

# Evolving Healthcare Analytics for a Thriving Digital-Health Ecosystem

Part of the National Insights Series Health & Human Services Community

(5 Key take-aways based on Public Sector Network's Virtual Event, 3 August 2022)

Healthcare by its nature is about providing clinical assistance to patients, whether that is in a hospital, a private clinic or even at home or in an ambulance. It is about ensuring that patients are treated for their ailments and that they can leave feeling better than when they arrived. Clinicians are central to this effort but shouldn't work in a vacuum. They work as part of a healthcare system. Within that system, a patient should be able to move around to different hospitals or different clinics and be treated equally, and their records should follow them. Equally, a clinician should also be able to move around and expect to have similar facilities and the same records available for each patient, irrespective of location or facility. The key to all this is data and the analytics behind it, and whilst the clinicians are the experts in their field when it comes to medical care, they also rely heavily on data to be able to do their job. Thus the data needs to be of high quality, available in real-time (or as close as possible), and it needs to be analysed appropriately so that the clinicians can make the most of it. Throughout the country there are experts that do this, and some of them addressed PSN's 'Evolving Healthcare Analytics for a Thriving Digital-Health Ecosystem' recent event. The following are five of the key take-outs from that event, though of course many of them are interconnected and inter-related:

## **1. The need to remove silos**

Clinicians tend to work in small teams. Whilst they often work within a large healthcare system, depending on the facility and the practices within that system, the clinical data can become very siloed. This was certainly the case at Digital Health SA, which is part

of SA Health. **Rhys Parker**, the Chief Clinical Information Officer at the Office of the Chief Medical Information Officer (OCMIO) at SA Health, says that in January 2020, there was "siloed application data and no single source of truth. There was a lack of a comprehensive clinical database." At around this time, the OCMIO was established as "the interface between the clinical and the digital world." They work with all of SA Health and their partners, in part to "address the challenge of siloed application data from across disconnected systems."

One of the first things they did was to build a proof-of-concept "with some small seed funding." The basic idea was to create system where information could be entered "in real-time into a single repository." This would allow data to be shared across the system and would also "resolve longstanding historical issues." The proof of concept was approved and they then moved on to the first phase of the rollout, which was largely about "addressing the needs of local health networks and end users." Doing it in phases meant that "we could only deliver what was possible now without trying to do too much at once." Their biggest issues were related to existing policies and practices rather than technology. Whilst overcoming some of those issues "would realistically take two years or more, we reshaped the design to meet some of the immediate needs now." They completed the first phase in December 2021, which was about "building on core enterprise clinical data in order to address the existing silos, and now we continue to develop the platform in order to address the operational needs of users."

## **2. Getting the most out of data**

One of the reasons why removing silos is so important, as the project at Digital Health SA shows, is because doing so means data can be used in better ways to treat patients, which is the ultimate goal. **Tanya Kelly**, the Clinical Director for Digital Transformation at Sunshine Coast Hospital & Health Service in Queensland, says that in the 1700s, healthcare was “boutique, bespoke and customised. Everyone had a unique problem with a unique solution.” It was only in 1980s and 90s that evidence-based medicine was first mentioned in medical journals, and “not just as an add on, but something that needed to be integrated into the living, breathing cycle of medical care.” Since then, it has become the standard way of practicing medicine because it “takes into consideration the patient’s expectations, our clinical skills and the best available evidence to us,” and that comes from data and analysis. It also means “looking beyond the individual and really starting to think in a cohort based way, in a manner that makes sense to clinicians.” In order to achieve this, across the sector “we implemented electronic medical records (EMRs) and digitised administrative systems” to get the most out of the data so that “for the first time, when we looked at it from a cohort basis, it could give us some rich information.”

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**“We as clinicians need data, but it needs to be contextualised to provide us with information which we can then turn into knowledge, and that then allows us to make decisions which form into actions.”**

**Tanya Kelly**,  
Clinical Director, Digital Transformation,  
**Sunshine Coast Hospital & Health Service (Qld)**

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In fact, nearly for the first time, “data is enabling us to find out if what we are doing is delivering the outcomes that we desire.” The data systems and EMRs are enabling clinicians to operate in novel ways with research and evidence at the core. One of those novel ways is through artificial intelligence. **Andrew McAlindon**, the Chief Data and Analytics Officer at the Central Adelaide Local Health Network, which

comprises of five hospitals, says that AI is “is often seen as a panacea but really it’s just spectrum of methods, tools and approaches for analysing data. It is an overarching concept that encompasses machine learning, neural networks and deep learning, or simply just a rules-based approach for analysing data and making decisions.”

