



**MEDILINK AUSTRALIA PTY LTD**

A.C.N. 063 587 262

P. O. Box 150  
TOOWOOMBA QLD 4350

Email  
[admin@medilinkaustralia.com.au](mailto:admin@medilinkaustralia.com.au)

Ph. (61)417 600 876

## **Chief Executive Officer**

Dr Henry R. Glennie, FRCS, FRACS, MPP, MBA

13 October 2019

Dr David Gruen  
Deputy Secretary (Economic)  
Department of the Prime Minister and Cabinet  
PO Box 6500  
CANBERRA ACT 2600

Dear Dr Gruen

### **Re: New Australian Government Data Sharing and Release Legislation**

It is with considerable pleasure that I provide this submission on the importance of data mining, data sharing and data matching, in conjunction with the utilisation of appropriate algorithms, to improve the efficiency and cost-effectiveness of healthcare delivery. Though data mining, sharing and analysis is applicable to all areas of government and non-government expenditure my particular interest and expertise is in health care. Very few nations have instituted structural changes in their health systems to improve the quality of care within sustainable levels of expenditure. Finland provides an exception. It has been identified as having the world's best "value for money" health system and has achieved this with effective restructuring of the health system subsequent to the Second World War. But, even in Finland, considerably more cost-effective changes could be made without reducing the scale, scope and quality of health care provision in that nation.

With the appropriate utilisation of existing databases insights are generated to provide a better product at lesser cost. The health sector consumes 10% of the nation's GDP. Savings can be made to fund products and services that are currently unavailable within the Australian health system or can be returned to the public purse to fund other sectors of the economy. I have been attempting to interest government in the dismantling of the legislative barriers to data sharing for several years. A letter to former Health Minister Dutton dated 14 December 2014 stated, "Utilising massive datasets effectively, by combining data from clinical trials and clinical information from treating physicians, together with accurate measurement of the cost of the resources required to effect the treatment, healthcare can be transformed so that it

becomes cost effective and cost efficient.” We met with one of Mr Dutton’s advisers and presented a detailed strategy followed by a data linking proposal to Mr Mark Cormack, Deputy Secretary, Department of Health, Canberra, in July 2015. At the suggestion of a senior Cabinet Minister I sent a briefing to current Health Minister Hunt in July of this year. All statements were backed by extensive literature searches and personal experience. I have not received any feedback as to whether any of these communications have been viewed by the respective Ministers. Certainly Federal and State governments, with the exception of Western Australia, have not utilised the very valuable health data assets they hold and which could have achieved innovative and cost-effective healthcare solutions. This is of particular concern when total health expenditure in Australia has increased at twice the rate of GDP growth from 2007 to 2017 (9.51% c/f 4.94%). I am hopeful that the submissions received by the Data Reform Committee, in conjunction with the recommendations of the Productivity Commission, will lead to the legislative reforms that are required. Accordingly, on behalf of Medilink Australia I welcome the opportunity to present the importance of data sharing and release to the Data Reform Committee.

*In support of my credentials to make this submission I have been the architect and lead consultant of the \$44 million contract with the Québec provincial government in Canada to measure the quality and cost per course of care and services within the hospitals and the community health centres for the 8.4 million residents. This involved the accurate measurement and cost of this resource consumption. Also, as an integral part of the contract, over a three-year period, performance indicators are identified to improve the performance, efficiency and effectiveness of clinical practices throughout the province.*

The Quebec province was ideal for this project because of their extensive database and the support of government to achieve the results the contract demanded. Australia has a similar database within Federal and State government jurisdictions and I can only suggest the reluctance to institute legislative changes to approved Australian entities to obtain maximal value for the tax dollar can be explained by the statement of Machiavelli in his 16<sup>th</sup> century classic, *The Prince*. “Reforming an existing order is one of the most dangerous and difficult things to do. Part of the reason is that people are naturally resistant to change and reform. Those who benefited from the old order will resist change very fiercely. By contrast, those who can benefit from the new order will be half-hearted in their support, because the new order is unfamiliar to them and they are not certain it will live up to its promises.”

