, you can identify trends that might tell you where you need to go from a quality perspective, or where we need to go do a site audit.

In the past, I think it was a little more "We need to audit six sites, and we do it midway through the trial". Now, it's like, "Well, no, let's see where there might be something that looks different". And then we'll go audit there.

I think there's going to be more and more use of real-world data. We use it to help guide us, even on designing protocols, where you can look at what co-medications they're on, where patients could be located, and I think that's going to continue.

Whether it be rare disease or a well-characterised subset of a more common disease where you look at either genetic or biomarker-driven phenotype that you can really target, real-world data gives you potentially much greater opportunity for efficacy, and it's allowing for some safety, so you can really shift that benefit to risk balance.

What's the value of patient centricity to the industry?

I think it's tremendous that we can have a broad impact working on a product that then gets used by people and can change their lives.

Bringing patients closer to our trials can be incredibly motivating for the industry and also ensure that we're working on the right things.

Unfortunately, the industry sometimes gets a bad rap. But, when you hear the real stories and get a letter back from someone who said, "We're so grateful that you were able to provide the drug for this individual".

When you read those, you know why you do what you do.

So, I'd say bringing patients closer can only benefit us in not only driving that sense of urgency and passion for what we do, but also ensure that we're working on the right thing and that we bring those medicines to patients.

About the interviewee

Dr. Bernhardt "Bernie" Zeiher serves as chief medical officer and has responsibility for overseeing all functions of Astellas' Medical and Development organisation, which includes development, medical affairs, regulatory affairs, pharmacovigilance, quality assurance, and planning and administration.

Prior to his current role, Bernie served as president of development where he was responsible for all stages of drug development at Astellas, helping to build world-class oncology and medical specialties functions for addressing serious unmet patient needs across multiple disease areas.

About the author

Eloise McLennan is the editor for pharmaphorum's Deep Dive magazine. She has been a journalist and editor in the healthcare field for more than five years and has worked at several leading publications in the UK.

Emerging technologies that are changing the way healthcare is delivered in 2022

Wherever you consider the medical industry, you will find several new technologies being used to make new medicines, vaccines, and fight illnesses. The purpose is to make our lifestyle better and healthier.

The last two decades have been revolutionary for the healthcare industry. While many tech firms have applied their expertise to find solutions to the global pandemic, others have turned attention to using technology to transform healthcare services and products.

The global health crisis has accelerated the digitisation of the medical industry. According to a recent HIMSS Future of Healthcare report, more than 80% of healthcare providers have increased investment in digital solutions and innovative technology.

That means you will continue to see expansion in healthcare sectors, such as personalised medicine, telemedicine, wearables, and genomics. The industry is also set to leverage cloud computing, artificial intelligence (AI), and extended reality to develop and provide new services and treatments.

Telemedicine – a new element of medical landscape

Stay-at-home orders and social distancing have changed the healthcare delivery model. It is the leading reason many health systems and clinicians have switched to virtual care and telehealth models. It can improve patient care in many ways.

Telemedicine has proven its resilience throughout the pandemic and established itself as a prominent and permanent element in the healthcare ecosystem. As a result, 2022 is the year in which many healthcare providers plan to formalise and strengthen training to promote and support telehealth practices.

The clinical teams will attain more expertise in providing urgent care by making a permanent shift to virtual models.

Ultimately, the increase in telehealth models will drive more focus around the mode of access related to tech in the coming years. As a result, it will have a significant impact on medical practice.

AI-powered technology to minimise infections

Infection prevention and control programmes powered by AI will be the focus of the medical community in 2022. By using AI, healthcare professionals are looking for ways to prevent infections. They use technology to monitor patients closely in real-time with early clinical intervention and infection risk identification.

Current data shows that medical facilities have allocated various resources to prevent and control COVID-19, which has increased other common healthcare-associated infections (HAIs). The Center for Disease Control and Prevention (CDC) compared HAI data from 2019 and 2020 to determine the impact of a pandemic on HAI rates in the US.

The analysis showed a sharp increase in infections, such as bacteremia. However, the CDC found that the increase is not due to a large volume of sick patients but due to insufficient operational and capacity challenges.

As a result, the CDC has invested $2.1 billion in the public healthcare sectors to upgrade infection prevention and control activities. It is an infusion that aims to help various healthcare sectors leverage AI to identify at-risk patients. Moreover, the investment will allow healthcare professionals to use evidence-based prevention plans.

Integration of robotics

Surgical robots are not something new in the healthcare industry. In fact, they have been a part of this field for more than 30 years.

The procedures have evolved significantly, making surgical procedures minimally invasive, as well as reducing recovery time and infection risk. Moreover, with heightened security and optimised networks, medical professionals can complete robotics-assisted medical procedures in a variety of locations.

You may have seen many healthcare robots assisting doctors in the surgical theatres, labs, and other parts of the industry. The integration of robotics-assisted medical procedures has significantly overcome the labour shortage.

They can perform a variety of simple and time-consuming tasks, freeing workers and medical staff to focus on providing better patient care.

AI also supports the increased use of robotics in medical procedures. For example, it allows human-supervised robots to perform surgeries, move freely in the hospital for different tasks such as disinfection, linen transportation, and even patient interaction.

Improved surgical outcomes via AR/VR

A large percentage of healthcare centres and hospitals use augmented reality (AR) and virtual reality (VR). This percentage is increasing, most notably in the post-up recovery and surgical arena. In fact, many healthcare providers consider it one of the state-of-art facilities.

AR enhances what you see in reality by utilising location-specific information and image overlays. On the other hand, VR can create an innovative digital environment that can replace the current/ existing real world.

Though AR and VR have different healthcare applications, they can improve post-op care and surgical processes. In addition, the technology can reduce invasive procedures.

When performing a surgical procedure, physicians use an anatomical map gleaned from the latest 2D imaging (scans and x-rays). It serves as a guide to performing an open surgery, in which the patient's anatomy is exposed, allowing the doctor to operate using less invasive tools to reduce recovery time and minimise the risk of infection.

AR can provide essential visuals to help surgeons perform less invasive operations and procedures. It creates a 3D rendering of the patient's anatomy and superimposes it on the live video. The addition of this AR information can give doctors more details during surgery.

Optimised and error-free medical billing

Whether a small clinic, medical institute, or independent health provider, each organisation requires services to improve treatment and procedures. Healthcare facilities need technologies that are compatible with the current processes to improve administrative functions.

Automated medical billing is one option that helps medical institutes allocate human and financial resources efficiently. This is an important aspect of the healthcare industry in 2022 that can maximise the productivity of medical practices and improve their profitability.

Digital medical billing reduces administrative responsibilities when healthcare providers partner with reliable medical billing services. Moreover, employees have to spend relatively less time finding vital information and prepare claims for submission. There are many cases where medical staff has to be on the phone for long hours to connect to insurance carriers for pre-authorisation.

Outsourcing medical billing services provides hospitals and medical institutes with an array of advantages, from saving time and money to eliminating the burden of monitoring different aspects of the medical offices. As such, staff members spend more time educating their patients about the medical conditions and responding to inquiries on portals.

