

# Approach to Health Innovation Projects: Learnings from eReferrals

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## Abstract

*This paper reports the learnings from a recent evaluation of four implementations of electronic referrals (eReferrals) regarding the impact of significant changes in New Zealand health sector that have been enabled by information technology (IT) implementations. Qualitative and quantitative data were collected in the evaluation, including project documentations, system transactional data, and stakeholder interviews. Each project demonstrated different approaches to innovation. The Hutt Valley solution was implemented as a standard IT project, notwithstanding the genuinely pioneering nature of the changes to clinical practice. Northland grew their project organically on a relatively low budget. Canterbury have undertaken the most comprehensive approach combining strong clinical leadership with active participation from Funding and Planning to develop clinical pathways that support the appropriateness and quality of referrals. Auckland has the opportunity of building into their programme the lessons from each of these other implementations. The eReferrals experience proves that they should not be viewed as just a 'project' that comes to an end at a set date; it must be an ongoing initiative, with ongoing capacity. Extending this to general innovative health IT initiatives, our conclusion is whatever specific approach is taken, the importance of iterative refinement, user engagement and feedback must be emphasised.*

## 1. Introduction

The National Health Information Technology (IT) Plan proposes an improved and rationalised health IT infrastructure for New Zealand that will support a transformed and more sustainable healthcare system [1]. One of the core applications mandated by the plan is electronic referral (eReferral) systems. The National Institute for Health Innovation has been commissioned by the National Health IT Board to evaluate four eReferral implementations in 2010 and 2011: the systems already in operation at Hutt Valley, Northland and Canterbury District Health Boards; as well as the Auckland Metro region's solution (entering pilot operation at the time of reporting). An analysis of the four approaches was carried out comparing their setting, technical functionality and features on a multi-dimensional framework of eReferral criteria; this also examined their benefits in terms of patient, health workforce and health system benefits (see the overall report at [2]). The evaluation was able to form conclusions in relation to a number of aspects of managing innovation IT implementations. Conclusions relate to approach to project management, change management, particularly in relation to the human dimensions, the lessons that were gained from the challenges encountered and how these may impact our approach to like implementations.

## 2. Methods

Evaluation data of the Hutt Valley, Northland and Canterbury solutions was gathered from September 2010 to May 2011 through collection of project documentation, visits to key sites, analysis of electronic transactional records and stakeholder interviews. The systems are already in operation in these three jurisdictions. In the Auckland Metro region the solution is entering pilot operation and in this instance a document review (including review of the solution specifications) and consultation was undertaken with their project team. The overall study protocol was approved by the Multiregional Ethics Committee, approval MEC/10/066/EXP. Quantitative data such as electronic transactional records were analysed to assess the uptake and usage pattern of eReferral systems as well as the impact of system

implementation. Qualitative data was collected through interviews with 78 clinical, operational and management stakeholders.

The study design was based on NIHI's evaluation framework for multi-dimensional evaluation of innovative health IT initiatives [3]. Sixteen domains of interest were identified for eReferrals, including approach, processes, economic advantages, resources and benefits. These criteria are based on the 2005 Health Information Strategy Advisory Board (HISAC) requirements for eReferrals [4] and, more broadly, the criteria pool utilised by Lau and colleagues for health information systems evaluation [5, 6]. The Hutt Valley [7], Northland [8], and Canterbury [9] findings individually, and the results of the four stages collectively [2], are available through the Health Innovation Exchange (the HIVE, <http://nzhive.ning.com/page/resources>). This paper focuses on what was learned about the way each system was implemented and what general implications can be drawn that will inform future health innovation projects, particularly projects with a strong focus on transformation of healthcare delivery.

### **3. Results**

In all cases, eReferrals offer the capability for faster, more reliable and more transparent referral from community to secondary services, and lays a foundation for further support and innovation in healthcare processes. But the design and implementation processes of each project demonstrated alternative approaches to deployment.

#### **3.1. Hutt Valley: IT-led Project**

The Hutt Valley eReferral solution was implemented in 2007, and encompassed general practitioners (GPs) from 30 general practices referring patients to 28 services at the main 260-bed secondary hospital for the region. Hutt Valley has provided measurable success in making electronic referral the dominant modality (while maintaining some use of paper) while achieving safety-promoting performance improvement: from 2007 to 2010 Hutt Hospital has significantly reduced the time from general practice letter date to referral triage – for both paper and electronic referrals – without changes in administrative staffing levels. The integration of referrals into the hospital clinical system was associated with more efficient, and transparent, processing from letter receipt through to assignment of referral priority (triage). All clinical staff can view the patient referrals within the Concerto clinical portal, with clinicians managing the triage process electronically at any time or place without reliance on paper processes. Clinical users of the system appreciate the improvement of referral visibility (status and content access); however, both general practitioners and specialists pointed out system usability issues in our interviews.

