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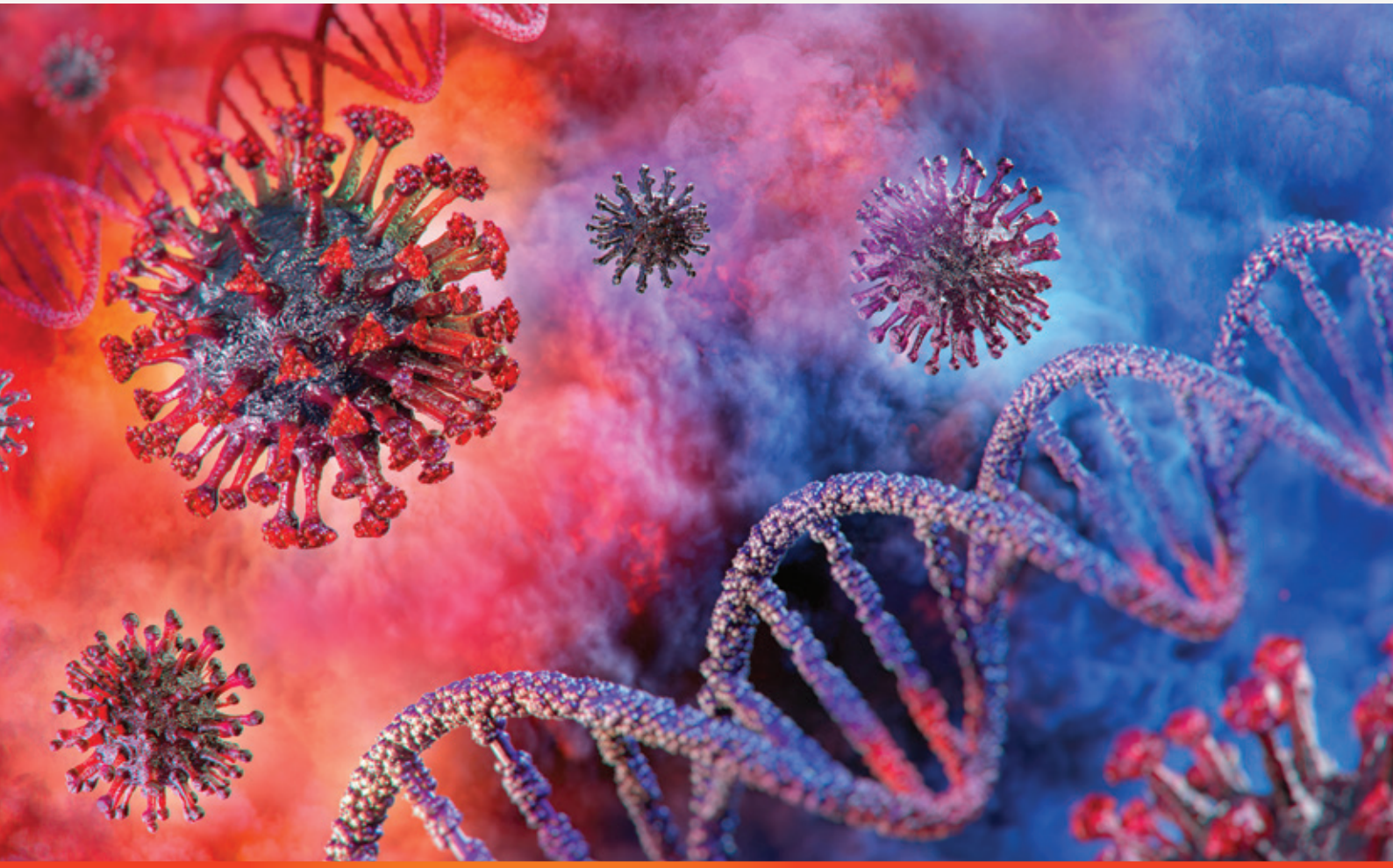

Linked data in the fight against COVID-19

How Australia's national data linkage research infrastructure helped the nation battle a once-in-a-lifetime public health emergency.

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Linked Data's Role in the Coronavirus Response

In early February 2020—a month before COVID-19 was declared a global pandemic—Queensland's Chief Health Officer Dr Jeanette Young called data linkage staff in on a Sunday. She'd recognised the role that data would play in Australia's coronavirus response, and instructed the team to begin linking Australian Border Force information on returned travellers to health and other government records. It was the beginnings of a nation-wide ramp up of the country's data linkage systems that would support every aspect of Australia's COVID-19 response.

Population Health Research Network (PHRN) chief executive Dr Merran Smith oversees a national collaboration that brings together data held by the states and Commonwealth. The network is funded by the National Collaborative Research Infrastructure Strategy and has participants in every state, including Data Linkage Queensland, the Centre for Health Record Linkage (NSW) and the Centre for Victorian Data Linkage, now a part of the Victorian Agency for Health Information.

Dr Smith says linked data has been used in the pandemic response for everything from contact tracing to preparing for a vaccine.

"It's powerful," she says. "Australia is a world leader [in data linkage]... and I think that has put us in a good place in responding to COVID."