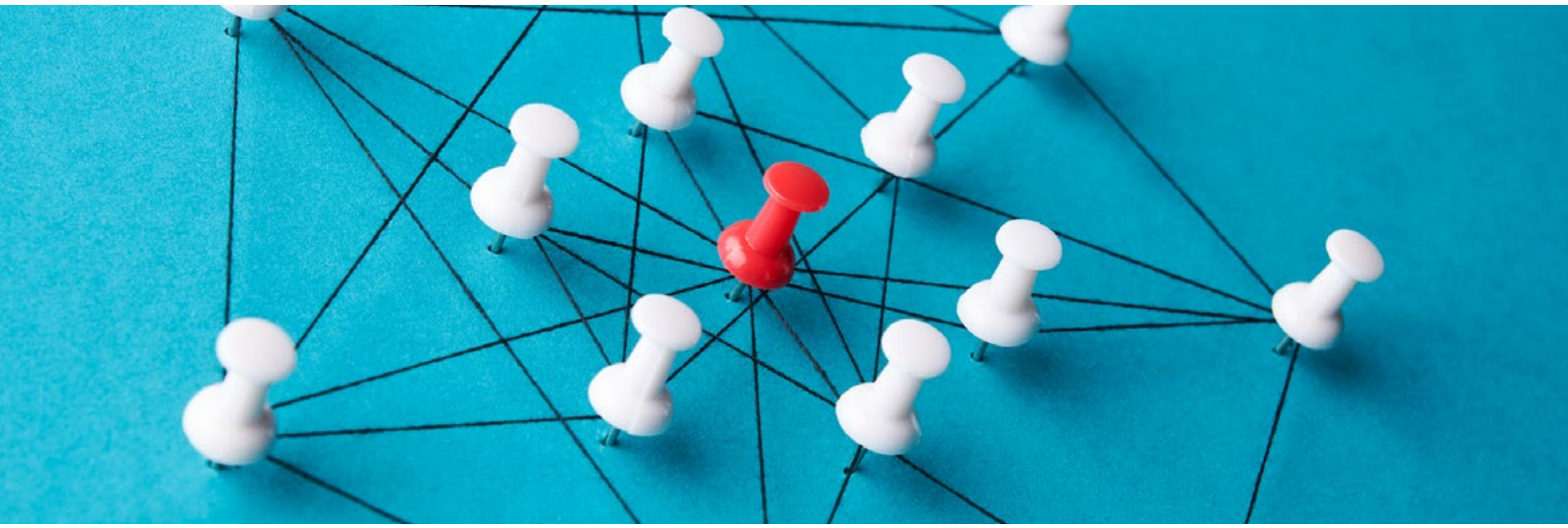
The current health crisis has led the healthcare industry to adopt the latest technologies to deal with the challenges and provide people with better support. The technology-driven, innovative solutions, such as telemedicine, medical billing, AI-powered solutions, and robotics-assisted medical procedures, are emerging trends in the industry. Thus, these solutions make the future of the medical domain and can benefit people in many ways.

About the author

Rahul Varshneya is the co-founder and president of Arkenea, a custom healthcare software development company. Rahul has been featured as a technology thought leader across Bloomberg TV, Forbes, HuffPost, Inc, among others.

Using cross-functional teams to develop a product's value story

Tanya Brinsden, senior VP of operations at ICON Global Medical Communications and Pubs Hub, Jessica Cherian, VP of content and strategic services at ICON Market Access and Reimbursement, and Béranger Lueza, principal Health Economics (HE) at ICON Global Health Economics, Outcomes Research and Epidemiology (GHEORE), discuss how essential a data-driven strategy is to successfully communicate a brand's value proposition in a competitive market.



The market access and reimbursement team, Global Health Economics Outcomes Research and Epidemiology team, and medical communications team are three groups within ICON's commercial solutions division that offer integrated solutions to pharma and biotech clients to demonstrate the value of their products for accelerated market access and product adoption.

"We show how companies can leverage and create efficiencies from the full scope of available data obtainable within each of its teams, whether medical affairs, market access, or GHEORE," says Cherian.

Preparing for a product launch should start at least 24 months prior to the anticipated approval date as the amount of data to collect, navigate, and determine how to use, is enormous. According to Cherian, having cross-functional teams under one roof that focus on identifying the right data to collect and how to optimise its use can streamline and expedite processes.

Though the market access team, GHEORE team, and scientific data team are separate, they can work cross-functionally with one another and consult with each other for input or reach out for expertise as needed.

"In thinking about market access or launching into a competitive space, ICON offers us the opportunity to work closely where needed. I can reach out to Tanya, on the Global Medical Communications side to get some insights on the scientific element, or I can reach out to a colleague on the GHEORE side to discuss opportunities to bolster the value story. We're able to offer all of those services in-house and really tag-team and reach out to the right experts as needed with both global and US expertise."

"Our groups can leverage one another. While each team has distinct skills and areas of expertise, [scientific, market access, and GHEORE teams], together we build a layered, effective story that leverages scientific, economic, and market research data to create access to therapy," explains Cherian.

The collection of evidence, research that is performed and evaluated, and the materials created are equally valuable. Understanding which teams are critical at different time points pre-launch can help manufacturers understand how to optimise our capabilities to meet their needs.

Early preparation: 12-36 months pre-launch

Medical communications

Gathering scientific data is an essential first step in establishing a product's potential impact, but the task of assessing and analysing all of that data can be arduous.

"Our pharma/biotech clients ask us to do all the analysis of what's being said in scientific literature and pull it all together," Brinsden says.

The information is then garnered, distilled, and communicated to internal stakeholders. "We are turning around our research and analysis very quickly to meet the incredibly fast pace of information that's coming through," explains Brinsden. "We arrange for the pharma/biotech stakeholders to meet, usually through WebEx or during a face-to-face meeting, and we help facilitate how they want to speak about the disease area, about the efficacy of their drug and the safety of their drug,"

The terminology and choice of words used to present a product to healthcare decision-makers can generate interest and determine how its target audience receives it. The language a company determines to use becomes what ICON calls the brand's 'scientific platform and lexicon', which is updated regularly throughout the preparation process.

"As more and more data comes in, companies must fine-tune their lexicon – what they want to say and how they want to say it – as they get closer to launch," Brinsden says. "Once you've got everybody's approval of the scientific platform and lexicon, then the company uses all the information for everything they do in their organisation. This ensures that everyone is utilising the same language."

Once the scientific platform and lexicon are established, there is a foundation for other teams critical to commercialisation such as market access and reimbursement and GHEORE to build upon.

Market access and reimbursement

As early as two years pre-launch, the market research and analytics team, along with US and global strategists at ICON Market Access and Reimbursement, are heavily involved in qualitative and quantitative research and analysis that is supported by secondary research conducted by a team of pharmacists. The main activities undertaken at this time are typically a landscape and analogue analysis, competitive assessment of target product profiles, as well as a payer segmentation and targeting analysis.

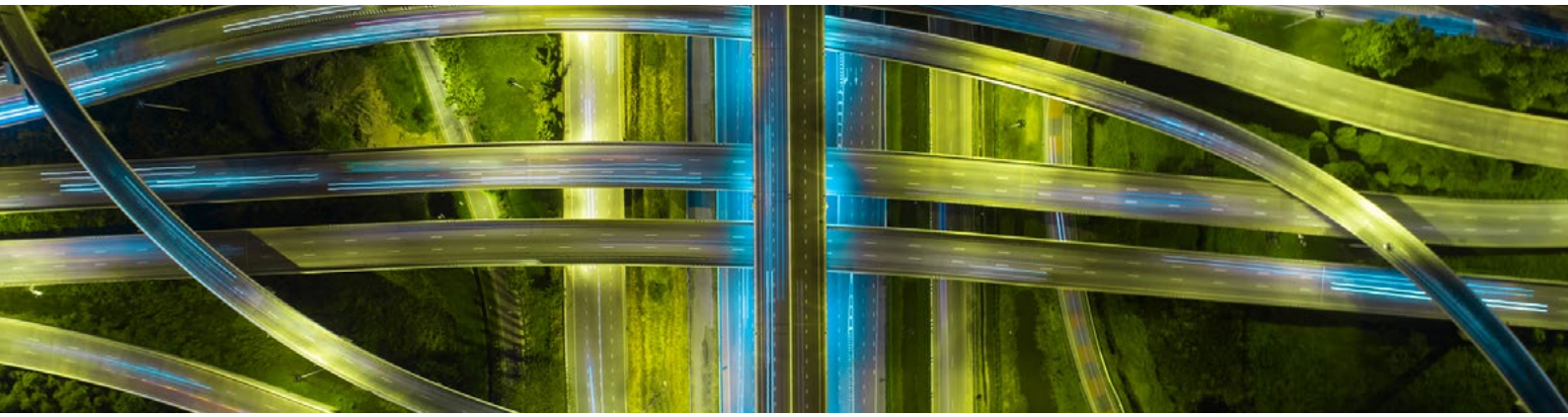
A landscape analysis provides deep understanding of key stakeholders, current and future competitive dynamics, and factors that heavily influence treatment decisions, such as clinical guidelines. These are foundational elements that are needed prior to other research activities.

