Submission
No 28

INQUIRY INTO THE MANAGEMENT OF HEALTH CARE DELIVERY IN NSW

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LORICA HEALTH

Inquiry into the Management of Health Care Delivery in NSW

Prepared for:
Mr Bruce Notley-Smith MP
Chair
Public Accounts Committee

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EXECUTIVE SUMMARY

Lorica Health appreciates the opportunity to contribute to the Inquiry into the Management of Health Care Delivery in NSW. Our submission addresses three of the four terms of reference:

- The extent to which efficiency and effectiveness is sustained through rigorous data collection, monitoring and reporting;
- The adequacy of the provision of timely, accurate and transparent performance information to patients, clients, health providers and health system managers; and
- The extent to which the current framework drives improvements in the healthcare delivery system and achieves broader health system objectives

Whilst healthcare outcomes in New South Wales (NSW) compare well internationally, it is well attested that NSW, like the rest of Australia, faces a number of healthcare challenges. Rises in healthcare costs have outpaced economic and population growth in the past ten years, while our chronic disease burden is growing. Challenges to the coordination of healthcare services continue to frustrate the possibility of providing patients with best-practice care, and this situation is not helped by outdated modes of data sharing and data management. Finally, patients are becoming increasingly aware of the lack of information availability surrounding the performance of healthcare providers.

NSW has taken positive steps to addressing these concerns by implementing strategies and frameworks focusing on increasing transparency and care coordination. For instance, the eHealth Strategy for NSW Health aims to create a digitally enabled and integrated health system which delivers patient-centred health experiences and quality health outcomes. This strategy encourages transparency across government agencies, quality data and information sharing between hospitals, community health, GPs, patients and private clinicians. Progress has also been made with the introduction of the NSW Health Analytics Framework and the NSW Integrated Care Strategy.

However, Lorica contends that NSW can make even greater strides toward meeting these challenges by aiming toward the creation of a ‘learning’ health system and focusing on three key pillars – *coordinated care*, *data*, and *transparency*:

1) *Coordinated care:* ending siloed care by creating a seamless health system experience for patients.
2) *Data:* ensuring excellent data quality for the extraction of insights from top-shelf data analytics to improve healthcare system delivery, planning and research, and

3) *Transparency:* promoting access to performance and price data to allow clinicians to follow best practice and to fully inform patients as to their treatment options.

As such, a learning health system constantly works to improve outcomes, decrease costs and reduce the number of unnecessary treatments, and in doing so, continuously improves healthcare value and delivery quality. Establishing this does not require an overhaul or redesign of healthcare provision in NSW. Significant progress can be made by unlocking the power of data and allowing it to flow between providers, regulators and key healthcare stakeholders in a patient de-identified format. Indeed, NSW has a unique opportunity to stand at the forefront of healthcare delivery and innovation in Australia by driving through the creation of such a system – one which can create truly personalised interventions for every individual, restrain cost growth, and, ultimately, lead to massive enhancements in health and wellbeing at both a state and federal level.

It should also be noted that, at the same time, the private sector has an important role to play to fostering healthcare delivery improvement by developing innovative solutions that drive transparency, efficiency and quality. Lorica software already does so (see the Appendix below). However, in this vein, Lorica is currently working on a clinical quality-improvement initiative, 'Suture', which aims to significantly reduce unnecessary variation in clinician performance by delivering suites of personalised, private, data-driven insights to clinicians to support peer benchmarking, continuous improvement and higher quality care for all Australians.

RECOMMENDATIONS

- Ensure greater clinical coding accuracy and comprehensiveness – especially at hospital level.
- In time, mandate the capture of clinically rich, meaningful and complete information in a standard format across all points of service.
- Encourage clinician uptake of the My Health Record and advocate to ensure that the information contained in the My Health Record is sufficiently clinically rich and useful.
- Focus on ensuring that state-led electronic medical record initiatives align seamlessly and integrate with the My Health Record.
- Encourage greater amounts of information sharing between healthcare providers at different points of care across public and private sectors.
- Focus on data-led strategies aimed at reducing the incidence of low value care and wastage in favour of those ensuring high value, high quality healthcare.
- Provide more opportunities for innovation by both government and industry through access to aggregated and de-identified data.

