

# Investigating the Potential to Improve the Free Flow of Health Care Information – a Survey of New Zealand Clinicians and Health Providers

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## **Abstract**

*This paper examines the current state of health care information exchange in the New Zealand health and disability sector by drawing on findings from extensive research of over 2,500 clinicians and decision-makers. The paper describes the priorities that research respondents believed were required to create a free flow of health information. The research findings support a view that technology-enabled information exchange could significantly improve health care delivery processes and enable person-centred care initiatives. Three-quarters of clinicians surveyed agreed that better electronic access to health care information could improve the way they provided health services. The research suggests that the greatest potential for benefit in the sector is in improving the capability to electronically exchange test results, patient referrals, discharge summaries, and medication information. The research also shows that health providers believe improving capability in these areas will require leadership and a co-ordinated approach to addressing system incompatibility issues. While there is widespread support for improving health information communication technology, there is also a strong belief that a lack of compatible systems, as well as the need for increased funding, are major barriers to progress.*

## **1. Introduction**

When providing health services to patients, clinicians often encounter an ‘inference’ gap [1]. This is the gap between the information available to a clinician at that place and time, and the evidence needed to support the best informed care decision. Improving information ‘liquidity’ [2] through information systems narrows this gap and supports clinical decision-making processes [3]. This flow of information can then follow patients from care setting to care setting along the patient care pathway, supporting a shared decision-making process that involves patients, clinicians and care teams [2].

Decisions around the planning of health care require increased involvement of clinicians [4] and an understanding of clinical priorities. The intention of this paper is to provide a base of evidence for health care providers, Government agencies and vendors to target their efforts and collaborate on information communication technology (ICT) initiatives. This paper is based on findings [5,6] from recent New Zealand health and disability sector research (the research) commissioned by the New Zealand Ministry of Health (the Ministry) and other research sources. It does not attempt to make detailed recommendations on specific clinical areas. Instead, it aims to provide an analysis of the health sector research results to support concerned groups, individuals and organisations by providing evidence of the expressed ICT needs and opportunities identified by New Zealand clinicians and decision-makers. The findings endorse some of the 2005 Health Information Strategy “action zones” by providing a clear basis of evidence. However, they also take several steps further by identifying the needs, benefits and barriers to greater use and adoption of ICT for segmented medical groups.

The New Zealand health and disability sector (the sector) is extremely diverse. This diversity includes wide variations in the size of health provider organisations, how they are owned, managed and funded, the type of services they provide, who they provide them to, and where and when they provide these services. There are an estimated 12,500 health provider organisations [7], which can be grouped into more than 200 separately identifiable segments [8], ranging from sole trader health providers to tertiary hospitals employing hundreds of people.

On a typical day in New Zealand thousands of health care transactions occur. These transactions involve the exchange of information between people, systems and organisations - which are currently recorded and communicated primarily

by mail and fax. Electronic information exchange in the health sector occurs over many different health ICT networks and systems. Often these have been built and purchased in isolation and in a number of situations they are not interoperable or interconnected across multiple enterprises [9].

In New Zealand around 80% of a total \$12.4 billion<sup>1</sup> public health budget is administered by the Ministry of Health and distributed to District Health Boards (DHBs). Public hospitals and the majority of public health services come under the umbrella of DHBs. DHBs fund 82 primary health organisations (PHOs) to provide essential primary health care services to local communities.

More than 200 national and local non-Governmental organisations (NGOs) and voluntary organisations provide not-for-profit services funded by the Ministry and DHBs. The DHBs also contract with private providers, such as aged-care facilities, rest homes, pharmacists, laboratories and radiology service providers. It should be noted that private health sector spending is additional to the \$12.4 billion of public money spent.

Health sector markets differ from other sectors because the health care 'product' is difficult to define, the outcome of care is not always certain, significant segments of the sector are supported by not-for-profit providers, and payments are made by third parties such as the Government and insurers. Many of these factors are present in other sectors, but to a lesser degree. The interaction of these factors is what makes the health marketplace unique [10].

In New Zealand, as in many other countries, external funding, targets and incentives are used to balance demographic differences, promote best practice and help ensure overall population health needs are addressed. Health providers are faced with an increasing number of interventions, complexities of disease management, rapid development of medical technologies, and increasing demand for health services.

Changes to business processes are not only driven by internal business requirements and the requirements of other health care providers, but are dependent on the funding controls used by insurers and Government to influence service availability and practice variations.

Once an agreement on any business process change has been reached, the costs of technology to enable and support it must be assessed. If the expenditure is justified then a source of funds must be found. Qualitative research carried out by the Ministry in April 2008 [5] shows it is difficult for most providers to justify and fund technology investments beyond those providing a direct 'business' benefit for individual organisations.

