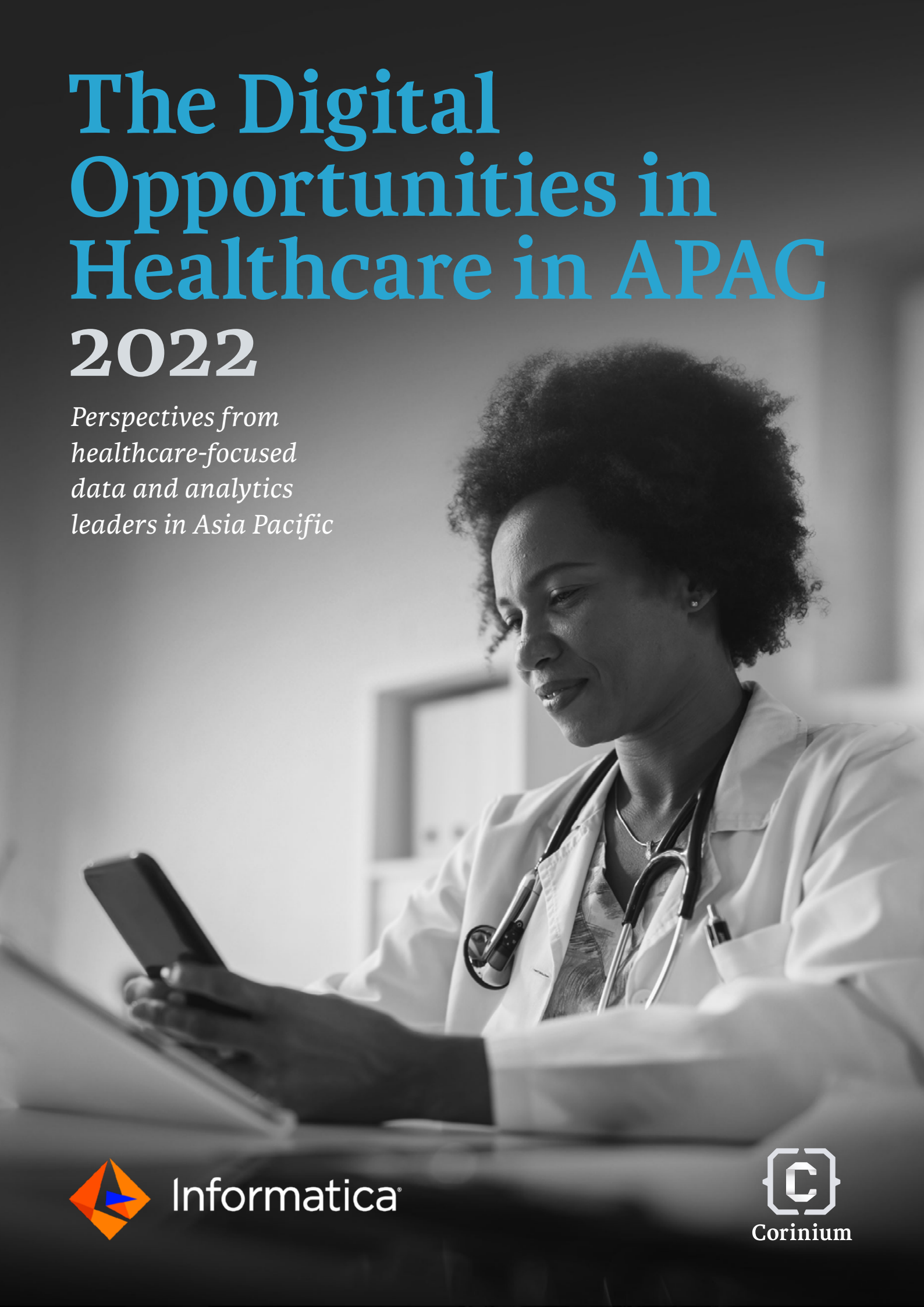
# The Digital Opportunities in Healthcare in APAC 2022

*Perspectives from healthcare-focused data and analytics leaders in Asia Pacific*



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# Executive Summary

In the healthcare industry exists many applications for data and analytics to modernise hospital and clinical operations and improve patient outcomes.