BACKGROUND

Lorica Health (Lorica) is a trusted, independent third party Australian health technology company specialising in healthcare analytics software. Born from government funded healthcare and data science research, it has an extended track record of securely and discretely storing, analysing and utilising sensitive healthcare data to improve the functioning of healthcare environments.

Lorica develops industry leading software solutions and associated services supporting the transparency and efficiency of healthcare in Australia and overseas. Lorica's expertise in healthcare compliance is demonstrated by commercial relationships spanning 30 of Australia's 37 private health insurers and a range of public sector payers, providers and regulators as well as our emerging international presence.

Lorica aims to empower private and public healthcare providers, payers and patients by using advanced analytics to improve the efficiency and fairness of the Australian healthcare system. Currently this involves the use of sophisticated analytics software to automatically identify fraud (intentional deception, misrepresentation or concealment), abuse (excessive or improper use of services), waste (overuse of services) and errors (mistakes or faults in the data), and is expanding to cover the identification and discouragement of low quality and low value care delivery by providing strategic insights via a range of healthcare mechanisms.

Lorica has operated as a successful healthcare compliance organisation since 2011, placing us amongst the foremost experts within the field in Australia. Our unique blend of expertise in data science, healthcare, software design and development – coupled with our use of an agile deployment framework – has allowed us to steadily broaden our product and client reach over this period through the provision of solutions delivered on a secure and efficient Software as a Service (SaaS) basis.

Looking to the future, we believe that advanced technologies such as Lorica's will support the development of a healthcare environment which provides patients and consumers with the information required for them to make informed choices about their care – and in doing so, one which encourages providers to deliver health interventions that are more effective, more sustainable, and ultimately, of higher value.

THE ROLE OF THE PRIVATE SECTOR IN HEALTH SYSTEM INNOVATION

Promoting transparency and efficiency within the delivery of healthcare will improve care for patients, reduce overall costs and spur innovation as well as the creation of new services. Indeed, Lorica's work represents what can be done when healthcare data is made available for private sector innovation. Our software products have been built with the purpose of promoting transparency and efficiency in three key ways:

(1) Through the extraction of data to provide windows into the fairness and efficiency of healthcare provision;
(2) Gathering and synthesising this data to produce metrics, analyses and insights; and
(3) Development and deployment of a range of software solutions to key healthcare stakeholders.

(Further detail regarding Lorica products is contained in the Appendix below.)

Our experience in working with a wide range of public and private clients has demonstrated to us that the coordinated use of analytics and technology is fundamental to producing a cost-effective healthcare system focusing on high-value interventions. Critical to this is developing dynamic feedback loops centred on identifying, extracting and acting on insights from this data to inform policy and drive the efficient delivery of high quality healthcare to all citizens.

However, (1) existing silos of healthcare data and a general reluctance to share healthcare information between public and private data holdings and (2) issues with data quality and interoperability act as a break on the kind of innovation that can support this effort. In turn, this reduces the capacity of government agencies and entrepreneurial firms to provide new services and solutions that can aid healthcare systems in meeting the health challenges of the twenty-first century.

It goes without question that the sensitivity of healthcare data requires that it is managed with the utmost care and respect – especially when it comes to privacy. While a genuine appreciation of privacy concerns must be allowed for at every stage of design and implementation, it is critical not to diminish the possibility of potentially life-saving applications that can be developed through the innovative use of healthcare data. Indeed, today a range of privacy preserving methods exist – such as de-identification and anonymization – that are able to simultaneously preserve privacy and analytic utility.

HEALTHCARE IN NEW SOUTH WALES

PILLAR 1 – HEALTHCARE COORDINATION

It is still the case in New South Wales – and Australia – that as patients move between different modes of care, patient information does not always travel easily with them. Test results, scans and summaries are often duplicated. Not only that, but patients continue to be asked to fill in their medical history at each point of healthcare: their medications, allergies, and, where necessary their disease history. This is a task which can be particularly complex and confusing at the best of times, especially for elderly patients.