When cost-effective solutions are available it seems inexplicable that there has been such delay in the Federal government calling for submissions on the importance of data reform. In contrast, there are other organisations which have given support to the Productivity Commission’s recommendation for comprehensive reform of Australia’s data sharing and release arrangements, appreciating the public benefit providing there are appropriate controls in place. Rio Tinto provides a good example of this. Their Brisbane process centre reduced costs by \$US80 million in the first year their productivity drive was generated by masses of data collection. They confirmed that the use of big data was the means to increase productivity, to reduce costs and enhance the quality of service provision. Their CEO stated five years ago the potential gains to our economy are akin to the oil boom of the past 20 years and the Hon Michael Keenan MP has agreed, saying, “data is the fuel that is powering our new digital economy...it is the new oil.”

Referring back to healthcare I submit the following to illustrate what can be achieved with the release of data. All data can be completely de-identified and, for additional security end-to-end encryption can be added. Insights are obtained from the appropriate analysis of large databases and restorative action can be taken by the identification of outliers without naming and shaming them. No-one wants to be an outlier. When confronted with incontrovertible evidence outliers are threatened to the extent that they stop what they are doing or do everything possible to rejoin the majority!

So, to illustrate what can be done in healthcare I present the following:

### **The contribution of the medical profession to healthcare costs**

Doctors, both GPs and specialists, are the decision-makers in illness and accident care. They decide who receives care, how much or how little is given, what type of care is appropriate and when and where it is delivered. For instance, doctors decide which of their patients can be treated in their own homes, those suitable to be treated in their general practice surgeries and those who require hospital care. Nurses and allied health workers carry out the work prescribed by medical practitioners. The doctors' decisions are costless to themselves but potentially costly, sometimes unnecessarily so, for the patient or third-party funder.

It is often not appreciated what a critical role they play in driving health expenditure. Administrative costs and plant overheads in running a general practice or hospital are small compared with the cost of the decisions made by doctors in the assessment and treatment of their patients. These decisions require a large staff for implementation and 62% of Australian hospital budgets are consumed by wage and salary costs (AIHW). Also, medical staff remuneration is only a minor part of total expenditure. From the studies carried out, the cost of the decisions they make constitute approximately 70% of total health expenditure. With \$181 billion being spent on healthcare in the 2016-17 year (AIHW) it is estimated that \$127 billion is doctor generated.

### **The medical marketplace**

There are over 100,000 registered medical practitioners in Australia, receiving \$23.2 billion annually from the Federal government through Medicare (2017-18) as well as the additional income they receive, either as salaried employees or as fees charged. The Medicare portion equates to an average payment of about \$200,000 per practitioner. However, that amount is small relative to their resource utilisation; the decisions they make to diagnose and treat illnesses and accidents. Fortunately, both GPs and specialists are well-trained in their respective disciplines and, for the most part, the decisions they make ensure the correct diagnosis is made promptly, effective treatment is delivered and restoration of function is achieved. Junior medical staff are often left in positions of responsibility and may not have the experience to make the right decisions. A Royal College of Surgeons report (2011) showed that many initial healthcare decisions are made by junior medical staff and up to 75% of patients are not treated optimally in the first instance for their injuries or illnesses. Where adequate supervision does not occur it is possible that a similar figure is likely in Australian hospitals.

Unfortunately there is very little costing and quality information on the decisions doctors make for the assessment and treatment of their patients relative to the outcomes achieved. Figure 1 shows the relationship between the numbers of health episodes treated relative to resource consumption. The more episodes treated the more cost generated but, within that cohort of GPs, specialists and residents in training there are

**Figure 1: Treating Episodes of Care**



three categories:

- 1) Those who are obtaining better outcomes with their patients than their colleagues in the treatment of patients with similar conditions and demographics, with less resource consumption, the low outliers.
- 2) Those treating patients less effectively than their colleagues, with more resource consumption, the high outliers.
- 3) By far the largest group, those treating their patients effectively for most of the conditions they are dealing with but with a large variation in cost.