While certain aspects of data collection and reporting have existed in various forms in healthcare for decades, there is renewed focus on innovation and increasing the role of data in making decisions across the sector.

Featuring insights from six health-focused data and analytics leaders across Asia Pacific, this report explores the importance of data in healthcare, how it is put to work today, as well as what some exciting applications and projects coming together in the region are.

Topics covered include data strategies that question reporting methods, encourage education and facilitate innovation, as well as projects that seek to modernise how data travels through and is governed by the multitude of systems that can be found in health.

We'll also look at some of the ongoing challenges that our contributors observe as hampering progress in this space, as well as how healthcare organisations should prepare for the next wave of data transformation. ■

## Contributors

**Sutowo Wong**
Director, Data Analytics
Ministry of Health
of Singapore

**Ali Khan**
Director, Data and Analytics
Auckland District
Health Board

**David Rankin**
Director, Clinical
Governance and Informatics
Cabrini Health

**Rachel Fojtik**
Business Engagement
Leader
Mater Hospital Queensland

**Wendy Chapman**
Director, Centre for
Digital Transformation
of Health
University of
Melbourne

**Jon Teo**
Healthcare & Data
Governance Specialist,
APJ Region
Informatica

# How Data Performs in APAC Healthcare

*From hospital administration to clinical outcomes, data is at work in the region*

Healthcare, like many industries, is moving to adopt digital and data driven practices to transform the sector to be more effective, efficient, better connected, and agile.

From patient outcomes to healthcare provider performance and operations, the way data leaders across APAC are applying data science into the fields of healthcare is varied.

Just how varied the field is, is illustrated well by Sutowo Wong, Director, Data Analytics at the Ministry of Health of Singapore, whose team works on a wide range of data applications across healthcare.

"There's a lot that can be done with data within each domain of health, with use cases ranging from administrative to disease-specific areas," he says. "One example of a use case in the administrative domain might be simulating the impact on costs as we move from one funding model to another.

"We also have a methodology to project healthcare expenditure at both a national and government level. We use machine learning to identify outliers in claims for the various health financing schemes that we run.

"Another domain we focus on is infectious diseases, wherein we combine phylogenetics, i.e., analysis of SAR-CoV-2 virus subtypes and epidemiological investigation to identify infection sources and determine how different cases are clustered together.

"When it comes to AI, we use natural language processing to automatically pick up symptoms from free-text physicians' notes or examine huge data sets. There are many dimensions that can be looked at. For example, to identify spikes in acute respiratory infection (ARI) presentations to hospital emergency departments and Polyclinics."

Whether it be for frontline clinical applications, operational analytics or administrative systems, data modernisation initiatives are indeed taking place in the APAC region, according to Jon Teo, Regional Healthcare and Data Governance Specialist at the cloud data management software company Informatica.

"We continue to see health analytics activity and data innovation emerging in the region. There is real momentum here," Teo says. "Covid-19 was certainly an urgent driver of rapid digital adoption, but over the past year we've also supported initiatives that were not directly a pandemic response.

"A lot of the work we see reflects a resumption of health systems' long-term data management strategies, for example establishing cloud or hybrid data platforms or planting key 'sources of truth' to anchor patient analytics, data literacy or regulatory reporting goals."

> ***"We continue to see health analytics activity and data innovation emerging in the region. There is real momentum here"***
>
> **– Jon Teo**, Regional Healthcare and Data Governance Specialist, **Informatica**

## The Job of Data in Healthcare

The use of data in healthcare is advancing, and while data in healthcare can mean many different things, there are several trends that data leaders in APAC are following or driving in their organisations.

Our discussions with healthcare-based data experts across APAC raised several currently relevant pieces of work or trends, including but not limited to improving the flow of data from patients to providers, implementing AI, self-service tools, advancing data literacy and, perhaps most commonly raised, improving clinician and patient outcomes.