The coordination of healthcare services has a crucial role to play in ensuring beneficial health outcomes for patients and healthcare efficiency. Nonetheless, New South Wales performs poorly in this regard when compared to several OECD countries. Just 21% of GPs in the state 'always' receive communication from hospitals that their patients are being discharged. Only 45% of practices 'frequently' coordinate follow-up care with hospitals.[1] NSW GPs also share information electronically with other healthcare providers less regularly than primary providers in other countries.[2] At the same time, two in ten hospitalised adults aged over 55 believe their GP is not informed and up-to-date with their hospital care post-discharge.[3] Without effective information sharing between providers, it very difficult to actively coordinate care across primary, secondary and tertiary settings – and in doing so, achieve optimal health outcomes at an individual and population level.

Failure to coordinate care and transfer information between different healthcare providers doesn't just frustrate effective care provision and promote wastage. It is also an issue which can lead to harm and even fatalities. This is especially the case in emergency situations, when patients may forget medications or allergies or be incapable of providing such information – for instance because of a lack of consciousness. 20-30% of all medical admissions for patients over 65 are attributable to adverse drug reactions, while the Australian Commission on Safety and Quality in Healthcare has noted that 'medication histories taken at the time of admission to hospital are still

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[1] Bureau of Health Information, *Healthcare in Focus 2015: How does NSW compare? (*2016), *p. 59.* Found at http://www.bhi.nsw.gov.au/__data/assets/pdf_file/0009/309663/report-Healthcare-in-Focus-2015.pdf.

[2] Bureau of Health Information, 2016, p. 4

[3] Bureau of Health Information, 2016, p. 59.

a point of vulnerability for medication error' and noted that two Australian studies have suggested that between 60-80% of patients omit or forget medications at hospital.[4]

That said, there are two positive developments in this space which should not be ignored. First, the deployment of clinical portals like eHealth NSW's HealtheNet program aims to improve the ability of clinicians to coordinate care by enabling NSW Health clinicians to obtain secure and immediate access to an aggregated summary view of a patient's recent medical history from all NSW Local Health Districts. At the same time, the Federal Government is attempting to prioritise healthcare coordination and information sharing by announcing that the My Health Record will be opt-out for all Australians by mid-2018.

However, to be truly effective, the My Health Record must be sufficiently useful to be utilised by healthcare providers across all points of service so that clinicians and patients have access to their complete medical history and current journey across the healthcare system. In this respect, Lorica is supportive of moving toward a more integrated and clinically rich My Health Record that incorporates not only hospital discharge data but also prescriptions, pathology test results and medical images. Much of the success of the My Health Record will lie in the quality of data it contains, and the information in the My Health Record should be detailed and easy enough to use so that it can support coordinated, evidence-based care in all settings.

On top of this, it is absolutely critical that steps are taken to ensure that electronic medical records used in NSW integrate seamlessly and effectively with the My Health Record. Failure to do so will add to clinician workload and jeopardise the uptake of these tools – which in turn will hamper care coordination and information flows. It will also make it far more difficult to use aggregated data extracted from these records for the purposes of evaluation and research, and, in consequence, will slow processes of quality improvement and care coordination.[5] It is paramount that governments actively support the utilisation of a clinically rich My Health Record at all points of care in both public and private settings.

It is also worth noting that there is also scope for greater levels of active care coordination between providers through new care models. In this regard, Department of Health-led Patient Centred Healthcare Home (PCHCH) initiative, due to begin trials in July 2017, is of great interest.

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[4] Australian Commission on Safety and Quality in Health Care, *Literature Review: Medication Safety in Australia*, (2013), p. 8. Found at https://safetyandquality.gov.au/wp-content/uploads/2014/02/Literature-Review-Medication-Safety-in-Australia-2013.pdf.

[5] Failing this, electronic medical records in NSW need to be clinically rich and contain structured data for facilitate easy analysis on the part of evaluators and researchers, who in turn should be encouraged to extract maximum insight. EMRs can be an extremely valuable source of data.

PCHCHs aim to place the patient at the centre of healthcare by enrolling them with a primary provider who leads a team of other professionals – such as nurses, pharmacists, allied health practitioners, specialists and care coordinators – to formulate a healthcare plan with the aim of managing patient health and specifically targeting preventative interventions with a view to reducing the need for expensive, acute episodic care and diverting patients away from hospitals.