The Hutt Valley project was implemented as a 'traditional' IT project, notwithstanding the genuinely pioneering nature of the changes to clinical practice. There were significant challenges in creating a new form of communication between primary and secondary sectors. In particular, challenges arose with developing agreement and interoperability across four vendors, developing and implementing standards, as well as creating structured referral forms (structured or standardised referral letters) that were clinically and administratively sound for users. The Hutt Valley approach can be characterised as an outgrowth of IT strategy, which was implemented (apparently quite effectively) and then not further reviewed or enhanced for a period of years. The way the project unfolded has created a sustained period with lack of follow-through on refinement of form content, upgrade of technical solution, or evaluation and dissemination of the system impact (with the latter being somewhat ameliorated by the present study). A downside of this IT-led approach was that post-project remedial work was not planned or budgeted for and this has impacted user satisfaction. This is typical of innovation projects, it relates to the fatigue that arises from a very hard road traversed. Five different organisations participated in this project, including the district health board (DHB), primary health organisations (PHOs) and software vendors. Relationships between these different organisations were tested by the nature of this innovation project. Traditional project management of vendor-purchaser relationships were not always aligned to the nature of an innovation environment which require all parties to work in a form of partnership, seeking the most effective approaches to achieving what might be seen as common or at least overlapping goals..

The IT implementation process at Hutt Valley was generally seen as a success by clinical and administrative users; but the impact of the implementation created a level of ambivalence at a senior management level which resulted in a lack of resourcing for post-project refinement. Its placement at the end of a lengthy and traditional IT project plan was not helpful. As can be expected with a long project, staff turnover resulted in the project becoming something 'inherited' by newer incoming personnel, which would obviously undermine sense of ownership and create an opportunity for a gap in articulation of the complete project rationale.

Although originated and implemented as an IT project using 'traditional' project management processes and activities, there was a strong sense among many of those interviewed that this was a clinician led project. A sponsor and several clinical champions were identified. The clinical champions were eager to provide leadership and supported the project.

On the other hand, there was a sense of unwilling leadership among the governance people involved in the project. Not being involved in the project at the outset influenced their approach to the project. From the perspectives of the sponsor, the project manager, the Out Patient Department manager and the quality manager, the Hutt Valley project aligned well with national health information strategy; however, they all felt that the project should have been a national project from the outset. No one could pinpoint exactly when the project was proposed, was approved or when it started. Interestingly, this lack of clarity did not surface as a concern for others, especially those who did not appear to hold a leadership role. On the contrary, many felt included and consulted.

Some clinicians – both GPs as authors and specialists as readers of eReferrals – struggled to adapt to new modalities, regretted the loss of use of old skills (such as letter writing and the ability to quickly scan through a paper referral), resented the adaption required to use electronic forms, and were slow to discover system features. Resilient clinical leadership saw through these issues to achieve a substantial level of sustained uptake. Changes were identified to have embedded into workflows and activities, for instance indicating user adoption of the electronic processes and ways of working. Such signs presented in the form of comments that it's time consuming to use the software, triage takes longer now than before (possibly because of the dual system of processing paper and electronic referrals), and that staff are busier. One specialist commented that "It's been two years since we started using eReferrals and I'm still very uncomfortable with the system." Some people presented alternative views that "it took a bit of getting used to" but that eReferrals are now more convenient (doing everything in one place, referral is visible, documents don't get lost). This optimism is tempered by difficulties using computers, e.g. typing slowly, not being able to attach the documents they want to attach, not being confident about attaching photos, and struggling to use the forms. Interview participants reported a need for continued attention to usability refinement, provision of training and cultivation of other communication channels, which is also recognised by the project.

Despite the mixed messages with respect to the process and the usability of the product, the analysis of the system data indicates some real efficiency gains from the Hutt Valley eReferrals solutions. In 2008 paper referrals required a median 7 days to be triaged, with electronic referrals taking a median 5 days. By 2010, with increasing uptake and assimilation of eReferral processes, both paper and electronic referral triage times have continued to improve: paper median 5 days, electronic median 4 days. These improvements lay a strong foundation for improved patient outcomes and combine with the functional properties of the eReferral for accessibility and status visibility to yield a more trusted and reliable referral than is achieved with paper.