When it comes to the latter, Dr David Rankin, Director for Clinical Governance and Informatics at Cabrini Health in Melbourne, Australia, describes his job as using data in a meaningful way to help clinicians improve patient outcomes.

"An important part of that work is understanding that clinical outcomes data is a screening tool, not a diagnostic tool," he says. "I can't use that data to tell you who is a good doctor and who is a bad doctor, that's diagnostic. What I can do is use data to highlight areas that are worth looking into."

In the pursuit of improved patient outcomes, using data to look for trends in patient comorbidities, clues in pathology results or prescribing behaviour and surfacing variations in patient care that could be leveraged to change clinician behaviour, Rachel Fojtik, Business Engagement Leader at Mater Health in Queensland, Australia, has made data literacy a big part of her role.

"To use data effectively to improve patient outcomes, clinicians need to understand the relevant questions to ask, they need to be able to understand how to get the answers to their questions from data and they need to understand what they see in the reports they are provided," she says.

"I'm focusing on how we engage people in the process of creating a more digital and more modern data environment and how they can become data literate and capable with data."

Fojtik says other common applications of data in healthcare might include variation analysis, quality and safety analysis, and tracking incidents or hospital acquired complications over time.

"That would be tracking variation over time as opposed to variation between peers that we already discussed. We might also look at cohorts of clinicians or patients involved with these use cases and understand whether there are differences within each of the patient types or diagnosis.

"There is then of course the financial side of things which looks at creating efficiency in a hospital; tracking assets and expenses and all the usual opportunities to save and grow. We do of course know that efficiency in the hospital contributes greatly to patient outcomes."

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>
> **– Rachel Fojtik**
> Business Engagement Leader
> Mater Health

## The Way Forward

The intelligent use of data and analytics in the healthcare sector serves as a means to advance the medical profession and improve outcomes for staff, patients and healthcare organisations as a whole.

Mater Health's Rachel Fojtik says data enables far greater capacity to have an overview of any healthcare situation one might be dealing with, while at the same time not detracting from clinical expertise.

"It's important to remember that data is a view of the past, not the future. While you can try to predict what a view of the future might be, it's still not a guarantee of what an outcome will be in health," she says.

"So, you can't take a clinicians gut feel out of the equation. It's a very important part of the process. As a clinician, it is important to get to know the data very well, immerse yourself in it, then take a helicopter view and make a decision from the gut.

"Without data, it is harder to become familiar with what is happening around you. There isn't that ability to take a more global view, then put the binoculars on and examine the detail of what is happening, you can only see things in very small pieces."

As data and analytics technologies advance, there is opportunity to accelerate the speed at which medical science can evolve, says Singapore Ministry of Health's Sutowo Wong, who sees advances such as big data as expanding our capability to derive insights from medical data.

"There's a limit to what a human being can analyse," he says.

"Doctors can remember information on their patients e.g., their conditions and their treatments, but if you think in terms of big data, instead of just doctors relying on the knowledge of their own patients, you open up possibilities to look at the trends of patients from other doctors around the world.

"While there are already many medical journals published on certain conditions and treatments, these papers may be based on limited datasets. I think we can derive even more value by fusing data from different sources to form larger datasets.

"That is the way medical science has advanced over many years. It's just that now with modern data and analytics practices, we are in a way compressing the timelines for how we can achieve advances in healthcare." ■

***"With modern data and analytics practices, we are in a way compressing the timelines for how we can achieve advances in healthcare."***

**– Sutowo Wong**
Director, Data Analytics
Ministry of Health of Singapore

# Health Data Initiatives in Action

*Rethinking reporting, simulating best practice data integration and empowering those with ideas*

With the opportunity of data in the healthcare space well established, how are some data leaders in the APAC region digging in and building use cases that improve the outcomes for their staff, patients and organisations?

Wendy Chapman leads the Centre for the Digital Transformation of Health at the University of Melbourne, which she says focuses on three main areas of work: workforce education, data driven healthcare improvement, and translative innovative technologies in healthcare.