At one end of the spectrum optimal care, with excellent clinical outcomes achieved at the least possible cost, the cost-effective doctors, at the other end poor outcomes achieved at high cost, the cost-ineffective doctors. Most are on either side of the centre of the normal distribution; those treating their patients cost-effectively in terms of a proportion of the conditions they present with and cost-ineffectively with other conditions.

Masses of data is collected by the Departments of Health federally and in each State and Territory. But none of this information is being used to identify where individual doctors lie in the resource consumption/clinical outcome spectrum; whether or not episodes of care are being effectively treated to achieve the best clinical results at the least possible cost.

*What should be tracked is individual performance, what decisions are being made and what consequences ensue. Throughout our nation there is no accurate data linking resource consumption with the clinical outcomes achieved. The masses of information which has been collected for many years is not utilised in a manner which identifies where our doctors lie in this spectrum. If this information was known considerable savings and better outcomes could be achieved. But it does not come easily. A management information system is required to analyse all health care episodes to all patients, with adequate controls to ensure data privacy. It must be capable of collecting declassified data in petabytes. Walmart, with a turnover of approximately 3 times the size of the Australian health system (\$515 billion compared with \$181 billion) collects 2 petabytes of data per hour. Healthcare needs to follow what industries such as these are doing to accurately correlate expenditure with outcomes achieved.*

Every person in Australia accessing Medicare has this data on their My Health Record, whether or not they have opted out from allowing their doctors to create a health record. Using this data all medical practitioner provider numbers would be correlated with all Medicare numbers and hospital identifiers, to track the episodes of care on all those treated in the community and all hospital patients. Using big data analytics, all investigations ordered, pharmaceuticals prescribed, all AR-DRG interventions, all lengths of hospital stay, all unplanned readmissions, in-hospital infections, procedures carried out would be tracked to determine whether there is a disproportionate amount of poor practice associated with particular provider numbers. Similarly well-performing doctors would be identified, including those who are very skilled in some areas, not in others. This information is critical in identifying inefficiencies in the optimal delivery of healthcare in our communities and is the means by which very considerable healthcare savings can be achieved, whilst enhancing the quality of healthcare.

Analysis of the information obtained could be carried out within the Department of Health and, with de-identified data, the results of analysis could be circulated to medical practitioners throughout each locality, demonstrating regional variations in hospital and community care. Every practitioner, GP and specialist, working in a region would have their data analysed in terms of the cost of service provision for all the patient-treatment episodes and the outcomes obtained. One means of demonstrating the need for further treatment is whether or not patients continue to present to providers, for example, patients having operative procedures requiring ongoing pain relief (evident on PBS data) or visits to providers such as rheumatologists and physiotherapists (evident with data-matching techniques).

To demonstrate the cost-effectiveness of data matching in the health sector I suggest that a similar project to that of the contract with the Québec provincial government in Canada be carried out to measure the quality and cost per course of care and services within the hospitals and the community health centres in an Australian state or territory. It would provide a template for the whole nation, with the identification of performance indicators to

improve the performance, efficiency and effectiveness of clinical practices throughout Australia.

## **Problems with Medicare**

### **1) Overview**

The present Medicare system, initially introduced into Australia in 1975, with its guiding principle that no one will be denied medical care, has survived basically intact despite several attempts to reform it. The annual Medicare expenditure for the 2017-18 financial year by the Federal government was \$23.2 billion with 414.3 million services over that period. This Federal government reimbursement for the services provided is purely demand-driven and is too prone to abuse, with unnecessary consultations and additional interventions which may or may not be required for the optimal treatment of patient conditions. In summary, the Federal government, as the funder, has no input into the quality of service provided nor the need for it.

### **2) Access to medical care**

86% of GP services are reported as being bulk billed in the 2017-18 financial year (Department of Health statistics). However, Dr. Harry Nespolon, Royal Australasian College of General Practitioners (RACGP) President, reports that only 23% of GPs bulk-bill all their patients and the AIHW report in the same year states that only 66% of patients had their services bulk-billed with one million Australians reported as delaying or avoiding seeing a GP because of cost concerns, sometimes because of the consultation fee but, more commonly because of the potential cost of the pharmaceuticals which may be prescribed, the cost of a private specialist which may be recommended or the likely cost of investigations that may be ordered.