At the Central Adelaide Local Health Network, they are using AI for “computer-assisted coding, clinical decision support, clinical documentation improvement, as well as in medical imaging to predict patient outcomes.” In general, they have “about 12,000 inpatients per month” across their facilities so they need to “code all the records.” They have 25 expert clinical coders, but there is a shortage of specialised staff at the moment, so “so we’re always looking at innovative ways of coding those records using a more automated approach.” However, it is not a matter of simply swapping out a person for a machine. The coders are highly trained because the standards are tedious and the processes are complicated. Only about “25% of cases can be coded automatically.” The rest still has to be done manually. For the most part, AI is being used to “predict patient deterioration.”

The general process is that if someone – a hospital staff member or even a family member – notices a deterioration in a patient, they press the emergency call button and “the emergency response team, staffed by intensive care clinicians, comes out and assess the patient.” However, this requires people to notice the deterioration and other people to assess it. So two Adelaide hospitals have been trialling a system whereby through AI, “EMR data is pulled every ten minutes and assessed in near real-time.” If there is an issue, it then texts the nursing manager on the ward, “giving a valuable head start for early intervention. It doesn’t replace any existing systems. It simply provides additional advance warning of a possible issue.” The Queen Elizabeth and Royal Adelaide hospitals currently trialling it are “the first public hospitals in the world to implement this system, which has been developed in Australia by doctors.” So far it has predicted “73% of emergency team calls more than one day in advance of them occurring.”

At its core, having data analytics as part of healthcare is really about providing better results for patients. **Andrew Aho**, the Regional

Director for Data Platforms at InterSystems, a software vendor and technology company, says that “this quest is really all about how to unlock data to provide actionable insights.” As part of that, InterSystems partnered with Ecosystem, a research company, “to conduct a survey of healthcare executives,<sup>1</sup> one that hasn’t been done in Australia and New Zealand for about ten years. We wanted to understand where these organisations are up to when it comes to data and analytics.” The research was conducted in 2022 with “180 people” across both countries and included people from “healthcare providers large and small, public and private, so a good cross-section.” One of the first insights was that “78% of respondents cited data analytics as being one of their top five business priorities, which is pleasing.” It is not always the top priority because “clinical outcomes remain very high in terms of expectations from analytics solutions, but being able to identify risk and being able to improve patient outcomes and experiences” based on data, is certainly of primary importance to most. What executives really want from their data, and what is already happening for the most part, is to have “software that can accumulate all patient data and make it easily accessible on any platform in real-time.”

### **3. Better use of electronic medical records**

One way to achieve better access is by making better use of EMRs. Andrew McAlindon says that across their five hospitals, they have “130,000 admissions annually, 122,000 ED attendances and over a million outpatient services.” To keep up with all this, about 18 months ago they installed the SA Health Electronic Medical Records and Patient Appointment Scheduler, known colloquially as Sunrise EMR & PAS or simply Sunrise EMR. It is a record of “all scripts and patient administration,” and is now being used “by hospitals from other local health networks across the metropolitan area as well, along with some of our larger country hospitals.” In fact, “more than 1.5 million people across South Australia now have an electronic medical record, and more than 28.3 million clinical documents have been created on the system.” What all this shows is that “we need to provide better care in future.”



**“Whilst the EMR is designed to support the care of a patient during an encounter or subsequent episodes, it is not structured to support data analysis.”**

**Andrew McAlindon,**  
Chief Data & Analytics Officer,  
**Central Adelaide Local Health Network**

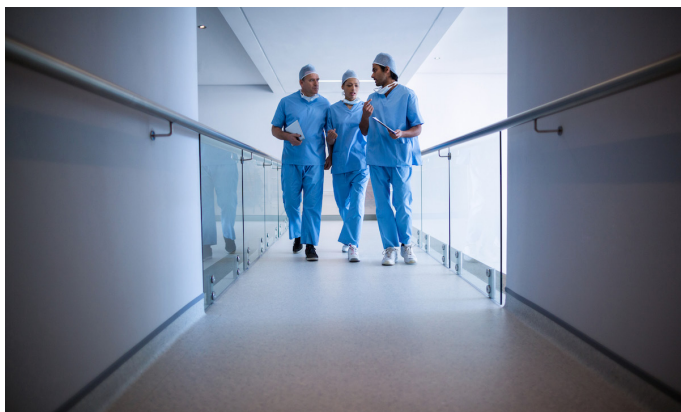
For instance, while it supports a patient’s immediate care, it is not quite appropriate for “case review and quality assurance, refining the evidence base for making decisions, personalised medicine and performance monitoring or activity based funding.” Noting these deficiencies, the Central Adelaide Local Health Network began a “clinical documents improvement project in July 2021.” It is focussed specifically on radiology and pathology data, and through a third party tool, it “extracts clinical notes and data from the Sunrise EMR and identifies potential gaps in patient records by triangulating with actual radiology and pathology results.” For instance, whilst the records may show that the blood cell count is normal, the notes may say that a patient may be prone to being anaemic, but ordinarily there would be no cross referencing of these two pieces of potentially conflicting data. The tool is also linked to pharmacological data, and in just the first year of operation, “\$10.1 million in funding was recovered, of which \$6.7 million was attributed to the AI tool, equivalent to about 1,200 national weighted activity units.” When these results were released, the CEO almost