"In the data space, we're focusing on getting the data needed to measure outcomes that matter to patients," she says. "There is a lot of research on big data sets that the government owns and manages and it's really helpful for quality indicators, but a lot of what gets measured is just not what patients care about.

"For example, if somebody has a surgery, the outcomes that get measured might be around if they survived or if they went home, when what the patient really cares about is if she can bend her knee so she can garden. That is not looked at at all. A procedure may be considered successful by a surgeon, while the patient considers it a failure.

"To get to those outcomes we have to link clinical data with data generated by patients and collected from the environment. That's where we are focused: how to collect and manage that type of data and how to build an infrastructure that supports clinicians and researchers in learning from it."

In Singapore, Ministry of Health's Sutowo Wong says an initiative to collect patient-reported outcome measures, like those being examined at the University of Melbourne, are being introduced.

"Apart from the data that is generated when a patient consumes healthcare services, we can also look at patient-reported outcome measures. Usually there is a gap in information in between patient visits to healthcare institutions. When they are at home, you don't really know how they are doing," he says.

"We have started a process in which we send out surveys to the patients in between visits to understand this more.

"Some of the questions are around understanding, for example, after a surgery, whether the patient has regained some functionality, movement or ability. We're increasingly looking at things like that."

*"There is a lot of research on big data sets that the government owns and manages and it's really helpful for quality indicators, but a lot of what gets measured is just not what patients care about"*

**– Wendy Chapman**
Director, Centre for Digital Transformation of Health
University of Melbourne

## Improving Patient Data Collection and Flow

The Centre for the Digital Transformation of Health is currently working on two main projects in data driven healthcare improvement. The first is a digital platform for brain cancer patients and survivors.

"This will help them get reliable information, help them connect with each other and also help them monitor symptoms," University of Melbourne's Wendy Chapman says.

"The other project is a simulated digital ecosystem, which includes simulated electronic medical record systems, patient apps and medical devices that allows researchers to develop new models of care and the data flows that support them.

"You can physically simulate use of digital technologies in patient homes or the GP's office as well, so you can refine workflows and validate digital interventions before implementation in a real setting."

In light of fragmented data stores and considering the increase in virtual care services, driven largely by COVID, Chapman says such projects will help to improve communication between the patient and the healthcare system.

"One of my favourite initiatives comes from Scotland's Digital Health & Care Innovation Centre (DHI), where they have learned what we as patients know: we want to tell our story once," Chapman says. "For patients to be partners with their clinicians, we need mechanisms for patients to share relevant information with them before a visit and for clinicians to efficiently use that to guide improved care."

Informatica's Jon Teo says that even on the administrative side, such as booking an appointment and signing in on arrival, establishing architectures that support good data flow, integration and quality across different environments can improve the patient experience and efficiency considerably.

"You want to surface the most relevant data about a patient when they make a booking or present themselves at the point of registration, regardless of where that data sits," he says.

"As some health organisations have embraced cloud-based applications for their administrative needs, having an intelligent data architecture to bridge between on-premises clinical systems and their CMS or patient management processes in the cloud, has made a big difference."

"Having the right information for a positive patient interaction means having the intelligence to filter out "noise" such as repeatedly rescheduled appointments, as well as link disparate online and offline touchpoints through a reliable patient and provider identifiers. In some cases, we have observed increased patient satisfaction scores, as well as up to a 3-fold increase in appointment volume."

## Data Communication and Literacy

Cabrini Health's David Rankin says in addition to ongoing works to maintain and improve data collection and data quality processes, he and his team are doing a lot of work on how to most effectively present data to clinicians.

"I think there is an assumption that because doctors are intelligent, they dive into to every data-heavy report that comes their way, but I don't think that's the case," he says. "It's not always something they want, so throwing it up on a portal and saying, 'There it is, go get it', doesn't work!

"One of the things we're doing is giving de-identified patient-level reports to clinicians that focus on highlighting the interventions for individual patients. If there are outcomes that look unexpected, they are shared, in accordance with privacy, first with the individual surgeon and then amongst a peer group of doctors who discuss what occurred and how it could have potentially been prevented."