Thereafter, identifying competitors and appropriate analogues and evaluating their coverage is critical to understanding the market landscape and factors that may influence US and global reimbursement decisions, as well as potential scenarios at launch.

The output of the analogue assessment is also essential for segmentation and targeting research, which will inform not only who the key targets are, but also attitudinal and behavioural variables that can inform future strategies, interactions, and tactics.

GHEORE

Two years pre-launch, the GHEORE team supports the development of health economics and outcomes research, patient-reported outcomes, Real World Evidence (RWE), and health technology assessment roadmaps aligned with global, regional, and local strategies.



Key opinion leader interviews and/or advisory boards would also allow for external validation of the relevant health economics, outcomes research and epidemiology (HEORE) roadmap. To develop the roadmap, the GHEORE team leverages an experienced and multi-skilled team, including statisticians, health economists, pharmacists, outcomes researchers, data scientists, and epidemiologists.

ICON's GHEORE team conducts clinical, epidemiological, health-related quality of life (HRQoL), patient-reported outcomes, and economic systematic and targeted literature reviews to gather available evidence and identify data gaps.

The GHEORE team reviews a client product's value evidence and develops a Global Value Dossier (GVD), which can be used at global, regional, and local levels. The GVD is a strategic tool that captures all clinical, safety, and economic information and plays a key role in communicating the product's value externally.

To meet the increasing need of RWE, the GHEORE team would also identify any RWE gaps, review existing databases, and map the available data to ensure a robust RWE strategy. Experienced epidemiologists, data scientists and statisticians from the GHEORE team leverage rich secondary data sources around the globe to profile burden of illness, assess patterns of use, and understand prescriber and patient experiences.

The GHEORE team also assesses the feasibility of network meta-analysis to incorporate potential competitors in economic models. At this early pre-launch stage, pricing threshold analyses and early economic models are also conducted together with the development of a cost-effectiveness model.

These analyses are constantly updated to account for new data and will be refined for health technology assessment (HTA) submissions.

Making the most of the product value for regulatory and HTA reviews: 12 months pre-launch

Twelve months ahead of launch, the goal of most undertakings is to bolster arguments for product coverage/reimbursement and successfully communicate a product's value potential to stakeholders, typically with an understanding of target segments, key drivers, and pricing in the US and global markets.

Market Access and Reimbursement

At one year pre-launch, the market access and reimbursement team utilises earlier insights to inform additional research into how a company can incorporate pricing and demand considerations and best shape its product messaging to address unmet needs and ensure its product is well-placed within the market.

This research may take the form of surveys, advisory boards or Mock P&T meetings and incorporates phase III clinical data to identify pricing implications, key value messages, and the priority of these messages based on resonance. While value message testing is not unique to ICON, the team's proprietary methodologies, experience, and ability to create the optimal story tailored to various stakeholders is unique.

"The research that is performed and the analysis of that research combined with access expertise is really what informs the entire strategy behind an effective value story and a successful market access launch," Cherian says.

She continues, "Working with a team of experts that understands the therapeutic space is crucial. Oncology is going to be very different than immunology, and it's going to be very different than the cardiovascular space or metabolic space, for example.

"Because payers manage those categories entirely differently, understanding the process thoroughly, nuances in utilisation management, for example, and having the expertise within a group to help you navigate these considerations is important to ensure you are guided in the right direction."

The team provides market access expertise while working cross-functionally with the GHEORE team to plan regional and local submissions.

GHEORE

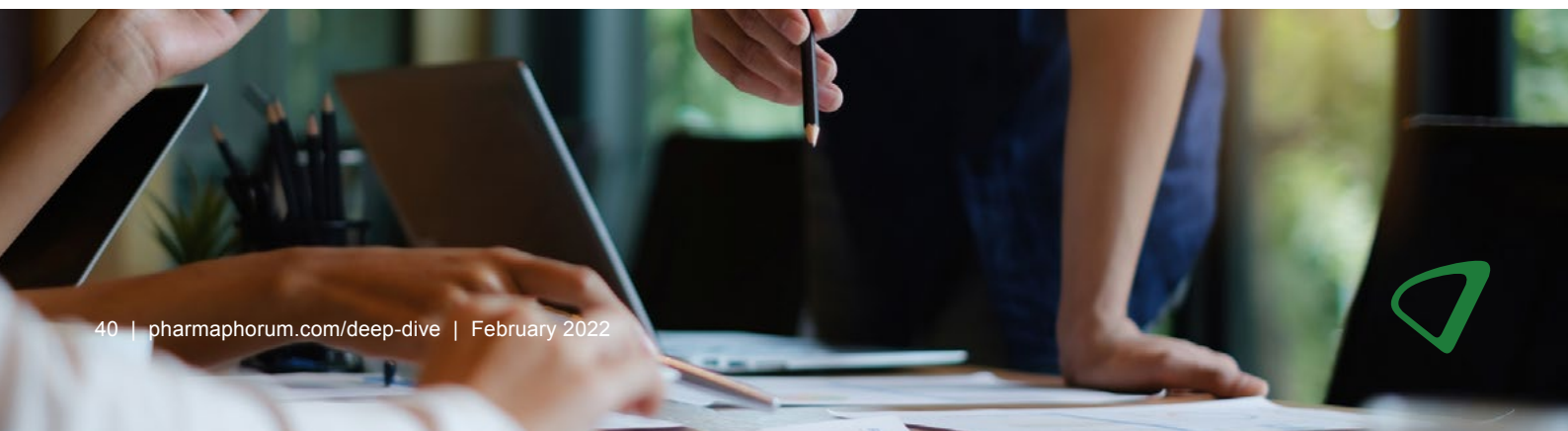
The GHEORE team simultaneously manages HTA submissions around the globe and performs economic modelling. Network meta-analyses, patient-centred outcomes analyses, cost-effectiveness and budget impact models are adapted and tailored to meet local regulatory and HTA requirements.

These analyses are constantly being updated to account for any new data, such as the release of pivotal phase III trial's data, new database lock clinical data, and RWE studies, which are then incorporated into the updated Global Value Dossier.

ICON's teams have the capacity to answer any demand made by either regulatory or HTA bodies which can include undertaking early scientific advice, providing specific countries results from clinical trial data, and launching real world evidence studies.

Building a company's value story for a successful product launch

After consolidating vast amounts of research and assessment, the companies then assemble a narrative around the product's value within the marketplace, which is delivered through customised strategic and tactical solutions at launch.



GHEORE

The GHEORE team adapts all HEORE material, including cost-effectiveness models (CEM) and budget impact model (BIM) local adaptations, country-specific clinical data analyses (e.g. utility analyses), to further submissions. Together with ICON's MAR team, the GHEORE team develops a value communication package for a successful launch with objection handler, payer toolkits, and direct payer communication.

Market access and reimbursement

At launch, the market access and reimbursement team works closely with the manufacturer's market access marketing leads to deliver value stories formatted to the stakeholders of interest and aligned to the current environment.