PILLAR 2 – DATA MANAGEMENT

Fragmented care is also a direct cause of fragmented data – something which is in itself problematic for care coordination, research and consumers exercising informed choice (as will be discussed in Pillar 3). Data and data analytics are a central pillar on which a learning health system rests. A learning health system constantly utilises the power of data analytics to create virtuous cycles between clinical improvement, policymaking and research. Every aspect of care is scrutinised, tested and analysed in real time to find deficiencies and push interventions in new directions through evidence-based policy and care planning.

The Right Data

For this to occur, data needs to be right at the source. Transactional data – otherwise known as point-of-service (POS) data, sits at the heart of NSW's healthcare ecosystem. POS data is that which is generated at every point of contact between a patient and a healthcare provider, and it also forms the basis of many of the datasets used in health and medical research.

Unfortunately, a number of problems currently frustrate existing methods of POS data generation, capture and management. For a start, the quality of POS data varies unnecessarily. Different funders and payers demand varying levels of data completeness, accuracy and richness depending on the setting. Data variance reduces the value of datasets, and makes it significantly more difficult for researchers, policymakers and even patients to utilise and derive insights from existing data.

Furthermore, administrative healthcare datasets at a secondary level are often prone to errors and omissions – something which stems largely from the way in which these datasets are used (or not used).[6] Datasets tend to improve in quality when they are utilised more frequently and for a broader range of purposes, as the consequences of erroneous data collection begin to have material impacts. Indeed, in Lorica's experience, there are clear benefits to be derived from tying the recording of clinical information to claims payment. Doing so increases both the usefulness and richness of a dataset, largely because recording information in a false manner takes on legal consequences on top of the clinical consequences that already exist.

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[6] As are primary healthcare datasets.

As such, Lorica contends that requiring stricter adherence to clinical coding protocols would assist in the creation of better datasets. For instance, our experience in receiving POS data has demonstrated that some hospitals appear not to record hospital acquired complications (HACs) such as falls, healthcare associated infections, pressure injuries, surgical complications requiring unplanned returns to theatre and unplanned intensive care unit admissions.[7] A solution needs to be found which ensures that HACs are clearly identified and recorded in hospital data, and such steps should improve datasets and actively identify avenues for quality improvement in healthcare delivery. In time, mandating the collection of all data in a standard format at all points of service is something which can lead to significant improvements in the functioning of health systems across the country – something which will be discussed in the vision below.

Data Fragmentation

On top of this, POS data remains fragmented. As discussed in Pillar 1, if an individual presents to a GP consultation, is referred to a specialist and then sent to a hospital, the record of each of these episodes remains siloed from one another – something which makes tracking a patient's journey through the health system far more difficult than it needs to be. It also means that determining whether a patient received best practice care is nearly impossible and frustrates the efforts of policymakers and researchers.

Not only that, but the existence of data siloes and a general reluctance to share information between public and private health providers limits the scope of innovation – whether at a government or an industry level. To take one example, without access to linked primary and hospital care datasets across both public and private settings, a state hospital system may be forced to make decisions relating to prevention programs (such as wellness campaigns) on imperfect information – and without the ability to effectively monitor what impacts this strategy might have in the community.

It is important to recognise that the NSW eHealth Strategy and Integrated Care Strategy, which aim to transform the NSW healthcare system by delivering technology that connects different information technology systems and data across NSW, are steps in the right direction. We believe these initiatives have the potential to improve the tracking of a patient's journey within the health system in NSW and benefit care coordination. Likewise, these documents have targeted Patient

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[7] https://www.safetyandquality.gov.au/hospital-acquired-complications-specifications-v1-1-oct-2016/

Reported Measures (PRMs) as a priority area with the intention of enabling patients to provide direct and timely feedback to drive improvement and care integration across NSW.

That said, questions remain. In addition to effective integration with the My Health Record (discussed above), Lorica is also of the view that the state's analytic capabilities can be radically improved by integrating and strategically linking a range of different data sets. Indeed, NSW Health has envisioned that hospitals will collect PRMs in order to create aggregated reports that can assist in facilitating improved service delivery. This is a positive step, but we believe that it is of significant value to actively merge PRMs with other clinical and POS data to create richer datasets that can assist in a range of different capacities, such as policymaking, research and the avoidance of low value care.