<sup>1</sup> <https://www.intersystems.com/au/healthcare-organisations-are-struggling-with-harnessing-the-power-of-data/>

immediately approved an expansion of the project.

In the meantime, Rhys Parker says that they have also worked with Sunrise EMR to simply make it better. “We want to ensure that the information is provided to users in the best possible way so that the EMR remains a single source of truth for them.” This means embedding some of the AI solutions into the dashboards and “showing the assembled data in a way that make sense and can be seamlessly embedded into the hands of the clinicians.” This way the data and the information contained within the records can be “scaled and better analysed.”

Tanya Kelly also says that the EMR needs to be used in better ways, but first and foremost, “the records need to be digitised. We know that there are areas of our health system that are still on paper.” The next step is to incorporate the digital records associated with “patient administration systems and HR systems.” In fact, “we need to map that electronic record and the information needs to be curated.” For instance, the data needs to be benchmarked and appropriately available. Some small local hospitals have been known to “create their own dashboards and their own data sets.” This is no longer acceptable. “If our version of length of stay is different to another version of length of stay in another health system, then we can’t benchmark very effectively.” Part of this is about portability of information, so the data needs to match up. Data from records and health systems also needs to be linked. “When you can link patient administration systems, referral management systems, personnel information and HR systems, then you can start to pull together a real understanding of the clinical side of things, as well as the time required and the resources required.” This is the real benefit of having better medical records.



#### **4. Analytics helps the patients and the clinicians**

As we’ve seen, being able to analyse data to assist in patient care is critical, but Andrew Aho says that can be a problem because in their survey, they found that “more than 50% of the key stakeholders do not fully trust their data.” This is a very challenging result given that data is so universally necessary, but it generally comes down to data quality. “Drilling down, we found that people actually don’t trust the quality of the data,” and more than that, “43% reported that there was an inability to access real-time or timely data.” All of this is further exacerbated by the fact that “organisations’ data strategies may very quickly become obsolete,” or that technologies and tools are moving and evolving very quickly. This is linked to the notion that most data strategies “are not tied into the overall strategy of the business.” It is critical therefore that data strategies and methodologies “keep up with technology.”

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**“We need to ensure that data is used better, even if it comes from older strategies, in order to help build a complete view of the patient. As one respondent said in their comments, analytics should allow a multidimensional approach to wellness.”**

**Andrew Aho,**  
Regional Director – Data Platforms,  
**InterSystems**

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As part of that multidimensional approach, Tanya Kelly says that the federal government publishes the ‘Australian Atlas of Healthcare Variation’, and the fourth edition came out in 2021.<sup>2</sup> One of its main purposes is to examine how different ailments are treated in different parts of the country and to see if there are any variations. For tonsillectomy for example, “there are pretty large variations in hospitalisations around Australia,” with much fewer cases in rural and remote areas. The question of course is “what is going on?” Drilling down into the data it becomes clear that the disparities are largely because of the way information is fed into the system. For instance, in many rural and remote areas the practices are “still not digitised,” meaning it is much more difficult to feed their results into a national system. “From a system

<sup>2</sup> <https://www.safetyandquality.gov.au/our-work/healthcare-variation/fourth-atlas-2021>

information perspective, we need to change the way we approach healthcare.”

In some cases this may mean “more intelligent gathering and use of data.” A great example comes from the ‘enhanced recovery after surgery’ (ERAS) guidelines. If instructed appropriately by the clinician and followed correctly by the patient, “they can reduce negative outcomes, reduce the length of stay and get people recovering better and home earlier.” But like most things, they only work “if both clinicians and their patients follow the guidelines.” When things don’t work, “clinical departments tend to move to a paper-based audit process.” However, there are new “ERAS interactive audit system dashboards being developed.” The problem is that most of them are bespoke, specific to one “clinical scenario,” but the challenge now is to expand so that the “dashboards enable clinicians to be able to interact with the information they need to be able to get beyond what they’re seeing in the clinical space and understand their practice in the context of their unit.” This will create the multidimensional system-wide perspective.