"Most often there are reasonable explanations for outcome outliers, but in cases where things have gone wrong, this approach encourages learning, by focusing on the individual patient and if any form of harm could be avoided. That has had positive results."

Deriving good, actionable insights from data, be it outcomes-based or otherwise, requires some level of data literacy. This is not always a given with physicians.

That's why building data literacy into the healthcare workforce from inside Mater Health is a key focus of Business Engagement Leader Rachel Fojtik's work.

"We have an education program on data literacy with four levels that covers using data for decisions, analysing data, communicating data and then one specifically contextualised to healthcare," she says.

"Another thing we do is have communities of practice running which brings analysts who are external to the analytics hub together to share the things they are working on.

"There are two types of communities we have. In one, data is the subject, wherein analysts discuss using data more effectively. In the other, healthcare is the subject, wherein data is used to better understand healthcare.

"We also have a mentoring program where we enable people from a particular clinical or business area to come in and develop a tool leveraging one of our technologists"

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> **– David Rankin**
> Director, Clinical Governance and Informatics, **Cabrini Health**

## Empowering Providers with Self Service

Auckland District Health Board's Ali Khan says a key component of the organisation's data strategy is centred on enabling customers to self-serve and innovate with their data.

"We are finding that most of the value for us is in making informed decisions quickly. These decisions require the combination of a deep body of business knowledge with supporting data in very short timeframes; hours and days not weeks and months," he says.

"Traditional intelligence approaches just don't work as they embed predefined hypotheses into high complexity data structures that are difficult and costly to change. For most decisions, new combinations of data are needed to support ever-changing business needs.

"We are shifting the entire model around the use of data and moving to a practitioner-based model where our practitioners have safe, controlled access to all layers within our data ecosystem."

To achieve this, Khan says ADHB's data team has organised themselves around four key pillars.

"Pillar one is data discovery, being able to find the data regardless of where it sits," Khan says. "One of the big problems is if data about a patient is spread across 20 different systems, only some of this data might exist in the data warehouse. The most relevant data may not be accessible, so our model allows some of our users, in particular our citizen analysts, to find, access and incorporate new data into their insights.

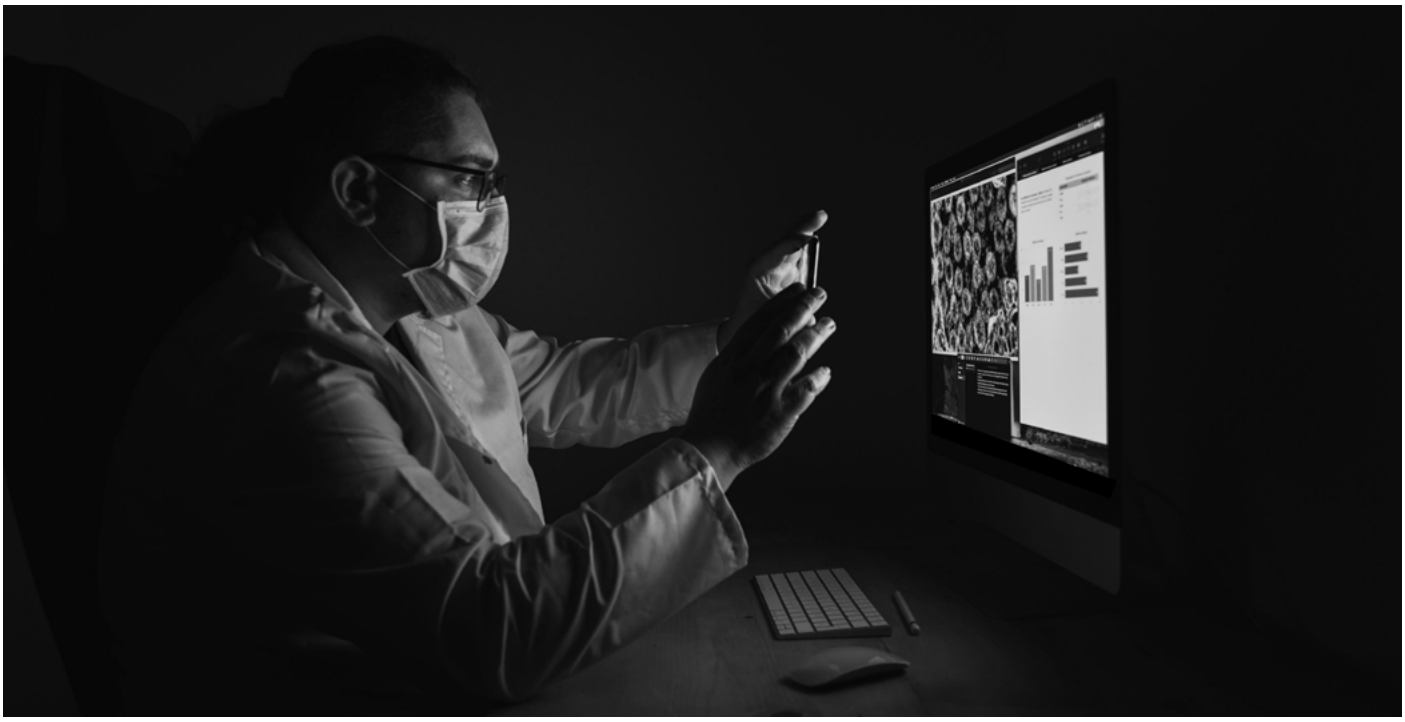
"The second aspect is self-service, which provides secure data environments and tools for our citizen analysts to prototype new insights and get answers that they need quickly."