PILLAR 3 – HEALTHCARE TRANSPARENCY

Getting the data right is also central to fully informing patients and reducing healthcare information asymmetries – in short, promoting transparency. Transparency is emerging as a vitally important element of all twenty-first century healthcare systems. Providing individuals access to performance and price data is of critical importance in helping constrain healthcare costs and engendering an environment of reflection and continuous improvement amongst clinicians. However, in this state – and across the country more generally – patients are largely unable to access information that can allow them to compare the cost, quality and volume of care that their clinicians provide, while clinicians themselves are often broadly unaware of how they compare to their peers. Likewise, many clinicians practicing in the private sector may not be aware of what may be considered fair and reasonable fees for particular services. Similar dynamics are in play for prosthesis pricing.

This information opacity leads to two effects. First, patients are largely unable to make informed choices about their care provision,[8] while clinicians are denied opportunities for self-improvement that come from peer benchmarking and understanding their performance in relation to that of their peers. Together, these problems lead to avoidable variation in care quality and levels of harm. Likewise, they ensure that 'outliers' – clinicians who may be delivering sub-standard care – continue to receive patients who are oblivious to the harm they may be causing.

Second, the absence of price discipline in the private sector means that incentives which are otherwise inappropriate remain unmoderated, leading to considerable variation in the cost,

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[8] For instance, knee arthroscopies are now commonly understood to offer no net benefit to individuals over the age of fifty. Yet, the number of knee arthroscopies performed on individuals over the age of 50 in private hospitals grew 14% between 2002 and 2014. Bureau of Health Information, 2016, p. 3.

quality and value of care provided to patients. For instance, it is well established that the price of several common surgical procedures can differ quite drastically between different private providers, despite there being no correlation between higher prices and quality of care delivered – something which often results in the delivery of low value care.[9] It also leads to increased out-of-pocket costs for patients – which in Australia are above OECD averages – and places upward pressure on healthcare expenditure.[10]

International evidence suggests that giving patients and clinicians access to both performance and price data can drive rapid improvements in care quality and help slow healthcare cost growth – and in some cases, even lead to material reductions in care prices and out-of-pocket costs for patients.[11] Yet, to date, efforts to achieve this kind of transparency in NSW have been somewhat limited. Recently, Medibank has in partnership with the Royal Australasian College of Surgeons begun to provide surgical variance reports. While a step in the right direction, the datasets used are not sufficiently comprehensive or granular to have an appreciable impact on clinical quality.

In a similar vein, a number of websites aim to promote transparency through the posting of patient reviews or clinician fee arrangements online. However, these are hamstrung by the fact that they currently lack the necessary objectivity and empirical rigour for patients to make informed choices as to their care provider or to drive quality improvement amongst clinicians. Furthermore, initial evidence suggests that providing patients with clinician pricing data alone can lead to an *increase* in costs as the patients associate higher cost with higher quality, despite the absence of quality metrics.[12]

SUTURE

However, the solution is not simply 'dumping' clinician data for public consumption in an unorganised fashion: it needs to be processed and delivered to the relevant healthcare

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[9] As an example: the first surgical variance report published by Medibank and the Royal Australasian College of Surgeons stated that in 2014, the separation cost of hip replacements varied from $18,309 to $61,699. See https://www.surgeons.org/media/24529112/mpl-racs_orthopaedic_procedures.pdf, p. 11. See also https://www.doctorportal.com.au/mjainsight/2016/11/racs-pledges-fee-probe/, in which former RACS President Professor David Watters OBE has stated that there is 'no correlation' between 'the size of the fee charged and the quality of the surgery'.

[10] OECD, *Health at a Glance 2015: How does Australia compare?* (2015). Accessed at https://www.oecd.org/australia/Health-at-a-Glance-2015-Key-Findings-AUSTRALIA.pdf.

[11] For an example, see James C. Robinson and Timothy B. Brown, 'Increases in Consumer Cost Sharing Redirect Patient Volumes and Reduce Hospital Prices for Orthopedic Surgery', *Health Affairs*, *32*, No. 8 (Aug., 2013), pp. 1392-1397.

[12] Sunita Desai et al, 'Association Between Availability of a Price Transparency Tool and Outpatient Spending', *JAMA*, *315*, No. 17 (2016), pp. 1874-1881.

stakeholders in a respectful, well managed way. Lorica is already taking steps to provide greater transparency in health systems across Australia through the development of the Suture clinical quality improvement initiative. Suture is a healthcare data analytics platform which aims to significantly reduce variation in clinician performance by delivering suites of personalised, private, data-driven insights to clinicians in support of peer benchmarking and continuous improvement.