### **3) Indexation of Medicare to provider costs**

Most GP consultations are claimed under MBS Item 23. This has only increased 19% since 2005, whilst out-of-pocket costs have increased by 140%. Also the RACGP contends that inadequate CPI indexation over the years has underfunded GPs by over \$1 billion. Together with this, no recompense is given to medical practitioners for administrative tasks associated with these consultations. A consultation attracting MBS item 23 may also require speaking with concerned family members, reviewing the results of investigations ordered and sometimes a letter of referral for specialist care. Medicare queries, phone calls from other practitioners and a host of other possible non-reimbursed services associated with running a general practice add to this problem.

### **4) Eligibility for Medicare payments**

General practitioners and specialists in private practice receive Medicare payments on a fee-for-service basis for specific item numbers. Also public hospitals are receiving these payments for services carried out by their consultants. This latter action, with cost-shifting to the Federal government, in conjunction with their policy to attract privately insured patients, with cost-shifting to the health funds, has played a significant part in State and Territory public hospitals being able to contain their health expenditure. This has meant that State and Territory governments have had a significant reduction in their projected health expenditure of \$49.6

billion (2016-17 year). The payment to their public hospitals was \$42.2 billion, a rise of only 0.1% over the previous year, whilst the Federal contribution was \$74.6 billion, a rise of 4.7% from the 2015-16 year.

### Should this cost-shifting be allowed to continue?

Public hospitals are funded for their services by State governments. Should the Federal government be allowing public hospitals to claim Medicare payments on behalf of their consultants? There is a policy within most public hospitals that out-patient appointments are not processed unless a consultant's name is placed on the appointment request so that they are Medicare eligible. To my mind this is a case of "double dipping" and should be stopped. I have served on the Cairns and Hinterland Hospital and Health Board and am aware that considerable opposition would be raised by individual hospitals, and presumably by State governments, as this practice has become a significant revenue stream for public hospitals throughout the nation. This does not condone it as a desirable practice!

### **The Medical Benefits Schedule Review Committee**

This was established in 2015. Over the intervening four-year period, with over 70 clinical committees, it has striven to bring more than 5700 MBS items into contemporary clinical evidence and practice. The work of the committee could be described as laborious and inefficient. There is considerable difficulty persuading stakeholders to delete or add an item. Also considerable difficulty obtaining consensus as to a reasonable reimbursement level for a particular item.

*In essence the Committee is simply tinkering at the edges of a demand-driven system which requires greater accountability; particularly in assessing the quality of the service provided.*

### Possible pathways to provide a MBS Schedule solution

a) In the late 1990s Ontario, Canada, inaugurated "Primary Care Reform" characterised by the sequential introduction of a menu of payment models replacing traditional fee-for-service for general practitioners.

Key elements include:

- Blended payment schemes employing various combinations of fee-for-service, capitation,
- Incentives/bonuses (pay-for-performance), and/or salary
- Patient enrolment (rostering)
- Physician choice of payment model.

In 1998, just under 100 percent of primary care physicians were paid by traditional fee-for-service and this had dropped to approximately 30 percent by 2013.

Other key issues included:

- Reducing Emergency Department and in-patient admissions
- Preparing for the healthcare needs of an aging population,
- Making general practice medicine more attractive as a specialty stream.

The following effects have become evident:

- (1) Primary care reform has become part of a broader effort to transform the health care system involving issues such as: faster access to care;
- (2) Better integrated scopes of practice for interdisciplinary practitioners;
- (3) An emphasis on the provision of comprehensive care including chronic disease management, health promotion and disease prevention.