The third pillar of the ADHB's strategy is automation, wherein the organisation has built tools to automatically generate datasets in the cloud based on a definition.

"Pillar four is innovation," Khan says. "With the first three pillars in place, we are set up to innovate with our data enabling our citizen data analysts, geeks, citizen scientists and engineers to use data in innovative ways to create value using knowledge only they have.

"We've already had a great use case where a hospital discovered efficiency gains for cataract procedures through the comparison of utilisation and efficiency. The clinical teams are now working to optimise the timing of these procedures to increase capacity. This was all achieved without IT being in the middle," Khan says. ■

> ***"Traditional intelligence approaches just don't work as they embed predefined hypotheses into high complexity data structures that are difficult and costly to change."***
>
> **– Ali Khan**
> Director, Data and Analytics
> Auckland District Health Board



## Where AI Fits In

It's difficult to have a data and analytics discussion without wondering how data leaders view the potential of AI to impact their industry.

Sutowo Wong from the Ministry of Health of Singapore says his teams had applied the use of AI across domains in healthcare. He mentions one example on the administrative side wherein AI was being used to surface healthcare claim outliers, but there is also a diagnosis use case in operation.

"We are also using AI to screen for diabetic retinopathy. Having the AI trained on images of the eye to detect that condition and its severity so patients can be prioritised for our ophthalmologists," he says.

"That's a signature use case at a national level, it has been rolled out in all of our Polyclinics, the subsidised primary care facilities in Singapore."

While the healthcare data leaders we spoke to acknowledged that AI is a powerful tool for the automation of certain tasks, expectations are tempered on how far they can meaningfully affect healthcare outcomes right now.

"I think where we are at in data analysis in Australia is that we want to throw artificial intelligence at determining clinical indicators, identifying system failures and various other tasks where there are big data sets," Cabrini Health's David Rankin says.

"These are all fine and helpful, but they don't change doctor behaviours, and unless you can change doctor or hospitals' behaviours, you are not improving the system."

University of Melbourne's Wendy Chapman says that while AI is useful for categorising large, rich data sets, it is not often the right solution to drive improvements in patient care.

"That's because much of the problem exists in the data," she says. "Our data demonstrates our biases. If you train an AI tool to do exactly what doctors did last year, you'll discover biases you may not have even realised existed. In addition, our data is messy and fragmented, and it is often not sufficient for driving useful predictions or supporting decision making. AI doesn't fix that." ■

*"We are also using AI to screen for diabetic retinopathy. Having the AI trained on images of the eye to detect that condition and its severity so patients can be prioritised for our ophthalmologists"*

**– Sutowo Wong**
Director, Data and Analytics
Ministry of Health of Singapore

# Ongoing Challenges

*Issues in data integration, standards, transformation and trust linger on*

In working with data to improve outcomes for patients and optimise the way data traverses healthcare systems, healthcare data leaders in APAC highlighted some of the biggest challenges that tend to bog these processes down.