As part of best practice, ICON creates training for field teams on the appropriate use and delivery of these messages, which it believes are equally important in ensuring the stakeholders receive the story in the most consistent and impactful way. Post launch, it is also critical to refine the value story as additional data becomes available to further support the clinical and economic value of the product and, ultimately, coverage/reimbursement decisions.

Beyond typical value/access tools, ICON's market access team is experienced in the creation of HUB sites and related tools that can enhance the value of a product and create added differentiation for a product entering a competitive space.

Preparing for success

Developing an end-to-end strategy that ensures a thorough evaluation of a product can maximise the uptake of a new treatment. With the right structure and strategies in place, companies can approach product launches with the confidence that the product story has been carefully planned.

For ICON, this concept encourages each team to work in harmony to develop a clear action plan. With all three groups working towards the same end goal, companies can be sure that they are creating an informed and impactful value story founded in clinical research, supported by expertise, and customized to the ever-changing market environment.

"There's a distinction between the three teams, but all work to recommend and generate the strategy, insights, and tools, which are equally critical and complementary in communicating a compelling product value story in a competitive space," Cherian states.

It is well accepted that an asset's commercial success relies on approval, reimbursement, and adoption. ICON's Commercial Solutions team advocates for an integrated approach to evidence-generation strategies to better demonstrate the value of therapies to all stakeholders, whether regulators, payers, or HCPs and patients.

About the interviewees

Tanya Brinsden, MA, CMPP is senior vice president of Account and Scientific Operations at ICON. She has over 20 years pharmaceutical and healthcare communications experience and leads organisations and teams in developing of strategic, impactful and timely medical scientific content.

At ICON, Brinsden is the organisational lead for Global Medical Communications & Pubs Hub™ and responsible for overall project delivery and strategic direction of the practice. She is a medical communications industry thought leader and influencer active in International Society for Medical Publication Professionals (ISMPP). She has a broad range of therapeutic areas such as rare disease, oncology/immuno-oncology, infectious disease, and immunology. Brinsden holds a B. Appl. Sc. from Sydney University and MA from the Graduate School of Management, Macquarie University.

Jessica Cherian, PharmD, Rph is the vice president of Content and Strategic Services with ICON Market Access & Reimbursement. In this role, she leads a team of pharmacists, medical writers, promotional writers, and editors to execute the translation of market access objectives and strategies into compelling deliverables. Cherian has significant experience in providing strategic medical and content oversight for specialty and traditional medications across a wide range of therapeutic areas throughout the product lifecycle to engage stakeholders in the payer, hospital/health system, and organised customer spaces. Prior to her time at ICON, Cherian held roles in academia and community pharmacy.

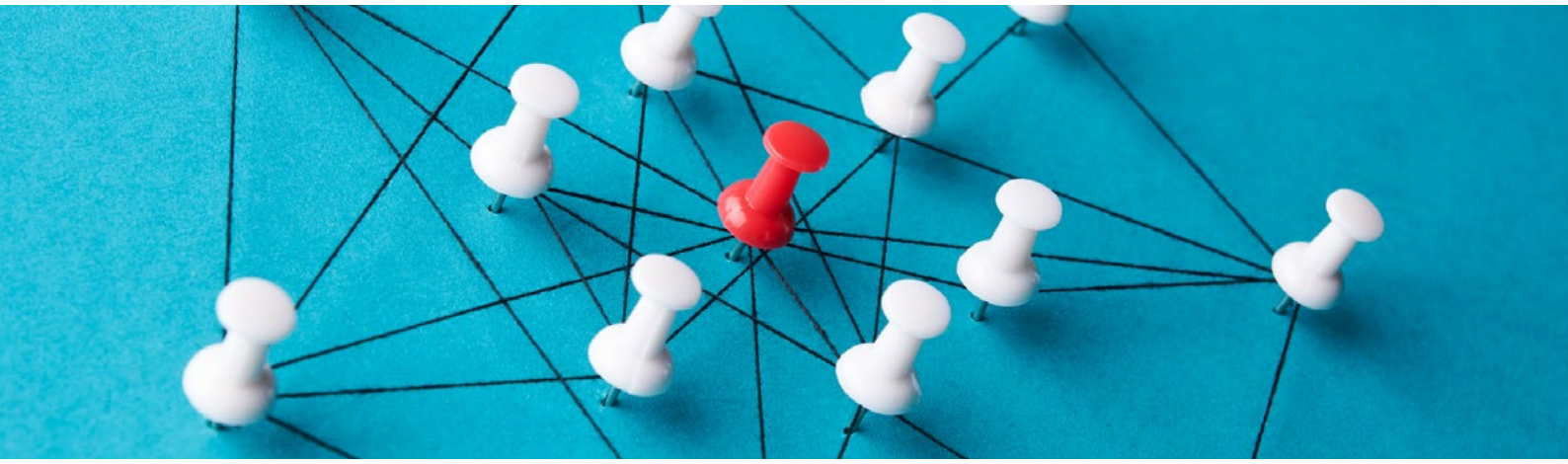
Béranger Lueza, PhD, is a principal consultant with the Global Health Economics, Outcomes Research and Epidemiology (GHEORE). He has worked in statistics and economic consulting and academia for over 11 years, specialising in health economics and outcomes research.

At ICON, Lueza acts as Project Director on a range of HEOR project,s such as development of cost-effectiveness and budget impact models, survival and utility analyses, HTA submissions, network meta-analyses, KOL ad-boards, literature reviews, Delphi panels.

His recent therapeutic areas of expertise include oncology (lung cancer, breast cancer, colorectal cancer, melanoma, and lymphoma), inflammatory bowel disease, heart disease, diabetes, meningitis B, haemophilia and blood disorders. Béranger holds a MSc in Statistics with a major in Health Economics from the engineering school ENSAI, Rennes, France, and a PhD in Biostatistics from Paris-Saclay University.

About ICON

ICON is a global provider of consulting, and outsourced development and commercialisation services to pharmaceutical, biotechnology, medical device and government and public health organisations. ICON's focuses on the factors that are critical to clients – reducing time to market, reducing cost and increasing quality – and its global team of experts has extensive experience in a broad range of therapeutic areas. ICON has been recognised as one of the world's leading Contract Research Organisations through a number of high-profile industry awards. With headquarters in Dublin, Ireland, ICON employs approximately 38,000 employees in 151 locations in 46 countries. Further information is available at www.iconplc.com.



Think global, act local: rethinking commercialisation models

The global market for life sciences is changing rapidly. Fuelled by technological advancements and a global pandemic, there are more opportunities than ever for companies to get innovative and life-saving therapies to the patients that need them.

But when it comes to marketing new therapies, the seemingly complex nature of global markets can be intimidating, with regulatory, cultural and language insight required to commercialise a brand image across different markets. Traditional launch models have reinforced this perception of complexity, most notably across the European Union, as companies have to seek out multiple siloed and fragmented partnerships to access the correct information and infrastructure before they have even entered a market.

In reality, global markets have a lot in common. But to identify and tap into budding opportunities, life science companies must rebuild their understanding of commercialisation to reflect the changing market landscape.