Translating this to the Australian health system. The prospect of a blended payment scheme such as capitation in combination with fee-for-service for out-of-hours and other defined services could be an attractive option to a significant number of general practitioners.

b) In New Zealand 20 geographically separated District Health Boards were created and these contract for primary health care services through 36 primary health organisations (PHOs). 93% of general practitioners have contracts with PHOs. The practices are privately owned and set their own fees, though the government subsidy provides free care for children. Those with a High Use Health Card may get reduced fees but this is at the doctor's discretion. There is increasing concern about patients making appointments because of the cost barrier. Public hospitals have Emergency Departments which discourage patients with illnesses which can be dealt with by general practitioners.

c) My recommendation is that the fee-for-service Medicare system be retained as a fee-for-service model but structural changes are made:

(i) An optional increase in the MBS schedule of 20% for each listed item. This would only be available to those general and specialist practitioners who contract to provide information relating to each consultation, as described in a document produced by Medilink Australia Pty. Ltd. and submitted to each member of the Medical Benefits Schedule Review Committee, entitled, "*The Medicare Benefits Schedule as a clinical tool: February 2016.*" The submission was not even acknowledged. There is a precedent in Canada where claims have to be annotated in a similar way for reimbursement to be obtained. This protocol has been accepted as a condition for payment. With suitable incentives it is very likely to be popular in Australia as well.

(ii) In addition, all general and specialist practitioners signing the contract would receive a quarterly payment for practice administration. I consider this should be indexed at 10% of the total Medicare payment to each practitioner for the previous three month period. Full-time public hospital consultants carrying out administrative work receive allocated time as part of the salary package. It is inequitable that GPs do not obtain financial reimbursement for their administrative tasks.

(iii) Those not willing to enter this MBS contract would continue to claim MBS items as previously, but the only increase in reimbursement would be the CPI adjustments announced by Government.

(iv) It is anticipated the incentive to enter the contract detailed above is sufficient to attract a substantial proportion of general and specialist practitioners. Projections suggest that despite an increase in Medicare payments the cost-effectiveness of prescribed treatment regimes would lead to a significant overall reduction in health expenditure.

## Why should the MBS Schedule be changed?

- 1) We live in the digital age. A Medicare Benefits Schedule which reflects the digital economy is required, one that can be modified rapidly and effectively to keep abreast of evidence-based medical advances.
- 2) Also, a schedule which is capable of providing far more information in the quest to obtain the best value for the health dollar. *Reimbursement on a fee-for-service basis is no longer appropriate when there is no clinical measurement of the quality of that service.*
- 3) MBS reimbursement should relate to the quality of the service provided and also the resources consumed to provide that service.
- 4) A suitably structured MBS makes this possible:
  - It is herewith proposed that the Medicare Benefits Schedule be restructured to be a clinical tool in the management of the myriad of physical and mental illnesses which constitute the Australian health system.
  - Over the course of time the MBS could become structured so that certain clinical indicators would need to be present in order to proceed to the proposed investigation or procedure.
  - Effective change to the MBS should be an evolutionary process and the chosen revision should be followed by subsequent revisions, progressively identifying waste and dealing with it effectively.
  - Duckett and Breadon (2014) calculated \$1 billion annually could be saved in public hospital expenditure with defined and mandated clinical pathways. However, cost savings must be achieved without creating angst amongst health professionals. It is imperative that consensus is obtained amongst acknowledged experts that particular pathways are the appropriate ones for the particular clinical circumstances. One of the outstanding benefits of data-matching is that mandated pathways are not required. Analysis of the data allows doctors to be placed at every point in the outcome-resource consumption spectrum for each condition they treat. With regular benchmarking of all specialists and GPs in every community, and disseminating that data in a de-identified form, where every doctor has a unique I.D. number, self-monitoring is followed by behavioural change. As said previously, no practitioner wants to be an outlier and, despite the unique I.D. number, repetitive cost-ineffective practice in one or more areas will become evident not only to that doctor but also to his/her colleagues and patients. In 2006 the Productivity Commission estimated that the efficiency of Australian health care could be improved by up to 20% by aligning performance with best practice across a range of service areas. If this conclusion is correct, \$1 billion in savings annually in hospitals is considerably less than the potential. Over the whole health sector 20% savings would be much greater.
  - Any such analysis of MBS data must be benchmarked against the treatment of similar medical and surgical conditions with similar case complexity and demographic factors. Also, the short-term, medium-term and long-term outcomes relative to resource consumption must be considered. This involves the analysis of approximately 1 million MBS claims daily and the technology is available to achieve this. By way of example, the author has worked with Northgate Public Services which benchmarks the services provided by each clinical department in every NHS hospital in the United Kingdom and Ireland; involving approximately 3.5 million data items daily.