For Cabrini Health's David Rankin, one major challenge he sees in the field is a lack of national standards for clinical outcomes data.

I think the huge opportunity in outcomes data is developing national standardisation, so that a doctor working at any facility gets a standardised report," he says.

"Whether they are public, private, are a surgeon, a physician or a GP, we should have a nationally standardised way of presenting data that doctors can compare with their colleagues, so that they understand what it means. Then, we could also have national benchmarks.

"Right now, there are multiple agencies developing proprietary reports and sending them all to surgeons who get reports from all over the place. It's overwhelming and counterproductive."

Rankin adds that on a smaller scale, data extraction and translation across various platforms within a facility is its own technology challenge.

"We have many clinical applications that collect data, such as in obstetrics, in the cath lab, and the endoscopy lab. They all have different clinical systems, and trying to extract meaningful data out of those systems into our data warehouse where it can be accessible, presented and combined is a huge challenge.

"We have HL7 and FHIR [data exchange frameworks] but each of the applications will still store even core things, like data and time, in different ways."

Data collection, data transparency and data quality continue to factor significantly on how clinicians and data end-users will trust their reports and analytics insights, Informatica's Jon Teo says.

"Adoption and end-user acceptance can pose a change management issue when new dashboards and reporting methods are introduced," he says.

"A good dashboard can be really valuable, but a big part of the challenge is ensuring that what is presented is meaningful. This is not always easy given the reality of fragmented data sources, variable formats and quality as well as just the 'information overload' that often occurs when clinicians deal with data.

"In other instances, the reliability of new data platforms or data lakes can be questioned when the reporting outputs are not sufficiently 'proven' to be as reliable as what stakeholders are used to looking at. Establishing clear transparency around the providence of the data, as well as easy comparability with the previous 'gold standard', goes a long way to build up trust."

## Integration Woes

Auckland District Health Board's Ali Khan says another key challenge in healthcare data is how end-to-end data integration and architecture improvement is being hampered by privacy concerns.

"If you look at the use of data warehouses, they have been around for 20-plus years, but I think healthcare often struggles to have effective warehouses. There is a lot of getting bogged down in misunderstood concerns about privacy preventing timely access to value information," Khan says.

"Often data is in many different systems and locked up into silos. When the central IT team is the only team allowed to combine different types of data together, they very quickly become the rate limiting factor.

"What you really want is the ability to connect any data together quickly. Once that data is connected, it can be analysed to determine the best care path to be on. That is rocket science for many industries at the moment in my view because of the reliance on central IT teams to do this work.

"They just cannot be expected to have the business knowledge needed to integrate this data in the right way and within the required timeframe."

Integration challenges in healthcare data is one of the reasons the University of Melbourne's Centre for the Digital Transformation of Health is investing in researching data flows and integration.

"The many covid virtual care systems being deployed across Australia demonstrate this. It's happened quickly, which is fantastic, but it's been put together with 'virtual duct tape' and it's not scalable," the Centre's Wendy Chapman says.

"The patient enters information on a website or their phone or a website, it goes into a database and then a clerk at the hospital retypes the information into the registration system.

"Then, the patient has their virtual visit, and the physician needs information that exists on the GPs system, for example, but the ED doc doesn't have access to it, such as comorbidities, allergies, or medications. It's a huge time sink for the physician and the patient.

"Patients relay the information from memory, and from personal experience as a patient, it can be inaccurate. If the patient is brought to the ED or a clinic, they often order repetitive procedures because they don't have access to previous results. Finally, after the visit, it's difficult to share the results of the visit with the patient's GP, and the fragmentation of information just gets worse." ■

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> Auckland District Health Board

## Preparing For Data Driven Change

As demonstrated by the data leaders in healthcare who have contributed to this report, there are interesting and meaningful data use cases and practices being employed and thought about in health services organisations, government departments and research settings.