REAL-TIME DATA LINKAGE

As doctors and nurses treated Australia's earliest COVID-19 patients, data scientists were working to link health information in near real-time. In Victoria, infectious disease notifications, hospital admissions, emergency department presentations and deaths that had previously been linked every three months were updated every day.

Centre for Victorian Data Linkage manager Sharon Williams says the move helped to supplement the information that was available to decision makers in responding to COVID-19. "The data helped track what was happening to people who tested positive, such as whether they went to an emergency department or were admitted to hospital."

In New South Wales, data scientists quickly linked COVID-19 infections to the state's patient flow portal. "That meant that we could have information on where COVID cases were in the health system," says Associate Professor Sarah Thackway, the executive director of epidemiology and evidence at NSW Health. "Were they in an emergency department, on a ward, in intensive care? And that information was updated every two minutes."

At any time, day or night, NSW Health secretary Elizabeth Koff could see where people with COVID-19 were in the hospital system—in Broken Hill, the Northern Rivers or the heart of Sydney. It also included people being cared for in their own house through the Hospital in the Home program.

"That means you can identify the resourcing impact on the health system, and where there might be stresses and strains," A/Professor Thackway says.

CONTAINING THE SPREAD

A/Professor Thackway says COVID-19 has seen a dramatic increase in rapid data sharing across government agencies, on a need-to-know basis and using privacy-preserving methods. It's been used to make decisions such as where to set up pop-up COVID-19 testing clinics, and even track the impact on health workers.

"We were able to report on whether we were seeing the level of testing we needed to see in Aboriginal communities," A/Professor Thackway says. "If not, we established pop-up testing clinics and re-directed communications."

A/Professor Thackway says that between January and June, NSW Health did 26 significant data linkages with very quick turnarounds, usually on weekends. "Because we had all of this existing infrastructure, we were able to do that really quickly," she says.

In Victoria, linked data was used to support contact tracing where contact details were incorrect or missing. When contact tracers couldn't get hold of a person from the details on a pathology test, for example, the Centre for Victorian Data Linkage would supplement the details with phone numbers or addresses from other government sources where available.

In Queensland, agencies have kept track of returned travellers through linkages between data sources such as Border Force, Home Affairs and visa data. They've used international student records, cruise ship manifests, airport screening data, state education data, licencing and vehicle registration data, home isolation and quarantine orders and a variety of Queensland Health data sources.

"Initially it was really about contacting returning travellers to reinforce the requirement that they self-isolate... and also to provide support for them,"

says Dr Trisha Johnston, the director of Queensland Health's statistical analysis and linkage unit. "So the contact details were being provided to people like police and Red Cross and other government agencies who were providing a telephone service to them."

UNDERSTANDING COVID-19

Linked data has also helped Australian doctors and researchers learn more about an emerging disease. It's helped health departments understand who is most likely to get tested for COVID-19.

It's also helped doctors understand the pre-existing conditions and co-morbidities that can increase the risk of complications or death from COVID-19. And it's helped hospitals prepare for the number of patients likely to be admitted or require ICU treatment in the future.

Linked data is also being used to monitor the long-term effects of COVID-19 infection, tracking emergency department presentations and hospital admissions in the months after patients have recovered from the virus. "What our health protection colleagues are looking at now is the longer-term impact on population health and health service usage," Williams says. "Are these people coming back more frequently than others in the population?"

New South Wales has funded monthly surveys of a subset of people in the ongoing 45 and Up Study, which is routinely linked to GP, medication and other health data. About one per cent of this group tested positive to COVID-19, allowing researchers to track their recovery.

In Queensland, Dr Johnston says another large study is looking at risk factors, service requirements and outcomes for COVID-19 patients. And she's already receiving requests from researchers, and quality and safety committees, wanting to look at things like the effect of COVID-19 in pregnant women.

THE PATH TO RECOVERY

At the peak of Victoria's lockdowns, the state used linked data to identify vulnerable groups and target them with wellbeing checks from agencies such as the Red Cross. It included people without an Internet connection, those living alone without support, people on an aged pension and single parents.

Williams says the state is now linking information relating to mental health, alcohol and drug use and child and family services as well as health information. "That's to help with the government's strategy of restoration and recovery," she says. "To understand better... the impact of the lockdown on the Victorian population to enable effective targeting of services."

Victoria is also studying people who didn't get COVID-19 themselves but may have missed medical treatments because of the pandemic. "We know there's patterns of people who missed cancer screenings and skipped various treatments," Williams says. "So we want to be able to better understand the extent of this and the impact on the broader population health as well."

Dr Smith says it's been a huge effort by Australian data scientists on the ground. "They've been working long hours and very hard, and under difficult circumstances," she says.

But the linked data provided critical intelligence to drive Australia's public health response. "Without it, I believe that we would not have been able to contact as many people as we did," A/Professor Thackway says. "And with that, I think you would have had more widespread COVID in New South Wales. Of course, there's many factors [that] drive the spread of COVID but having good, very timely data really did help us shape that response.

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