- The objective is to invoke clinical pathways of statistical validity to achieve the best possible outcomes at the least possible cost. A Medicare Benefits Schedule as a clinical tool, in conjunction with appropriate analysis of the data obtained, would achieve this.

To conclude this section it must always be remembered that patients are the recipients of healthcare services but it is the providers of these services who drive the expenditure within the health system through their purchasing decisions (tests, treatments, hospital admissions). No country can reduce health expenditure nor improve the quality of the care without active surveillance of the clinical decisions made by their major cost generators, general and specialist medical practitioners.

## **My Health Record**

### **Introduction**

Electronic health records should not be seen simply as a means of dispensing with all the disadvantages of paper-based records. Electronic prescriptions and scheduling of on-line appointments are popular EHR features but many of the very considerable additional benefits are still to be appreciated by the vast majority of doctors and patients. Privacy and security of records are the main concerns of patients, with the thought of unauthorised access preventing many patients from enrolling in digital record systems. From the clinician perspective interruption in normal workflow processes is probably an equally important concern, resulting in considerable frustration, marked reduction in the number of patients assessed, missing data resulting in clinical errors and less effective communication with patients.

A more usable and useful EHR system than has so far been designed is required, not just in Australia but also globally. Software developers need to appreciate the importance of clinician engagement and doctors should be more involved in system design. It is best to view My Health Record and all the systems available globally as first generation models, requiring very considerable further development to fulfill the promises made for them. They require full interoperability between all health providers, with designated levels of access, extremely secure and of sufficient simplicity that work-flow patterns are not disrupted. They have the potential to be the means by which clinical pathways will be appropriately chosen and accurately costed so that the highest quality of care is delivered at sustainable levels of expenditure. Future EHR development in this manner brings enormous challenges but huge benefits; perhaps most of all by encouraging whole populations to take an informed interest in their health and wellbeing. Better care, better health, lesser cost.

### **Problems with My Health Record**

- My Health is a public policy disaster for the Federal government in its present form as is evidenced by the statistics that are displayed on the website. For optimal value near universal uptake is required. The potential benefits are not being harnessed effectively with the present direction of the Australian Digital Health Agency. I am the author of "Electronic health records: where are they now and where should they be," in "Clinical

costing techniques and analysis in modern healthcare systems.” Ed. R. Ma. 2019. IGI Global ISBN 9781522550839. This article demonstrates the potential of My Health Record to be an effective clinical tool. Currently, Australian GPs and specialists are not using it as intended. There are only 2.2 million health summaries by GPs posted. This figure should be viewed in the context that there are 145 million GP consultations per annum in Australia. There are only 2.4M public and private hospital discharge summaries of the 10.5M total annually and only 102,000 specialist letters posted of 28 million consultations annually. This is despite the Federal government spending over \$2 billion since the inception of the project, beginning with the PCEHR which became My Health Record.

- Incentives are given to GP practices but not to the individual GPs working in the practice. As the result of this there is no incentive for GPs working for a practice (a large proportion of the total number) rather than being the practice owner. Very often they are showing little interest in posting a health record and the introduction of an incentive payment would result in far more records being entered.
- Static records, such as those currently being posted, are not utilising EHR to its potential. Ideally, the individual patient record should incorporate all contacts with providers from birth to death. Summaries are very useful in times of crisis but there is very considerable benefit for patients if all episodes of care are entered and filed in “Patient Notes” just as is the case in GP surgeries. The problem at the present time is that very few files are available from one GP surgery to the other nor from one hospital to another, particularly interstate hospitals. There is the storage capacity of MHR to carry all this information on each individual patient. Ideally it should be combined with costing data which should not be available to patients to visualise, but should be accessible, in a de-identified form, for planning optimal care pathways (in outcome and cost) for the particular conditions patients present with. Comprehensive electronic health records on a large population will, with available algorithms, produce insights to improve clinical decision-making. Capturing all episodes of health care in this holistic sense has the capacity to identify ill-health before clinical symptoms are manifest. Gradually this data should be combined with large scale genomic sequencing, augmented by proteomic, metabolomic and microbiomic analyses. To make this a reality, every person within a population must have a comprehensive EHR, fully secure, with all privacy issues dealt with and, with pre-authorisation from patients, accessible to users when and where it is required. Strict levels of access are integral to this so that information can be retrieved only in areas relevant to the user’s particular discipline and where authorisation has been specifically made by patients.
- Electronic health records could also be the storage site for data from wearable sensors, allowing continuous monitoring of “at risk” patients in residential care facilities and in their own homes. Alerts generated from these sensors, transmitted by an external assistive device to a central monitoring facility, would allow support beyond the resources of RCF staff or home carers.