These factors, combined with a the high level of specialist skills and knowledge involved in health care make the adoption and integration of information technology to support new or updated business processes across DHB regions [11] and within smaller organisations and sole practices, particularly challenging.

Even with these challenges, the health sector research findings indicate implementing ICT initiatives to improve overall health care delivery is a high priority for a significant number of clinicians and organisations.

## **2. Research Methodology and Approach**

Research to identify current and future ICT requirements of the health sector was undertaken by UMR Research on behalf of the Ministry from 2007 to 2009 in two phases. The purpose of the first (qualitative) phase of research was to confirm the way the sector was segmented (as an ICT market) and understand current and potential future use of ICT in the sector. In addition the research was intended to provide an understanding of the drivers and barriers to better use of ICT in health care delivery and to ensure the next, more in-depth, phase of research was targeted correctly.

The Ministry provided UMR Research with a validated database of health providers and a definition of the New Zealand health sector divided into 237 health sector provider groups (e.g. urban GP, rural GP, pharmacies, private hospitals). UMR Research then used the Australian and New Zealand Standard Industrial Classifications to classify these groups into 12 categories to support consistency with other sector statistical data.

UMR Research conducted eight detailed interviews with sector opinion leaders<sup>2</sup> to develop two topic guides (one for clinicians and one for ICT decision-makers) for the first, qualitative, research phase. These guides were then used in more than 100 face-to-face interviews of representatives of the 12 categories in urban, rural and provincial locations across New Zealand. This research was completed in July 2008 and provided information on the views of a representative sample of health practitioners regarding ICT and how ICT could support communication and collaboration in the sector.

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<sup>1</sup> See the New Zealand Treasury website - <http://www.treasury.govt.nz/topics/health>

<sup>2</sup> Defined by UMR Research as being recognised as leading opinion within the New Zealand Health Sector.

For the next (quantitative) [6] phase of the research, the Ministry supplied a database to UMR Research of more than 7,000 clinicians and ICT decision-makers from more than 5,000 health provider organisations. Clinician respondents were defined as ‘health care practitioners’ within the particular segment surveyed and include a wide range of professions from Medical Specialist to Ambulance Officers. ICT Decision Makers were classified on the basis of the role of the individual in their organisation to make decisions on ICT. The findings from the qualitative research phase were used to develop the quantitative questionnaires to confirm and quantify the earlier qualitative findings in more detail. The questionnaires provided a selection of choices based on the findings of the qualitative phase as well as the option of an alternative response. These questionnaires were tested with sector representatives and tailored to decision-maker (answered on behalf of the organisation and covering technical and financial aspects) and clinical (answered from personal perspective and covering the impact of ICT) respondents. The questionnaires also contained questions about interest in a possible national directory for the sector. As these results were generally inconclusive they are not covered in this analysis.

Three questionnaires were mailed for completion from November 2008 to January 2009. These surveys were sent to DHBs and non- DHB organisations (organisations separately identifiable as not directly governed by a DHB) and sought information from both clinicians and ICT decision-makers. The quantitative research average response rate was 32% or more and significantly higher than anticipated. The margin of error varied from +2.3% for non-DHB clinicians, +3.4% for ICT Decision-makers to +7.9% for DHB clinicians<sup>3</sup>. The Technical Appendix of the quantitative research provides a detailed outline of the methodology used by UMR Research.

While international and New Zealand research corroborates the findings of this survey, there are few other health ICT surveys that have covered such a wide range of health providers to this level [12] and none to this extent in New Zealand. All quantitative research data included in this report has been sourced from the Ministry of Health’s quantitative research findings unless otherwise stated.

### 3. Health Sector Research Findings

The quantitative health sector research provides a baseline assessment of the health sector’s view of health ICT uses and requirements. The results strongly reinforce that it is a very diverse sector; there are a wide range of “business” types and many of these operating from multiple locations. Despite this diversity, there was widespread agreement on the main opportunities and barriers to improved use of ICT. The sector is typically well served by technology, but respondents often had trouble finding the electronic information needed, were faced with incompatible systems, and were not entirely convinced they were receiving value for money. Some key observations include:

- A third (34%) of all organisations were part of a larger group, a further third (34%) were from sole private practices, and a fifth (17%) were not-for-profits. A quarter (26%) of GP practices were sole practitioners<sup>4</sup>.
- There was a significant variation in the number of patients that clinicians provided health services to on a daily basis. A third (32%) provided health services to less than nine people per day, just under half (41%) provided health services to between 10 and 20 people per day, and a quarter (23%) provided health services to more than 30 people per day. The remaining 4% did not know or did not answer.
- More than half (51%) of non-DHB clinicians and three-quarters (72%) of DHB clinicians reported that at least once a day they could not find the patient electronic information they required to optimally treat their patients
- Nine out of ten (93%) New Zealand clinicians have internet access and use email.
- Both DHB clinicians (84%) and non-DHB clinicians (71%) identified that lack of compatible patient management systems was the most significant barrier to electronically accessing medical or health care information from other organisations.(Please refer to section 7.1 for more information)
- Almost a quarter (19%) of all clinicians and a quarter (25%) of specialists work in more than one DHB area.
- Just under half (42%) of the specialist segment and a quarter (25%) of the GP segment reported that they worked from multiple fixed locations.

This level of diversity shows there are a number of challenges involved in establishing systems that span multiple health providers. It also suggests the flexibility to configure technology to meet specific business needs is very important. A

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<sup>3</sup> “DHB Clinicians” are classified in the research as clinicians who were employed directly by District Health Board (DHB) care providers, and “non-DHB Clinicians” are those clinicians who were employed by organisations other than DHBs, for example primary and secondary health care providers such as private hospitals. “ICT Decision-makers” are representatives of health provider organisations, other than DHBs, responsible for making decisions about ICT investment and implementation.

<sup>4</sup> Please note that multiple ICT Decision-makers selected more than one option to define the type of organisation they worked for.

'one size fits all' approach to implementing ICT systems in the health market could risk compromising the needs of many health sector organisations.

This dichotomy between the need for ICT systems that are tailored for individual providers and those that are generalised to support multi-enterprise collaborative business processes, suggests an "add-on adaptor" (consider the use of external power adaptors for consumer electronics) type of approach to achieve interoperability between systems.

#### **4. Current Uses of ICT in Health Care**

By international comparisons, the New Zealand health sector has a high level of modern technology available [13] and widespread electronic connectivity<sup>5</sup>. However, the quantitative research shows only a small number (16%) of health ICT decision-makers reported 'excellent' value from their ICT investments. This response implies that a health user's experience of what capability ICT typically provides does not translate well to their perception of value (cost/benefit).

Given the information gaps identified elsewhere by the research, there appears to be a significant disconnect between the availability of ICT and its productive use in the sector. This response should also be considered in light of the view that 'inadequate funding' is considered a barrier to ICT investment. (Please refer to figure 5 for further information). The fact that health ICT is considered expensive is unsurprising given the perceived low value and limited ability to fund its purchase.

While nine out of ten (93%) New Zealand clinicians have internet access and use email, not all employees of health sector organisations have a dedicated account or computer at work. Two-thirds (67%) of non-DHB clinicians accessed email through an email client, while a quarter (28%) used a web browser even though a large proportion were working from a single fixed location.

Email is more commonly used by health care organisations to communicate with non-health care organisations than by clinicians to communicate with patients. Use of email varies widely across various health sector groups. There is a preference in the mental health segment to use email for communicating with other providers and practitioners, and rural GPs use email to communicate with patients much less than their urban counterparts. The variations in findings between rural and urban GPs reflect differences in information needs identified in other New Zealand surveys [14-16].

Half (51%) of non-DHB clinicians reported using email for communicating mainly with patients, this suggests an interest in engaging with patients, however, the survey did not provide information on the nature of these communications. A significant number of clinicians (42% of non-DHB clinicians) also reported using email for sending and receiving referrals. This suggests that while email is often considered insecure, the risk of sharing private patient information is either not understood or not considered significant by many clinicians, given they generally see privacy as a significant barrier to information sharing (refer to figure 5).

##### **4.1. Experiences and Attitudes**

Half (51%) of non-DHB clinicians and three-quarters (72%) of DHB clinicians reported that at least once a day they could not find the patient electronic information they required to optimally treat their patients. While this appears to be a concerning statistic, the research also shows clinicians generally found alternative channels to source this information. However, it does indicate there is considerable scope to reduce the time, resources, and associated costs of sourcing health care information, such as repeated tests. It should also be noted this response was closely tied to the level of ICT use: those segments, such as sole traders and independent practitioners, who recorded lower levels of ICT use and lower numbers of patients treated per day, also encountered fewer problems accessing information. Other research [3] supports the view that providing clinicians with medical knowledge that is immediately relevant to their practices can have a direct impact on medical interventions and patient outcomes.