Advances in technology and data science have now reached the point where it is possible to create software which delivers private, empirically rigorous insights to clinicians, and Suture takes much of its inspiration from comparable efforts overseas.[13] Suture will use high quality and appropriately risk-adjusted data obtained from a range of sources to build comprehensive pictures of variance in volume, quality and cost and report these back to clinicians in a personalised, clinically actionable format, all with a view to this information eventually being provided to patients – in an appropriately curated manner – and other healthcare stakeholders in due time.[14]

VISION: DATA + COORDINATED CARE + TRANSPARENCY = A LEARNING HEALTH SYSTEM

Addressing fragmented care, insufficient data usage and information opacity promises major benefits for health at both an individual and population level, and with it, slowed growth of healthcare spending and overall gains in economic productivity. It is important to stress that overcoming these obstacles does not require an overhaul or re-design of the entire health system. Major steps forward can be taken by unlocking the power of data already being collected and allowing it to flow easily between providers, regulators and researchers in a de-identified format.

Mandating the capture of clinically rich, meaningful and complete information in a standard format across all points of service is key to this endeavour.[15] This is the critical first step that will drive significant improvements in the efficiency and efficacy of healthcare in NSW and Australia more generally. On top of this, it is vitally important that governments and innovators utilise advances in data science, natural language processing and machine learning to constantly analyse and extract maximum value from all data collected. Whilst this is an effort which goes beyond the remit of NSW Health alone, those involved in the planning and coordination of healthcare in this

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[13] See for instance the American Academy of Ophthalmology's 'IRIS' Registry at https://www.aao.org/iris-registry.

[14] Transparency initiatives are gaining momentum internationally – for a high profile case, see the 'My NHS Choices' website at https://www.nhs.uk/service-search/performance-indicators/consultants/consultants-interventional-cardiology.

[15] Or at the very least, making it an urgent priority to address data interoperability problems and issues stemming from the perception that healthcare data is a proprietary asset.

state have the opportunity to push for these changes across all levels of care throughout the entire country.[16]

Research

Doing so will deliver a range of benefits. For a start, richer and easier-to-read administrative datasets promise to precipitate advances in health and medical research. Boosting research is of paramount importance, especially when it comes to finding solutions that can help delay and prevent the onset of the kind of chronic diseases and ailments that put upward pressure on health spending and carry risks to the state's future economic productivity. Indeed, researchers will be able to use large-scale longitudinal data to progress our understandings of a range of issues in more efficient and cost-effective fashions than traditional methods (such as clinical trials). For example, these datasets can:

- Facilitate deeper understandings of the factors leading to disease causation and identify previously unknown predictors of illness
- Provide real-time market surveillance of pharmaceutical efficacy and side-effects
- Examine population health trends
- Track the usefulness of various interventions and therapies
- Monitor the quality of hospitals and health providers

If these datasets are linked responsibly with other demographic datasets – such as education, social security and labour force data, the possibilities for improving the health and wellbeing of individuals in this state are almost limitless.

Planning

Richer POS data also promises a superior evidence base with which to inform health system planning and evaluation – something which will result in vastly improved healthcare policymaking. Policymakers will be better able to understand service usage patterns and cost effectiveness, allowing the targeting of funding in an outcomes-based manner to ensure high-value interventions, such as preventative programmes.[17] These efforts should help mitigate demand for health services and improve overall efficiency.

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[16] It should be noted that a range of other steps also need to be taken to help free up data usage in healthcare. For an examination of some of these issues, see the recent Productivity Commission Report on Data Availability and Use, at http://www.pc.gov.au/inquiries/completed/data-access.