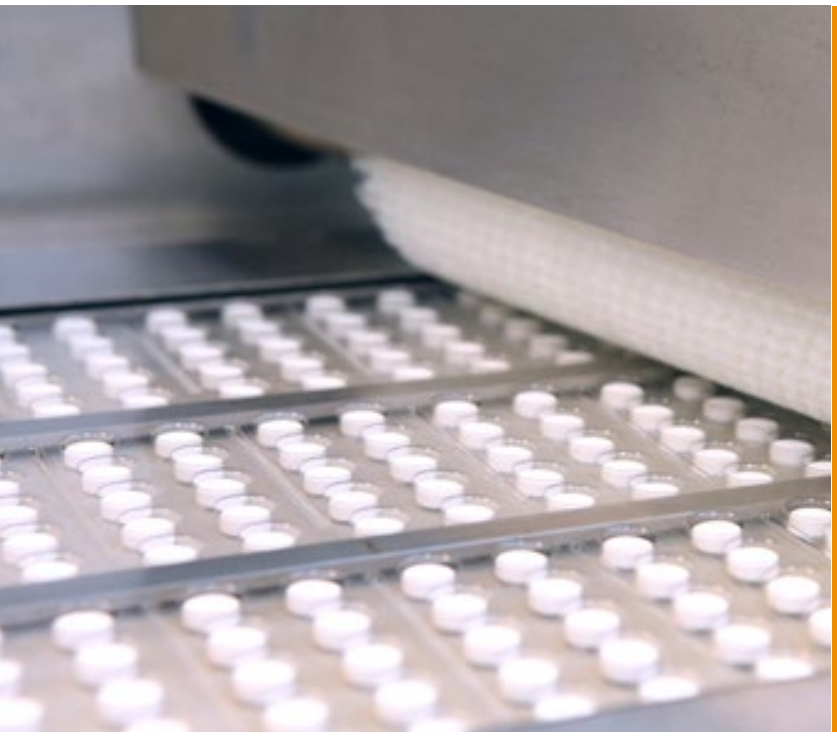
As EVERSANA™ executive vice president, EMEA Mike Ryan explains, "There is a lot of opportunity for companies to effectively replicate a commercial infrastructure that's reusable time and time again to effectively create all of the infrastructure necessary to commercialise across a maximum number of markets."

A new pharmaceutical strategy for Europe

With more than half a billion people currently living in the EU and UK, life science companies have a wealth of opportunities to bring impactful products to market. Historically, however, launching a new therapy in the region required companies to navigate a complex landscape of service providers, price sequencing and patient and regulatory needs. Consequently, the EU has gained a reputation among stakeholders as a complex and often intimidating market to launch new pharmaceutical or biotech products.

As part of ongoing efforts to reframe this perception of Europe, the EU adopted a new pharmaceutical strategy in November 2020.

"The European Union is making efforts to really work closely with industry and with national governments to ensure that the most important drugs reach everybody across the European Union as quickly as possible – certainly more quickly than they used to," says Ryan.



"We export more drugs and generate more revenue from pharmaceutical companies in Europe than any other market in the world for the time being. It's an enormous employer for Europe, an enormous source of innovation worldwide, and it's an industry that we have to nurture."

For Ryan, a core part of nurturing the European market is looking beyond the big four: France, Germany, Italy, and Spain. There are currently 27 countries in the EU, each presenting unmet needs that life sciences companies can tap into.

At first glance, these nations may appear to have more differences than they have things in common. But in reality, there are numerous similarities to be found throughout the EU market. According to Ryan, focusing on these elements is key to unlocking a more efficient and impactful commercialisation strategy.

COVID-19 highlighted the potential of unconventional market launches. The rapid development and delivery of multiple vaccines was a stark contrast to the overcomplicated perception of EU market entry.

"In the COVID-19 crisis, we've seen that where Europe takes a central stance particularly on procurement and procurement of vaccines, that there's a strong advantage to that for all of the national governments," says Ryan. "My hope is that the European Union and national governments now have a very concrete, very demonstratable example of what was one of the original founding principles of the European economic community, strength through unity."

Adopting a global strategy

Understanding the minutia of global markets is a mammoth undertaking. For manufacturers, keeping up to date with changing market, patient, and regulatory requirements across all markets takes up time and money that could be better used to drive innovations that benefit patients.

This is where EVERSANA has identified an opportunity to accelerate and improve the marketing process, breaking down siloes between commercialisation entities with its unique Single-Commercialisation partner model. Unlike traditional models, where companies had to partner with multiple external organisations to enter a particular market with no guarantee of success, the single partner model reduces risk by reusing and adapting existing infrastructure to suit the product launch needs.

"You have to set up infrastructure or mechanisms that recognise the commercial requirements of every individual country," explains Ryan. "We're creating a single point of contact that allows you to enter into an agreement where you've got a platform that's reused again and again and again. We do all of the work in setting up our entities in each individual country, the legal requirements, compiling the specific HTA assessment requirements and so on for each country."

Beyond improving efficiency and reducing risk, adopting new models significantly benefits patients by reducing the time it takes between market authorisation and patient access. However, in order to deliver innovative treatments to patients in different markets, Ryan stresses the need to begin commercialisation planning early in the development process.

"You can't just start thinking about commercialisation a year out from phase three," he says. "What has often happened in the past is companies have waited until late in the review process to start gathering retrospective data to help gather and make a case for the economic and indeed clinical benefit of a particular product.

"Safety, efficacy, they're all proven in clinical trials, but cost-effectiveness needs to be determined with data that is often different from what you're gathering in a clinical trial."

Beyond the EU

While the EU market provides a stark example of how new commercialisation models can help bring products to patients more efficiently, it is by no means the only region where such strategies can be beneficial.

The US is one of the largest markets for biotech and pharma products, making it a core target for companies looking to launch new therapies. However, bias towards the US has prevented patients in smaller, untapped markets from accessing vital medicines. As with the EU, these markets offer a wide range of opportunities.

As each regional market is different, adopting a one-size-fits-all approach to commercialisation is not conducive to achieving global success. This has made it important for companies to maintain control over strong brand identity that can be introduced alongside new products.

"Whilst you have to tweak the brand for every individual country and obviously translations, there are definitive ways of establishing a single brand across an entire continent," says Ryan.

Moreover, streamlining access to information and infrastructure about individual regions is helping to foster a global market landscape that companies feel incentivised to enter. Armed with new commercialisation methods, companies around the world can work together to bring a broader range of treatments to patients that need them.

Improving market access for patient benefit

COVID-19 showed us that life sciences companies are capable of adapting to dramatic operational changes and pulling together in the pursuit of a higher goal. Building upon this momentum, decision-makers are in a unique position to expand brand identities and bring products to a wider range of patients as governments and industry work to address issues in market access.

"If you just look at it from a plain economic example, if we bring on better treatments to patients, they'll get treated faster, cured faster maybe, they won't be in the hospital as long, and the economics will ultimately play itself out," says Ryan.

"We have the opportunity to create an environment where we've got more channels open to our healthcare providers to keep them more informed on developments in our industry, the benefits of those developments, and ultimately delivering a better healthcare service to all patients."

About the interviewee

Mike Ryan, executive vice president, EMEA

Mike Ryan leads EVERSANA's operations in Europe, the Middle East and Africa, and is responsible for accelerating growth throughout the region. He brings more than 25 years of experience to the industry, having held, global leadership positions in both clinical development and life sciences software companies.

Ryan passionately believes that technology can simplify the development of novel therapies and improve access to treatment. He holds a degree in Industrial Biochemistry from University Limerick and earned his Master of Business Administration from the University College Cork.

About EVERSANA

EVERSANA™

EVERSANA is the leading provider of global services to the life sciences industry. The company's integrated solutions are rooted in the patient experience and span all stages of the product lifecycle to deliver long-term, sustainable value for patients, prescribers, channel partners and payers.

The company serves more than 500 organisations, including innovative start-ups and established pharmaceutical companies, to advance life science solutions for a healthier world. To learn more about EVERSANA, visit eversana.com or connect through LinkedIn and Twitter.

PODCAST

Catch up on the series so far

Hear about biotech strategy, digital disruption, biosimilars, marketing teams and much more

Listen Today!
https://pharmaphorum.com/podcast/

pharmaphorum™
bringing healthcare together

Amplifying the voices in rare diseases

There are approximately 300 million people around the world living with a rare disease. Yet, until relatively recently, there was limited focus on this heterogenous population. By their nature, rare diseases are just that – rare – with a wide array of symptoms and severities affecting patients, which makes it challenging for pharma companies to identify opportunities to develop effective new treatments.