At least 90% of clinicians reported using fax for communications. Findings from the qualitative research show that clinicians and ICT decision-makers believed using a fax was 'safe' compared to using other electronic methods of communication, which were perceived as varying in their reliability. The use of paper-based communications is supported by observations in other developed countries and reflects a health sector-wide accepted practice where regulation requires that prescriptions must be signed, and paper records are considered more secure and authoritative.

More than three-quarters (80%) of all clinicians reported that they liked to keep up with the latest technology and three-quarters (78%) of non-DHB clinicians rated themselves as 'knowledgeable' about ICT. This result is somewhat at odds

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<sup>5</sup> The Ministry of Health Quantitative research findings showed that there is widespread electronic connectivity and availability of ICT in the New Zealand Health Sector.

with a view that ICT provides little value, but it does indicate openness to adopting ICT if the cost issues can be overcome and business benefit can be clearly identified.

Respondents were canvassed on their interest in receiving information on developments and use of ICT in the sector and asked how they would prefer to be kept informed. Interest was generally high at 67% of non DHB clinicians overall, however, there were differences between segments that may reflect dependence on ICT and reporting demands. For example, not-for-Profit expressed a much higher interest level than Rural and Independent Practitioners. Both Clinicians and ICT Decision makers selected quarterly email newsletters, above other options such as websites and workshops as the preferred method to be kept informed.

#### 4.2. Health Provider ICT Implementation Process

As well as discussing current and future ICT requirements with the health sector providers, the qualitative research explored the decision-making process and timeframes required by non-DHB ICT decision-makers to implement ICT changes. The eight-step decision-making process required to support the adoption of technology was generally defined as follows:

1. Identify and prioritise need/problem
2. Confirm project objectives/budget/project team
3. Information gathering
4. Formal and informal feedback
5. Analysis/evaluation/consultation/discussion
6. Presentation to decision-makers
7. Agreement/decision
8. Purchase and implementation

The eight steps were applied differently for each organisation, reflecting its size and sophistication, and the scale of the proposed changes to ICT capabilities. These results support other survey findings which show that while there are examples of providers that can smoothly integrate new initiatives into their business processes, many do not have sufficient spare management capacity (including IT skills) to implement new projects [17].

The average time required to implement an ICT change was typically less than a year for smaller organisation, depending on the scope of change (refer to figure 1). Not-for-profit or larger organisations estimated a timeframe of one to five years, or more.

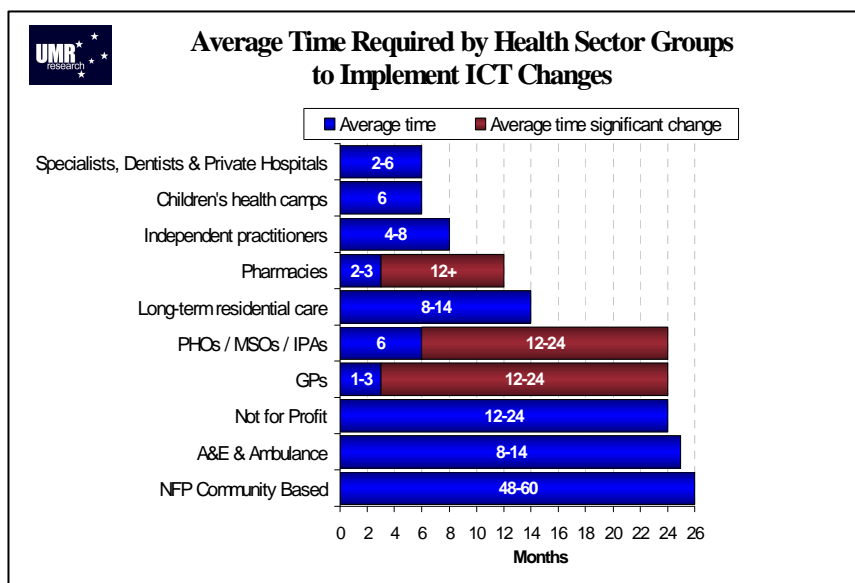


Figure 1 - Time Required by Health Sector Groups to Implement ICT

## 5. Opportunities for ICT to Improve Health Information ‘Liquidity’

The research strongly supports the belief that technology-enabled health information exchange could improve health care delivery. It shows that at least 80% of clinicians agreed (strongly or slightly) better access to health care information could improve the way they provided health services. This belief is further supported by the view of three quarters (74%) of ICT decision-makers, who agreed that improving their organisations use of ICT was a priority.

The main drivers for investments in electronic systems and applications were reduction in paperwork or manual processing, workflow benefits, and improved access to patient information. These factors were closely followed by savings and revenue increase, and the need for more information to support decision making.