## **Research and Development**

Before leaving for the United Kingdom to head the UK Genomic Program, Professor John Mattick of the Garvan Institute in Sydney sent the following to me:

“Health is the largest, most important, and fastest growing industry in the world. The increased discretionary income from advances in economic productivity inevitably translate into increased expenditure on lifestyle and health.” “Australia is well placed to be a leader in this transformation, based on an outstanding healthcare system and exceptional medical science and technology. We are big enough and small enough to do it well, and to strategically leverage the many years of investment in our research base. The issue is how to realise this future, i.e., one where millions of genome sequences are accompanied by millions of clinical records that can be analysed by machine learning, with health ultimately taking priority over all else.”

Unfortunately he felt that the opportunities for Australia to be a world leader in predictive medicine were hampered by a lack of investment. The National Health and Medical Industry Growth Plan allocated \$500 million over 10 years for a Genomics Health Futures Mission. For Australia to be a world leader in this field investment in the realm of \$1 billion over a two-year period would be the minimum required. I have no doubt that frustration over inadequate funding was the reason Professor Mattick accepted the Oxford position. I recently received a note from Sir Andrew Dillon, Chief Executive of the UK National Institute for Health and Care Excellence, “Thanks very much for getting in touch - I read your thoughts on the use and value of medical records with great interest. I think you’re right! And I agree, that we’ve been fortunate in recruiting John Mattick.”

A much greater investment in healthcare research and development is required in Australia, in conjunction with the responsible use of government databases is required if our nation is going to be a leader in this rapidly emerging field; the one which will transform the delivery of healthcare. I am of the opinion that a considerable portion of the Commonwealth Medical Research Fund should be allocated to provide the infrastructure to achieve this. The enhancement of the health of our population would significantly outweigh the expenditure. The time is not too far distant when all newborns in OECD countries will have either had their entire genome mapped during the pregnancy or in the early postpartum period and their proteomes, metabolomes and microbiomes assayed at varying intervals, depending on their likelihood to develop acute or chronic disease processes. The emphasis will change from disease management to prevention; from illness care to wellness management. For those who do develop disease processes targeted therapy will be available to treat the condition promptly and effectively. The result will be increased longevity and overall cost savings when compared with our present “trial and error” system where a treatment pathway is commenced and changed when it is clear that the original therapy was ineffective. However, it is only the health systems prepared to invest in the necessary infrastructure that is required for the potential benefits to be achieved. The United Kingdom was very fortunate to attract John Mattick to head the Genome Project in Oxford. Neither the New South Wales State government nor the Federal government appreciated the importance of the work the Garvan Institute was doing under his leadership. The UK certainly have; their commitment to very large investment will mean that masses of clinical information will be collated and, under Mattick’s leadership, it is likely the UK will be the first nation to demonstrate the potential of gene and cell therapy.

## **The problem with the dual funding model for health care**

The Australian health system is beset with inefficient practices, perhaps first and foremost being the cost shifting between State and Federal funding allocations. Revenue streams to hospitals and community care facilities are split between the two, to the financial disadvantage of both, mainly due to service duplication. Continuing the “double funding” model for hospitals will never solve the current problems with service delivery. A sole funding body is the only cost-effective solution. States do not currently have the financial capacity to take on their healthcare expenditure without an additional funding stream but this could be obtained with legislative changes such as increasing the present goods and services tax (GST) or other available fiscal measures.