Yet the very fact these diseases are unusual and often fly below the radar has created a tight-knit rare disease community, comprising patients, carers, family members, advocates, and healthcare professionals (HCPs) who are invested in the health and treatment of patients living with one of more than 6,000 identified rare diseases.

Very few rare diseases have a cure, which leaves many patients in need of treatment options. These patients offer invaluable insight and experience when it comes to understanding the realities of living with a rare disease. Acknowledging and amplifying these voices is essential for pharma companies looking to enter the market but communicating with such a passionate and informed group can be challenging.

"Rare diseases are notoriously heterogeneous," says Dr. Emma Lemon, who leads the Medical practice at AXON, a global healthcare communications agency. "You have to have a tailored approach. You can't go in and approach a medical communications plan for one rare disease in the same way as you would do it for another rare disease."

No one-size-fits-all approach to rare disease treatment

Due to the lack of information about rare diseases, patients and caregivers often take matters into their own hands when it comes to understanding their conditions and treatment approaches. As a result, patients with rare diseases – and their caregivers – are among the most empowered or informed patient populations and are closely connected to their healthcare teams.

"For some rare diseases, very little is known. There's a huge educational aspect that needs to happen in terms of raising the profile of those rare diseases, particularly when it comes to improving diagnosis and exploring possible treatment options," says Lemon.

With limited experience in treating larger patient populations due to the rarity of these diagnoses, HCPs must work closely with each individual patient on their personalised treatment plans.

Working with patient groups and HCPs

Patients, caregivers and family members, and physicians and other HCPs truly act as a team when it comes to managing rare diseases. Parents of patients with rare conditions often lead patient advocacy groups (PAGs) as they have personal experiences and emotional investment in the topics related to diagnosis and treatment.

PAGs can help to inform pharma developments – for example, by providing invaluable insights into rare disease symptoms and the side effects they find acceptable. They also leverage their knowledge and experience to support the design of clinical trials and contribute to real-world data collection.

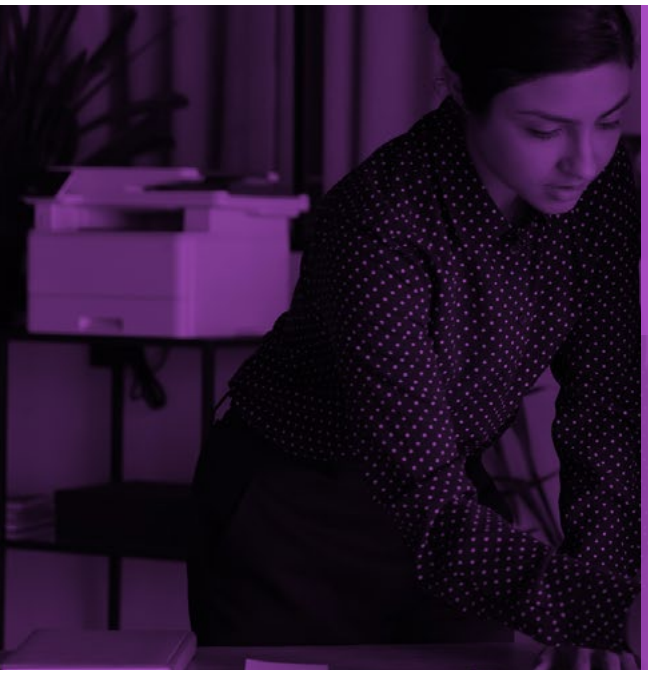
Given the prominence of PAGs in the rare disease space, it's important to co-create communications activities with these groups to ensure they will resonate with the specific community they are trying to reach.

HCP input is always a key consideration when developing communications activities, however their contributions may be even more insightful in a rare disease setting, given how engaged they are with patients and their support network.

"The physicians that we work with are very emotionally engaged, not only in the disease area, but also with the patients and their support networks," Lemon explains.

As such, pharma needs to be sensitive and aware of the emotional investment that HCPs have in their patients' treatments.

"The way pharma interacts with HCPs who work in rare diseases needs to be looked at carefully because there'll be many disciplines within the pharma team that will want to interact with that HCP for various different activities," says Lemon. "You need to have a very buttoned-up plan in how you're going to interact with those HCPs because due to the specialist nature, there are not many of them, and you don't want 15 people bombarding them with emails and trying to get information from them or book their time."



Key considerations for marketing rare disease products

Marketing activities and other types of campaigns need to be developed with an awareness that the target audiences are small and have specific levels of knowledge and engagement of their conditions.

Consequently, sales teams for rare diseases need to have a deep understanding of the specialist –and multi-disciplinary team approaches – that are used within that group.

Access and cost of drugs are also a key issue when it comes to rare disease treatments. As the demand for specific rare disease drugs varies from nation to nation, patients often struggle to access the right treatment for their condition. To ensure that new drugs reach those who need them, creating strategies to address these topics should be part of the overall communications plans from the outset.

"Rare disease treatments often come at a very high cost because you only have a small patient population that's being treated, and the costs of the research and development still need to be offset" explains Lemon. "Making sure that you're devising early access programmes, minimising the time between the diagnoses of these rare diseases and treatment, and taking into account any potential funding gaps is key."

Data can be a valuable tool in the process of developing marketing strategies for rare disease treatments. Real-world data has a vital role to play in understanding rare diseases and developing treatments that effectively meet their needs, as clinical trial data will inherently be limited due to smaller patient populations.

"Payers often want to see the drug value beyond the data," says Lemon. "Understanding how it impacts patients in the real-world setting is very important for all drugs, but especially in the rare disease space because you have so few patients to gather that data from."

Changing tides for rare disease research

For millions of patients around the world, living with the effects of rare diseases remains a day-to-day challenge. However, there is a growing awareness of how targeted treatments can be developed in niche indications with significant unmet need, and so the outlook for rare disease treatment looks increasingly positive.

Education and awareness are a key part of this drive for Lemon, with events such as Rare Disease Day spotlighting the need for new treatment options and providing an opportunity to shine a light on the realities of day-to-day life for these patients and their caregivers.

With a better understanding of challenges with diagnosis and management, pharma companies can support education around the signs and symptoms of a condition whilst developing products that effectively target unmet need, with the ultimate goal of enabling patients to better manage their conditions.

"Patients are being diagnosed a lot quicker. That means that their quality of life is likely improved," says Lemon. "There's no anxiety from wondering what's wrong with them. They're able to better explain to family and friends what's affecting them and how it needs to be managed."

About the interviewee

Dr. Emma Lemon holds a BSc in Pharmacology and received her PhD in cardiovascular disease from Imperial College London. She was a research scientist in academia and worked for a start-up biotech company before moving into healthcare communications.

She is head of Medical at AXON and has 17+ years' experience in the field, across a variety of global and local communication activities. She has in-depth knowledge and experience in the strategic planning, management and implementation of pre-launch and launch campaigns, internal communications programmes, KOL development and educational programmes, events such as advisory board and stand-alone meetings and symposia, publications planning, disease awareness and development of digital aspects of programmes.

Lemon has 11+ years' experience of working in rare diseases, focussing predominantly on rare lysosomal storage disorders in that time, including MPS II, Fabry disease and Gaucher disease.

About AXON

AXON is a global healthcare communications agency that ignites change in healthcare. Through the power of life-changing communications, we contribute to medical advances that improve lives. At the core of every scientific innovation and advancement, there is a simple and compelling story to be told. We know how to tell that story, how to use the right tools to reach the right audiences at the right time, to provoke meaningful change.