### 5.1. Improving Electronic Access

There was general agreement on the most significant opportunities for improved electronic access and sharing of health information. The top four clinical priorities were: diagnostic test results, referrals, discharge summaries and medication information (refer to figures 2 and 3). These priorities are not necessarily ranked in this order when broken down to represent ‘sending’ and ‘accessing’ priorities, for example clinicians were more interested in accessing diagnostic test results than sending them.

These differences are generally due to variations in the role and function of the organisations involved, e.g. some GP practices provide blood testing services. The gap between willingness to supply information, and the demand to access it, will need to be closed if clinicians’ needs are to be met. An information environment with free flow of information requires balanced demand and supply.

As demonstrated in section 7, respondents consistently expressed a greater overall interest in accessing information than sending it. It is worth noting though that giving clinicians an easy way to obtain information in an electronic form that can then be shared is a prerequisite to supplying this information. Improved access to more information, say via a web site or shared database, has the potential to reduce the need to ‘send’ information, however the results do not allow any firm conclusions to be drawn in this regard.

In reality the barriers to sharing information are not just technical, but depend on clinical relationships and inter-organisational business processes being established. There are significant differences between the ‘sending’ figures for DHB and non-DHB clinicians, which could be attributed to the different health practitioners’ roles or information requirements. For example, because GPs often repeatedly see the same patients, they typically have access to the patients’ treatment history prior to a consultation. Hospital clinicians however, often need to assess and diagnose patients without the benefit of easy access to their treatment background. This variation between DHB and non-DHB clinicians further emphasises the potential benefit of improved information exchange between primary and secondary health care providers.

The research shows significant variations between other sector segments. For example, mental health clinicians were much more likely to regard accessing patient referrals as a top priority, reflecting their dependence on information from primary providers.

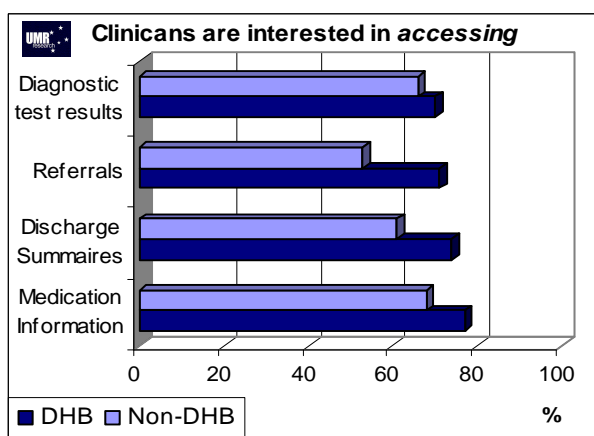


Figure 2 - Summary of Clinician Interest in Accessing Information Electronically

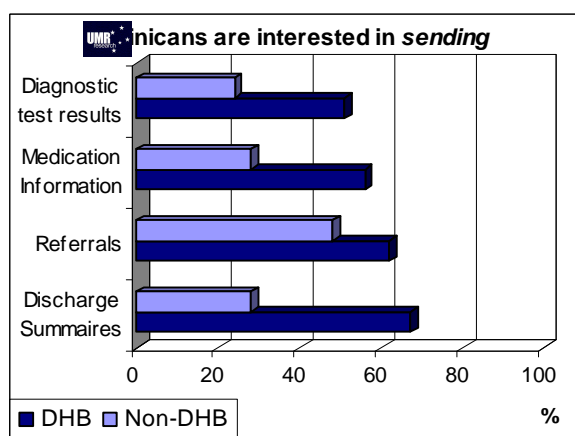


Figure 3 - Summary of Clinician Interest in Sending Information Electronically

Clinicians consistently agreed (67 to 77%) that accessing diagnostic test results was a top priority. The aged-care, DHB clinician and GP segments had the highest levels of interest in accessing this type of information electronically. As previously stated, most clinicians rated the importance of sending diagnostic test results significantly lower (18 to 28%), with the exception of DHB clinicians (51%) who see 'sharing' as significantly important. A strong interest in accessing additional and related patient test information from other organisations was provided as the reason for a greater demand than supply interest in the pathology/laboratory segment.

Clinicians across the board had a high interest in accessing patient referrals (53% to 71%), particularly secondary providers, including DHB clinicians (71%) and specialists (61%) (Refer to figure 3).

Sending patient referrals was of almost equally high priority (46% to 54%), with DHB clinicians (62%) again rating sending as more important than the other Clinician groups.