General practice has to be under the same funding umbrella and there are significant benefits in terms of data analysis if it is maintained as a Federal responsibility. The delivery of healthcare efficiently and effectively will never be optimal whilst there is this dual funding model. Therefore the artificial separation of hospital funding from community care should, in the medium-long term, be replaced by the Federal government becoming the sole funder of health services, with the seamless integration of community and institutional (in-patient) services. To illustrate this point I would like to provide a scenario which I do not believe is too far distant. Amazon, Microsoft and Apple are investing between 15 and 19% of their vast profits into research and development. Most of this is going into healthcare. Huge changes in the delivery of healthcare are inevitable, driven by quality, efficiency and cost-effectiveness. The majority of businesses today cannot envision how to use developing technology but leaders will emerge who are able to harness the new environment effectively, reducing their product and service costs to capture market share. No product provider will be immune from this. Competition will ensure that purchasing decisions will be made on the basis of quality and cost. Also, most professional service providers will be online; lawyers, architects, pharmacists, accountants, bankers, university lecturers and real estate agents. Even a visit to your doctor. The IBM Watson computer has the capacity to scan 20 million pages of paper in 15 seconds. After entering your symptoms into your phone app, you will supply a finger prick of blood on to a designated medical app and within a very short period of time a diagnosis of your illness will be made and the appropriate medication will arrive by drone or 3D printer within a short period of time. For more serious conditions a visual display will give “face to face” contact with a doctor. You will be able to ask and answer questions. Where necessary, continuous monitoring of all your vital signs will be relayed to medical tracking stations, with rapid response teams coming to your home as often as required to ensure prompt and effective treatment of your illness. The result will be that most patients will be treated in their homes; hospitals will be much smaller than we have today, reserved for the treatment of life-threatening accidents, psychiatric emergencies and serious illnesses requiring operative procedures. Obstetric care will also change. In the latter stages of pregnancy, mothers and their unborn babies will be continuously monitored and rapid response teams will be dispatched for home births and for dealing with any problem that becomes evident. Caesarean sections will be fewer in number because of the continuous monitoring. Mothers will be admitted to regional hospitals for these procedures but returned home very promptly, with appropriate monitoring of baby and mother for as long as necessary and home support workers to care for their other children. The only occupations which will be safe from this digital workspace are those who work with their hands as well as their heads, those who have to be “hands on,” engaged in tasks which

require actual presence rather than virtual presence. These are the plumbers, electricians, builders and factory workers not displaced by robots. Also the police, firefighters, carers, nurses, teachers, child care workers, scientists, paramedics, dentists, surgeons and other medical proceduralists. There will be very significant displacement of current occupations; many will require a smaller workforce whilst others will have greater labour needs. Also the cost of professional services will be reduced as a consequence of increased market-based competition.

In conclusion, disruption in the way healthcare services are currently provided is inevitable. Government should gradually make the structural changes to ensure our whole population obtains the best possible care with minimal cost barriers. User costs delay the procurement of health services. Early diagnosis leads to early treatment. Currently 5% of our population is responsible for 50% of healthcare costs; 38% of this is consumed in the treatment of chronic health conditions (AIHW 2008). A new paradigm is required to predict those at risk and treat them before the conditions become clinically apparent. Genetic screening together with metabolomic analyses will gradually become the means to achieve this, with continuous monitoring of “at risk” groups by utilising wearable or implantable devices electronically connected to central monitoring stations located in large community polyclinics, staffed with GPs, specialists, allied health and social workers. Rapid response teams are best located in regional hospitals; with on-call arrangements to ensure adequate 24/7 community care in conjunction with their hospital duties. Data collection, data sharing, analysis and implementation of healthcare when and where it is required will be the means of providing universal care of the highest quality within sustainable levels of expenditure.

Yours sincerely,

Henry R Glennie, FRACS, FRCS, MBA MPP

Medilink Australia Pty. Ltd.

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