For healthcare organisations that remain in the early stages of their digital and data journeys, our health data leaders shared some thoughts on preparing for data driven change.

"I would suggest looking into DataOps or the concept of a Data Mesh," says Auckland District Health Board's Ali Khan. "The important thing is not to adopt the latest methodology in the hope it will fix a low-performing data environment. The key is to bring a holistic understanding of business needs and then combining the right aspects of various methodologies and architectures to accelerate value delivery.

"The data domain is one of the toughest domains for people to be successful in, as most people are only focussed on reports and semantic data layers for their customers.

"Report building is a broken model when it comes to delivering value because problems are often transient in nature and rapidly changing. Most business value is in the ad-hoc questions that need to be answered because somebody needs to make a decision now."

Whether an organisation has data maturity or is just getting started, Cabrini Health's David Rankin says ongoing education is a must.

"Even in our third-quarter results that we put out several weeks ago, I learned some new aspects of how data could be tweaked or presented differently, what doctors found of interest, what they thought was relevant and irrelevant," he says.

"Because my aim is to make doctors think and reflect, I have to be in a continual state of learning."

*"Because my aim is to make doctors think and reflect, I have to be in a continual state of learning."*

**– David Rankin**
Director, Clinical Governance and Informatics, **Cabrini Health**

## Bridging the Skills Gap

University of Melbourne's Wendy Chapman says to realise the opportunity that digital innovation can bring to healthcare, organisations must invest in skills, both to have top analysts and analytically minded clinicians but also technical teams who can build modern data architectures that enable better communication and decision making.

"The size of electronic medical records (EMR) teams and IT teams at hospitals here is miniscule compared to the places I've been overseas," she says.

"You may have all these ideas you want to implement using data but when there's just a team of two people for your entire health service keeping the lights running, they don't have time to build new things.

"I think figuring out a new way to fund innovation within health services and collaborating with universities is going to be important to embracing IT and training clinicians on data. More jobs are being created in this space, and health services and universities can't find people with the right skills and knowledge."

Chapman says clinicians who see the value in good data can work with the IT and data teams and move that transformation forward.

"We are launching a new program called the Applied Learning Healthcare System (LHS) Academy with two arms. First, we have a short course to give broad groups of learners experience in the LHS cycle from data to knowledge to practice using a simulated scenario of managing diabetes. Second, we have a fellowship program to empower clinical champions. We will mentor clinicians from six Melbourne hospitals and several GP clinics over a year on projects selected by their leadership," she says.

Chapman says the plan is to add more workforce development opportunities to grow a more empowered workforce on the clinical side while at the same time teaching more people on the data science side about the peculiarities and power of healthcare data and the complexity of integrating digital interventions in health settings. ■

*"I think figuring out a new way to fund innovation within health services and collaborating with universities is going to be important to embracing IT and training clinicians on data."*

**– Wendy Chapman**
Director, Centre for Digital Transformation of Health
University of Melbourne

# Conclusion

The applications for data in health remain wide and varied. In addition to use cases such as in clinical outcomes reporting being modernised through new thinking and education, entirely new processes for democratising data and managing data flow and access are also being developed and even implemented.

We've explored just some examples of projects, strategies and major challenges data leaders in the Asia Pacific region are immersing themselves in as they work to make their industry more data driven.

While data privacy, data quality, interoperability, and standards may throw up roadblocks in our region, the action around training, data democratisation, and report innovation, as well as an acceleration of data transformation projects, suggests that the digital opportunity in healthcare in APAC is significant. ■

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# About the Editor

Michael Jenkin is an editor and journalist with more than a decade of experience producing content across broadcast, print and digital media. He specialises in enterprise IT and technology writing.

At Corinium, Michael develops content to inform and support data and analytics and information security executives.

To share your data story or enquire about appearing in a Corinium report, blog post or digital event, contact him directly at michael.jenkin@coriniumgroup.com

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