DHB clinicians again see the importance of both accessing (74%) and sending (67%), or 'sharing', discharge summaries. Aged care clinicians also rated both sending (71%) and receiving (76%) as important, and were the most likely to have agreed that sending discharge summaries is important. More than half of GPs (65%) want to access discharge summaries, and a significant number say they want to be able to send them (29%). American research [18] suggests this priority reflects the impact that delayed or incomplete discharge communications can have on the safety and quality of follow-up care management.

All clinicians had a very high interest in accessing patient medication information. Between 68% and 77% of clinicians agreed that accessing was a priority, compared with a significant variation of interest in sending (20% to 56%).

DHB clinicians were a quarter (27%) less interested in sending medication information than accessing it. Most other segments were, on average, half as interested in sending as accessing.

## 5.2. Potential Benefits from ICT

The qualitative research findings show respondents thought the improved use of ICT would result in an improved quality of care. Specific potential benefits identified were better care coordination, workflow efficiencies, increased professional knowledge, and improved decision making through availability of timely clinical information. These benefits were tested in the quantitative research and both clinicians and ICT decision-makers expressed a consistently strong belief that electronic access to information had the potential to improve health care outcomes (refer to figure 4).

The research shows all segments surveyed had a strong desire for improved electronic connectivity and exchange of information.

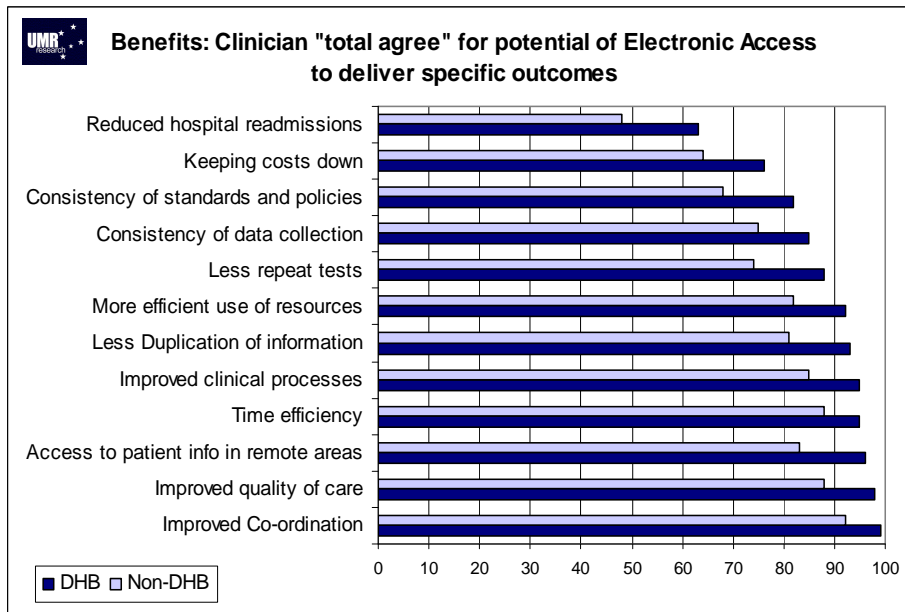
With the exception of 'reduced hospital admissions', more than 60% of clinicians agreed the outcomes listed in figure 4 could be enabled by ICT.

Clinicians rated the top five benefits enabled by ICT as:

- Improved co-ordination between health care providers
- Improved quality of care
- Time efficiency
- Improved clinical processes
- Better access to patient information in remote areas.

Non-DHB clinicians who identified significant problems finding the information electronically were more likely to agree that reduced hospital admissions were a benefit. This suggests that improved access to electronic information could have a positive impact on the effectiveness of primary health care provision.

Also of note was the view that the importance of health ICT is increasing, with most ICT decision-makers reporting that their organisation's investment in ICT would increase in the next year. When ICT decision-makers completed the quantitative market research late last year, only 2% thought their level of investment would decrease and a quarter (28%) expected no change. The segments more likely to increase their investments were PHOs and not-for-profits.



**Figure 4 - Summary of Potential for Electronic Access to Deliver**

### 5.3. Enabling Person-Centred Care through Health Information Liquidity

There are many aspects to what is typically referred to as ‘person-centred’ health care, but the common characteristic is a partnership between the health provider and the person whose medical information is available to them at the point of care [19]. Overcoming barriers to increase the flow of information is the key step to achieving a person-centred health system. In other research, healthcare consumers identified [20] system connectivity and privacy issues as major barriers to adopting remote care devices and applications. Patients are often the ‘transport mechanism’ for some health care information such as medicines and diagnostic images. Therefore, ensuring this information flows freely across patient care settings and encounters gives patients greater confidence around the care decisions made at each point in the health system.