The company specialises in advising clients on medical affairs, clinical studies, real-world evidence, marketing, advocacy, and communications, all underpinned by insights and creative strategy. AXON has an international reach, with offices in Copenhagen, London, New York, and Toronto, and a worldwide affiliate network.

Established in 2002, AXON has a deep heritage and expertise in healthcare strategy and communication and continues to learn and grow in the fast-changing healthcare sphere. AXON is proudly an AVENIR GLOBAL company.

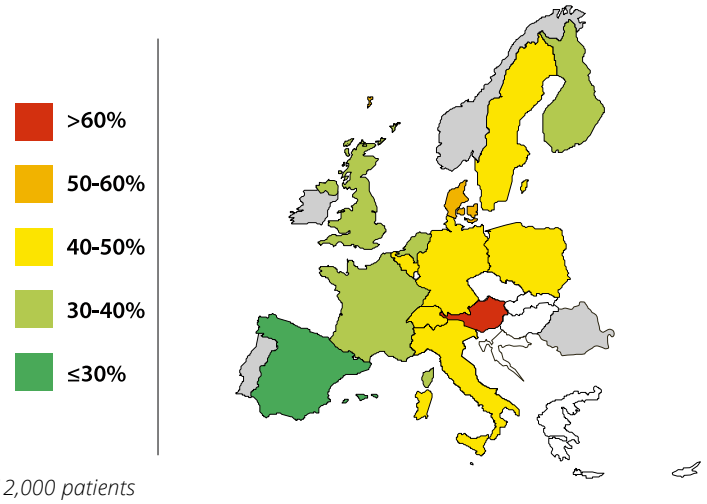
Medical Informatics in Rare Disease – the bridge between two worlds

Rare diseases bring with them a multitude of challenges for those affected, their relatives and care providers. Modern technical solutions, based among other things on methods of medical informatics, offer great opportunities here.

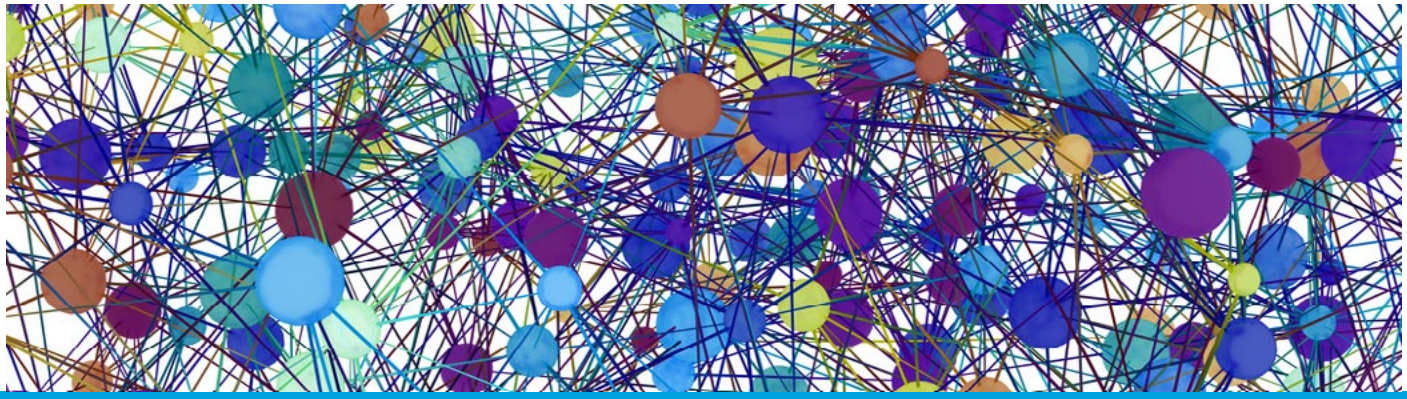
Typically, the first major burden for those affected is getting the correct diagnosis. Unfortunately, this is often a lengthy and complex process accompanied by a range of corresponding challenges.

For example, in a survey conducted by EURORDIS of 12,000 patients with rare disease, over 40% of patients are initially misdiagnosed (fig 1). Moreover, results from the survey show that patients visit an average of 7.3 physicians before an accurate diagnosis is given, with an average time to diagnosis between 7.6 to 5.6 years in the US and UK, respectively.

Figure 1 Percentage of respondents reporting initial misdiagnosis



Adapted from EURORDIS-Voice of 12,000 patients



Sharing data to drive diagnosis

A multitude of medical informatic solutions exist to help health care providers identify and confirm rare disease diagnoses, particularly for rare diseases arising on a genetic basis, which account for an estimated 80% of cases.

Freely available, searchable, comprehensive online databases of genetic disease phenotypes and human genes are available through resources, such as the Online Mendelian Inheritance in Man (OMIM) database, accessible through the NCBI database portal.

Together with newer AI-based searchable database applications, including FindZebra , Phenomizer, and image based genetic syndrome identification tools, such as Face2Gene,healthcare providers are bolstered in reducing diagnostic odysseys by an ever-increasing armamentarium of resources to construct a rare disease differential diagnosis.

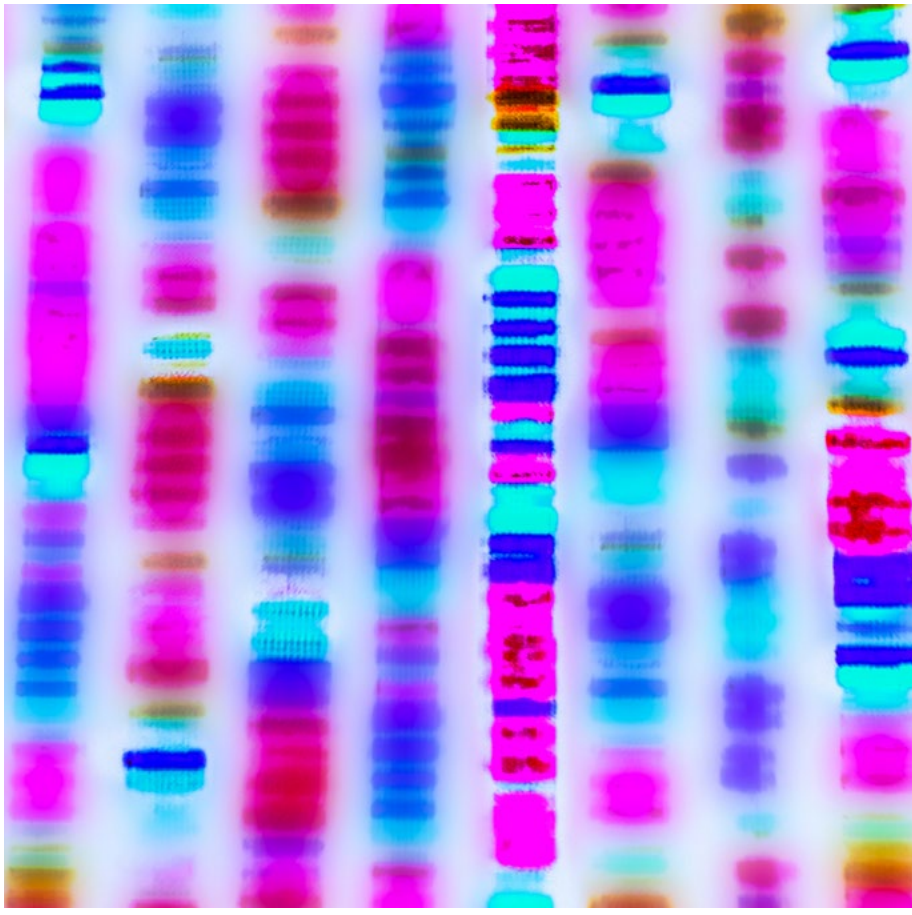
Once a most likely diagnosis is identified, healthcare providers can utilise existing additional bioinformatic repositories to identify potential genetic testing laboratories, such as the Genetic Testing Registry (GTR). This a searchable centralised database of genetic tests, also accessible through the NCBI database portal, facilitates molecular confirmation of clinical suspicion.