Andrew Aho adds that another approach is through the use of a ‘smart data fabric’. This is a “relatively new concept that acts as a cloth that you weave across your organisation’s data assets.” In other words, it “taps into all of your data sources to harmonise, collect or connect to these data sources, and provide the data to where it needs to be at the time that it’s needed.” It is new, but “74% of organisations believe that a smart data fabric would be beneficial in order to leverage their data and get the most out of it.”

Rhys Parker also wants to get the most of the data, and says they are in the process of “moving into the next phase of work which will deliver cloud analytics and a modern toolkit that can scale into the future.” Along the way, they have addressed their challenges in creative ways by “developing the use of synthetic data which improves the ability to access and share data while maintaining privacy and security.” Using synthetic data, “there is no link between the synthetic record and any real patient, so this actually gives us internally some ability to test and innovate at a faster pace.” But it needs to be translatable.

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**“It’s great to have a central data asset, but we’ve realised that unless it’s easy for everyone to access the products, then true data literacy across the organisation may remain an aspirational thought. In order to address this, we need to have the ability to deliver solutions direct back into the hands of our users.”**

**Rhys Parker,**  
Chief Clinical Information Officer,  
**Office of the Chief Medical Information Officer, SA Health**

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This is why they now have a “three-year roadmap which is focussed on tangible delivery.” The intention is that all the products and deliverables are co-designed or co-developed with the business experts, and that there is “a direct link between the technical work and the business outcomes” for the benefit of the users.

## **5. Creating better healthcare outcomes**

The ultimate goal of any technology is to make things better, and this is particularly true in the healthcare sector. Tanya Kelly says very succinctly that “quality in healthcare settings may be defined as the extent to which a healthcare service or product produces a desired outcome.” Obviously that outcome is improved patient health, and often that can be achieved through better analytics. For instance, “investing early in the necessary dashboards with funding from state bodies, is important and will make a difference.” The good thing is that clinicians are experts and know what they are doing. They also know the information they need. “They might just need a little bit of help from an analytics point of view.” However, whilst technology and dashboards are important, “it is only clinicians who have that real contact with patients so we need to bridge to system and never forget to include them.” For that reason, and numerous others, “don’t wait for the data quality to be perfect before you undertake clinician business intelligence activities, because it never will be. Always engage in opportunities for continuous improvement.”

Andrew Aho says that one way to continually improve healthcare outcomes is to ensure that the data that clinicians have access to is “in real-time or as close as possible.” From their survey they found that having access to real-time (or near real-time) data was one of the top priorities for respondents and that this was “key to future success and getting value from their investments in data and analytics.” Ultimately for them, their survey was about providing “actionable insights to be able to change the course of care,” and giving clinicians a better understanding of some of the issues that plague all practitioners in the industry.

On the issue of real-time data, Andrew McAlindon says that “the time for passing around USB sticks is definitely gone.” Near real-time data is crucial in health analytics, especially when it comes to AI and the mass of data that is required. AI can be useful in predicting cancers and in many other settings, but the algorithms also “need to be trained to recognise what good looks like and what bad looks like, and what a good and bad cancer look like in terms of survival, for example.” This is done through image recognition with “the ultimate goal of identifying the most appropriate treatment outcome option to deliver the best outcome for the patient.” This should be the defining factor for all AI and machine learning, and in fact for all technologies in the healthcare sector.

In fact, Rhys Parker says that “the focus for us has been to acknowledge the place of technology as a central component to meet the needs of our patients and community. But it is just one component that we use to address the challenges faced by clinicians and staff when faced with a massive information from multiple systems and trying to bring this together to improve health outcomes for all our patients.”



# Evolving Healthcare Analytics for a Thriving Digital-Health Ecosystem

Virtual Event, 3 August 2022

Clinical decision-making is one of the few things in the world where precision literally saves lives. Healthcare analytics today is a functional asset that assists healthcare providers on a multitude of levels; from population monitoring, medical and health records, to diagnostics, treatment, clinical decisions, and even procurement and accounting.

Healthcare professionals dream of predictive analytics maturity to enable efficient patient flow, precise and personalised diagnosis, strategic healthcare procurement. Being armed with the capability and capacity to collect, make sense of, and share valuable data appropriately, is a significant leap toward future-proofing the evolving landscape of patient care and healthcare systems globally.

Innovative, emerging and even advanced use of data and analytics technologies are many and ongoing. At this virtual event we heard about cutting-edge innovations, developments, and applications across Australian Healthcare. Let us realise the potential of the resources, tools, and technologies available in our hands now to create the future of health together.

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## Featured Speakers



**RHYS PARKER**

*Chief Clinical Information  
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Office of the Chief Medical  
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**TANYA KELLY**

*Clinical Director, Digital  
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**ANDREW MCALINDON**

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**ANDREW AHO**

*Regional Director – Data  
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