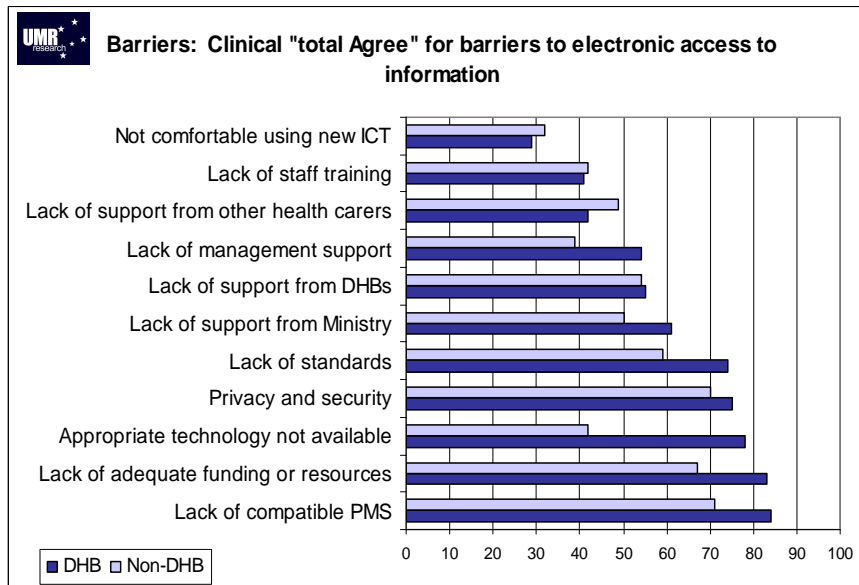
## 6. Challenges to Realising Improved Information Exchange

While the overall research indicates there is widespread support for improving health ICT, it also demonstrates that a lack of compatible systems and applications, as well as a need for funding, are seen as barriers to progress.

### 6.1. Incompatible Systems

The quantitative research respondents identified that “lack of compatible patient management systems” was the most significant barrier to electronically accessing medical or health care information from other organisations (refer to figure 5). This option of “patient management system” was provided based on the qualitative results and the selection in the quantitative questionnaire most likely reflects a wide interpretation of “patient management system” as relating to IT systems used in the management of patient care. The health sector research findings show both DHB clinicians (84%) and non-DHB clinicians (71%) indicated that “lack of compatible patient management systems” was the most significant barrier to accessing information electronically from other organisations.

The qualitative research showed there are numerous different “patient management systems” being used across the health sector. Those clinicians who worked with more than one DHB (19% according to the quantitative research) found their use of different patient management systems to be particularly challenging. The qualitative research also showed a sector belief that lack of standards around “patient management systems” was a significant problem. For example, a lack of consistency in coding medical data at the GP practice level impacted on the quality of data analysis. In general, clinicians most often felt current ICT systems were incompatible due to a perceived lack of leadership from DHBs and the Ministry of Health in ensuring a co-ordinated and common approach. (This was a finding in the Qualitative Research, please refer to Section 7.4)



**Figure 5 - Summary of Barriers to Electronic Access to Information**

## 6.2. Inadequate Funding and Resources

The quantitative research findings identify a view that inadequate funding or resources as one of the top four barriers to accessing information electronically (refer to figure 5). A majority (83%) of DHB clinicians and two-thirds (67%) of non-DHB clinicians believed inadequate funding or resources was a significant issue.

The qualitative research supports these findings, indicating respondents were particularly concerned with costs associated with training and changing systems to ensure that they were compatible (particularly if they had recently updated systems only to find that they were not compatible).

## 6.3. Concerns about Privacy and Security

Privacy and security issues were also identified by the quantitative research as one of the top four barriers to accessing information electronically, with three-quarters (75%) of DHB clinicians and almost three-quarters (70%) of non-DHB clinicians having agreed that it is a significant barrier (refer to figure 5). Significant concerns about privacy and security were shared across the board, with all groups showing equal concern. The results indicate the level of technology use had little impact on the degree of concern around privacy of information.

A substantial proportion of non-DHB clinicians communicated with patients by email, including half (52%) of those who cited privacy and security as a barrier.

The qualitative research identified the main concerns regarding security and privacy as:

- Patient consent;
- Deciding who has access;
- Deciding how much patient information should be accessible; and
- Confidence in the ability to transfer information securely.

## 6.4. Lack of Support

Limited support or direction from other areas of the health sector also emerged as a barrier to accessing information electronically (refer to figure 5). Clinicians agreed that DHBs, other health care providers, and the Ministry of Health had not provided support to the level required. Most non-DHB clinicians (94%) who identified lack of support from the Ministry said lack of support from DHBs was also a barrier. There was a feeling that the Ministry of Health needed to provide better advice and follow up on national initiatives and requirements such as privacy and security and that DHBs

could do more to work cooperatively with providers to, for example, support the use of accredited ICT products or services.