[17] This promises many benefits: for instance, tracking patient journeys and linking these with Patient Reported Outcome Measures and other datasets will provide governments with the ability to determine whether each instance of care delivered to a patient followed best practice-guidelines. If not, governments can investigate and, where appropriate, various measures can be employed to ensure that this does not happen again – such as incentives, penalties and behavioural 'nudges'. See Runciman et al, 'CareTrack: assessing the appropriateness of healthcare

Transparency

In time, providing clinicians, payers and patients access to appropriately curated, empirically rigorous data on provider quality, volume and cost can only benefit NSW's health system. Patients will have a greater say in their treatment options, but more importantly, they and their GPs will have access to information allowing them to receive care from the clinician who is best suited to their needs. On top of this, making this data available will prove a powerful restraint on unnecessary variation: not just in quality, but also in the prices charged for certain procedures by individual clinicians – all the whilst ensuring that outliers can be identified and given appropriate support. Integrating this data nationally and allowing clinicians to benchmark themselves against a variety of averages (local, regional, state and national) can only improve any such initiative.

Fully Informed Healthcare

With access to the right resources and datasets, the end goal is clear: for clinicians to practice fully informed healthcare. If steps are taken to establish a learning health system, clinicians will have access to vast amounts of curated, actionable data, such as patient medical histories and the status of a patient's current medical journey. This will in turn allow them to coordinate healthcare interventions with other practitioners far more easily and promote efficiency by reducing the unnecessary duplication of tests and treatments, and, ultimately, achieve superior and safer care.

As actors in the health system continually take advantage of the virtuous cycle between transparency, research, care coordination and policymaking, clinicians will eventually be able to turn to data-driven insights to recommend preventative interventions well before the symptoms of morbidities become evident.[18] As a result, patients will receive treatments which are increasingly cost-effective and far more efficacious – something which can only help seriously reduce health costs, place less pressure on hospitals, and drive large increases in the health and wellbeing of our population.

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delivery in Australia', *Med J Aust*, *197*, No. 2 (2012), pp. 100-105, which demonstrated that only 57% of Australians received appropriate care ('care in line with evidence-based or consensus-based guidelines').

[18] Researchers conducting network analyses on Australian health insurance data have already been able to build baseline models predicting the onset of type-2 diabetes for specific patients with 85% accuracy. In time, such methods can become a powerful tool in aid of personalised medicine for all individuals – especially if automated. See Arif Khan et al., 'Understanding chronic disease comorbidities from baseline networks: knowledge discovery utilising administrative healthcare data', (2017), at http://dl.acm.org/citation.cfm?doid=3014812.3014871.

Appendix: LORICA SOFTWARE

Lorica has extensive experience dealing with public and private healthcare datasets from both Australia and overseas and delivering impactful compliance, assurance and information management tools in a safe, secure and private manner. Lorica's products drive healthcare efficiency and transparency by eliminating fraud, abuse, waste and errors (FAWE) in health claims and by providing stakeholders with suites of data visualisation tools.

HIBIS

HIBIS analyses insurance claims for 30 of Australia's 37 private health insurers, enabling the automatic detection and management of FAWE related to healthcare claims as well as the generation of insights regarding healthcare inefficiencies and wastage.

Rule-based analytics use custom-coded, logic-based algorithms to mine healthcare claims data for irregular claiming patterns, with more than 450 proprietary algorithms now in active production. Lorica's subject matter experts, business analysts and software engineers work together to constantly improve and expand this rule set based on requests and feedback from clients and in-house research into emerging compliance issues. Once a new rule is developed, it is typically shared with all Lorica clients so as to improve the performance of the software across the entire user base.

The HIBIS Express Platform also features a suite of integrated analytic and workflow capabilities. These deliver operational impact and value by providing a wide and evolving range of functionalities that support of the identification and management of anomalous claiming and billing behaviours.

I+PLUS

Our I+PLUS clinical analytics platform is a claims analytics tool which offers rich and responsive analysis in support of benchmarking, contracting and management of health service delivery. I+PLUS advanced analytics have been developed to support claims analysis and provider performance assessment. The use of I+PLUS also extends to provider-payer contract negotiation and management as well as provider referral and readmission analysis.

I+PLUS provides advanced provider performance analysis derived from the application of claims-scoring and predictive modelling. I+PLUS has been developed to support filtering of data by patient characteristics, treatments, DRGs, hospital peer groups and other factors, as well as widely used risk scores and adjustments to account for relative patient risk, allowing Lorica to present results that compare ‘like with like’. In doing so, the platform provides insights about healthcare provider performance – the first time that such analysis has been possible in Australia.