The art of matchmaking in rare disease

Once a diagnosis has been reached, innovative software solutions can support the search for the right but often also rare experts. Here, comprehensive databases, such as se-atlas or Orphanet, can provide support, as well as the American College of Medical Genetics and Genomics (ACMG) "Find a Genetic Clinic" searchable database.

Medical informatics is also facilitating connections between clinicians, researchers, and patients. For example, resources such as the Matchmaker Exchange use a network of application programming interface-connected genomic and phenotypic data to match individuals with a shared interest or experience in similar rare genetic disorders and genetic variations. Another avenue for creating connections is social media. However, while social channels do offer opportunities, they also harbour risk.

In the case of rare diseases, there is a need to collect data tailored to the respective disease. Disease-related patient registries are particularly well-suited for this purpose. Due to their specificity, the quality-assured data these registries collect is much more suitable than the pure analysis of health care data. However, integrating analysis of such register data with health care data analysis can be advantageous.



Two aspects are challenging here. On the one hand, the usually small stakeholders of a particular rare disease often only have access to limited resources and possibilities to build up a register that fits the data models of state-of-the-art systems.

On the other hand, researchers who could derive great benefit from such data sources have little chance of finding these data treasures in the first place. The experts are often widely distributed, which makes cooperation difficult.

A similar barrier is also found in data collection. In most cases, different data sets are not coordinated, and as a result they are only compatible with each other to a limited extent. Difficulties at the organisational and legal levels can further complicate the issue of data management.

One important goal of initiatives like the European Joint Programme on Rare Diseases (EJP-RD) is to support researchers to find available resources for rare disease research activities, such as data sets or biomaterial.

To achieve this, different sources are identified, brought together, and made searchable via a metasearch functionality. That cooperation, which is that important in the research of rare diseases, is directly supported by technical solutions.

Harnessing the power of information

When addressing those mentioned challenges, medical informatics approaches offer good opportunities to improve the situation. For example, through IT support of the so-called FAIR (Findable, Accessible, Interoperable, Reusable) criteria.

FAIR criteria acts a guide for data producers and publishers as the landscape for medical informatics matures. With greater volumes of data being shared and distributed online, it is important to develop functional infrastructure that prioritises accessibility.

With a foundation of easy-to-access information, healthcare providers and life sciences companies can dedicate more time to developing new therapeutics and treatment options for patients.

About the authors

Joanne M. Hackett is the Head of Genomic and Precision Medicine at IQVIA and previously was the Chief Commercial Officer at Genomics England.

Dr Hackett is a clinical academic, entrepreneur, investor, and a strategic, creative visionair with global experience spanning successful start-ups to Fortune 500 companies. Aside from her curious passion for life and positivity, Joanne is known for building innovation, driving personalised medicine and leading through fast paced, complex changing ecosystems and integrations. Joanne's goal is to contribute in bringing the world novel, cost effective and simple health care solutions, and she is particularly keen on building the case for prevention, open science and citizen genomics. She has extensive global experience across academic, business and clinical institutions, and enjoys sharing her experiences with the Boards she sits on as well as companies she provides strategic advice to.

Joanne has been publicly recognised for her relentless pursuit of revolutionising healthcare and has been named one of the top six Influential Leaders in Healthcare by CIO Look, the Accenture Life Science Leader of the year, Freshfields Top 100 Most Influential Women, One HealthTech Top 70 Women in the NHS, Pharmaceutical Market Europe's 30 women leaders in UK healthcare and BioBeat Top 50 Women in Biotech Award. Joanne believes in human courage and perseverance against the odds, and demonstrates that positive change, whether in a company or in one's personal life, can be carved out from even the greatest of trials. As a believer of 'health = wealth', Joanne is an internationally known yoga instructor.

Dr David Tegay, is the senior medical director for IQVIA's Pediatric and Rare Disease Center of Excellence, where he provides medical strategy to paediatric and rare disease programmes across the company.

Tegay has more than 20 years of experience as a practicing clinical geneticist across the spectrum of rare genetic disorders, with expertise in adult and paediatric genetic disease, neurogenetics, cardiogenetics, newborn screening and inherited metabolic disorders.

Prior to joining IQVIA, he served in multiple leadership roles at tertiary care academic medical centres.

Holger Storf heads the Data Integration Centre (DIC) at the University Hospital Frankfurt and leads the Medical Informatics Group (MIG) since November 2015. The DIC focuses on the exploitation, integration and provision of clinical routine and research data for different purposes. The MIG is focussed on designing and developing innovative software solutions close to application, especially in the field of rare diseases. Additionally, he is the CO-PI for Frankfurt of the MIRACUM-Consortium, funded in the German Medical Informatics Initiative and project leader of different national and EU-wide Rare Disease Registry-Projects and Dr. Storf continues coordinating the technical activities of the OSSE-project (Open Source Registry System for Rare Diseases). Holger Storf graduated from the Heidelberg University in 2007 with a diploma in Medical Informatics and finished his PhD in 2013. Before establishing the MIG he worked at the Institute for Medical Biometry, Epidemiology and Informatics (IMBEI) in Mainz for two years. Previously he worked for six years at the Fraunhofer Institute for Experimental Software Engineering (IESE) as a member of the Data Management & Ambient Technologies department in applied national and international research projects.

Dennis Kadioglu, M.Sc. is the deputy head of both the Medical Informatics Group (MIG) and the Data Integration Center (DIC) at the University Hospital Frankfurt in Frankfurt am Main. He graduated with a Master's in Medical Informatics from the Fachhochschule Dortmund - University of Applied Sciences and Arts. His research focuses on the development of methods for improving the exploitation and integration of medical routine and research data for answering subordinate questions. He is known for the ongoing development and application of the software solution Data Element Hub (DEHub), which as a Metadata Repository holds reusable specifications about the data elements of a data set. In this field he contributes to various research projects like MIRACUM (funded in the German Medical Informatics Initiative by the German Ministry of Education and Research) and EJP-RD (funded in Horizon 2020 by the European Union) focusing on the development of adequate IT support to foster collaboration in medical research. This also includes the continuous development of the OSSE registry framework, which was developed specifically for the field of rare diseases.

About IQVIA

IQVIA is a leading global provider of advanced analytics, technology solutions and clinical research services to the life sciences industry. IQVIA creates intelligent connections to deliver powerful insights with speed and agility — enabling customers to accelerate the clinical development and commercialization of innovative medical treatments that improve healthcare outcomes for patients. With approximately 77,000 employees, IQVIA conducts operations in more than 100 countries. Learn more at www.iqvia.com

Stay informed

Get future editions of Deep Dive

Insights and analysis on the big trends shaping healthcare from pharmaphorum.

Deep Dive magazine brings you the knowledge and expertise of the top minds in the industry, backed by our team of specialist healthcare journalists, and presented in an innovative, interactive format. Each issue focuses on a specific topic.

Upcoming themes:

- **Market Access (May 2022)**
- **Oncology (June 2022)**

Keep up to date with what you need to know.

Sign up to receive complimentary future editions of *Deep Dive* magazine direct to your inbox, as soon as they are published.

Subscribe to Deep Dive, visit https://bit.ly/33lccAB

Contacts

Editorial team
Eloise McLennan
editorial@pharmaphorum.com

Sales team
Samuel Peploe-Williams
advertising@pharmaphorum.com

Design
Mike Hammerton
Mike Smith

A pharmaphorum media publication

www.pharmaphorum.com

pharmaphorum media ltd, Third Floor, Rosemount House, Rosemount Avenue, West Byfleet, Surrey KT14 6LB, UK
Tel: +44 (0)1932 339 264