Just under half of non-DHB clinicians (49%) and DHB clinicians (42%) agreed insufficient support from other health providers was a barrier to accessing information electronically. DHB clinicians were also more concerned about lack of management support (54%) compared with non-DHB clinicians (39%).

## 7. The Way Forward

Given the nature of the health marketplace and diversity of the health sector, there are considerable barriers which ICT vendors and health providers must overcome to capitalise on the opportunities enabled by ICT. The sharing of electronic information is currently dependent on the interoperability and integration of the various systems and databases used to store health care information by different provider organisations, including primary and secondary, public and independent.

There is wide agreement that improving the interoperability and integration of health provider systems and databases has the potential to create significant flow-on benefits for the health sector [21]. These benefits include improved access to health services, increased quality of care, and reduced costs [22]. In the United States a computer model was created to project the impact of IT enabled disease management on diabetes care processes. This modelling projected savings of \$US16.9 billion over 10 years from the use of integrated provider-patient systems for diabetes care [23].

The need to involve vendors, health agencies and clinical groups in agreeing common approaches to interoperability has led to the increasing membership of organisations focussed on finding common solutions to these issues, such as Integrating the Healthcare Enterprise<sup>6</sup> which has more than 250 member organisations worldwide.

It is generally accepted that there are steps or levels [24] of health system interoperability. These range from mail and telephone to an ideal state where all systems exchange information electronically using the same formats and vocabularies. There are many ICT standards supporting this optimum level of system integration, but achieving this across multiple organisations requires organising standards into a set of unified specifications or 'profiles' that solve a specific health problem [25].

The research suggests that the greatest potential for ICT problem solving in the health sector is in improving the capability for specific types of health providers to electronically access and exchange:

- Diagnostic tests results
- Patient referrals
- Discharge summaries
- Medication information.

Both the qualitative and quantitative research show that health providers believed improving capability in these key areas will require leadership from the Ministry of Health and DHBs to drive a co-ordinated approach to addressing system incompatibility issues. The research also implies that if additional costs are involved in improving system interoperability then funds need to be made available – additional to capitation or fee-for-service types of payments.

Even with funding available, the implementation of health ICT to facilitate health information 'liquidity' will take time. The research shows there is a substantial time delay between health provider organisations making the decision to change and actually implementing the necessary changes.

In addition to the implementation of the new ICT capability, updated process and procedures to utilise the additional capability are required and must be integrated into each organisation involved.

The health sector also wants more guidance and support on how to appropriately deal with patient-identifiable information if the flow of electronic health information is to be improved significantly. The research indicates the issue is not so much the lack of legislation or regulation, but the need for a wider understanding on what is appropriate to share and what controls should be applied.

The research shows there is significant scope and an overall willingness from health providers to implement health ICT initiatives to improve information exchange in the sector. Clinicians and ICT decisions-makers surveyed showed a belief that improving electronic information flows presented significant potential to support better quality of health care to New Zealanders.

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<sup>6</sup> For a list of member organisations see [http://www.ihe.net/governance/member\\_organizations.cfm](http://www.ihe.net/governance/member_organizations.cfm)

There was general agreement by all segments on the barriers that need to be overcome and that the benefits are significant. Making the priority areas of information available when and where they are needed will require a coordinated approach across the health sector involving funders, providers, vendors, decision-makers and clinicians. Involving clinicians in the planning of health care and enabling them to make decisions at the closest point of contact with the patient are important Government priorities [4].

The New Zealand Ministry of Health has a number of initiatives underway to support the health sector in realising the potential for ICT enabled care delivery identified by the health sector research. The key objective of the Ministry's information planning effort is to ensure New Zealanders have a core set of personal health information available electronically to them and their treatment providers, regardless of the setting. This will require a common and coordinated approach to establishing a person-centred and provider-friendly health (information) environment where clinicians and patients can safely share information. The initial focus is on 'e-events', which are projects that support the priority information flows identified by the health sector research, such as e-labs to support diagnostic test information flow, e-prescribing, and e-referrals.

Gaining the potential benefits from these sorts of capabilities will require the implementation of a national architecture framework and standards, a series of process change activities, increased sharing of ICT services, and joint clinical governance arrangements.

While technology has provided us with a range of powerful tools which can enable health information 'liquidity', the challenge for all clinicians and health provider organisations is to employ these tools collaboratively in order to build a better health sector for the benefit of all New Zealanders.

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