### **3.2. Northland: a Clinical Quality Improvement Oriented, Organic Approach**

The Northland eReferral solution, which was implemented in 2009 and continues to be iteratively developed as part of an ongoing clinical quality improvement initiative, encompasses GPs from 36 general practices referring patients to 29 services at the main 250-bed secondary hospital. The Northland project was an outgrowth of clinical quality improvement activity; as such, highly focused on a small number of specific conditions (at any one time), but also became fundamentally iterative and open-ended. It demonstrates that innovation can start small, in this case, getting the benefits of electronic delivery from a generic eReferral form while implementing just a few problem- or investigation-specific structured forms based on perceived greatest clinical quality improvement opportunity. However, this has, to some degree, restricted the ability to propagate eReferrals outside of the initial area of application.

From the start, Northland was a clinician-led project, targeting clinicians' requirements for seamless patient care transfer between primary and secondary services, with an attempt by a general surgeon to collect more and focussed data from referring GPs when patients were referred for colorectal problems. It was suggested that the planned hard copy form be developed as an electronic form attached to the primary care practice management system (PMS). The paper form was subsequently used as the basis of the Colorectal eReferral. The "analytical capacity around system design" brought in by the participating clinical leaders was regarded as a critical success factor for Northland. Both secondary and primary care clinicians were involved from the design phase, which is seen as a key factor in form acceptability and success.

The Northland experience demonstrates their ability to iteratively refine forms and improve process. The development and implementation of the new processes and software occurred as a series of reflective, self-correcting cycles while involving new stakeholder groups such as administrative users into this 'IT-enabled process re-engineering process.' Each step was analysed carefully for strengths and weaknesses and adjustments were made to the next step of the project. This resulted in a high degree of innovative thinking, unplanned software application development and iterative implementation as each component of the project became ready for use. While it was not a formal project there was always the intended structure of getting the referrals "to the door". Once this was established then progress development toward the full end-to-end solution was achieved. The implementation of eReferrals also addressed process problems such as replacement of paper referrals from GPs to avoid loss of hard copy letters in the mail system.

The GP liaison officer was a key figure in the Northland project, taking on the roles of project sponsor, manager, champion as well as an end user. This clinician operates in the clinical networks characteristic of healthcare systems. She drew on the network for participation in the project and relied on the relationships to simplify implementation of the new processes and software. Almost all interview participants mentioned the GP liaison officer's persuasiveness and consistent support throughout the eReferral implementation, which clearly contributed to the success in uptake of the solution.

Four different organisations were involved in this project – DHB, PHOs and two vendors. Some interview participants commented that the relationship between the vendor of Northland eReferral solution and the vendor of GP PMS became strained at one point. The interviewees commended the vendor of the eReferral solution on their persistence and efforts to forge a productive relationship in the interest of gaining a positive outcome for the project. They also commended the vendor for their investment in additional unplanned development of RMS-Lite (which is the hospital-based eReferral management system) to meet the needs of the hospital clerks. The requirement for creative responsiveness to the unexpected need for RMS-Lite demonstrates the advantage of an agile and open working relationship between vendors and health organisations to support a successful innovation partnership.

The solution is clearly finding acceptance with a wide and growing set of Northland GPs. Analysis of transactional data confirms a rapid uptake and sustained use of the system. Northland intends to continue to refine and broaden its set of eReferral forms. An internal audit of the diabetes general referral forms found the electronic version significantly improved completeness of key information [10]. Further and more comprehensive audits are needed to provide the supporting evidence for the generally held belief that these forms are highly successful in improving the quality and appropriateness of referral content.

### **3.3. Canterbury: “Whole of System” Initiative**

The Canterbury Initiative (CI) was formalised in August 2007 in the wake of a Ministry of Health policy to reduce referral waiting time to six months or less. CI, like Northland, is fundamentally open-ended; and is a manifestation of a ‘whole of health system’ approach that is not attached to any traditional boundaries of community and secondary service. As put by the Canterbury DHB General Manager, Planning and Funding, “there’s only one budget, so it’s a single health system.” In Canterbury, eReferral is a tool that helps to support a sustained effort of specification of HealthPathways that provide clear, locally-negotiated procedures for referral to secondary services. CI has been associated with a dramatic refocusing of care back to the community, and innovative services such as GP triaging for community referred radiology (CRR).

Canterbury has successfully combined strong clinical leadership with active participation from DHB Funding and Planning to develop clinical pathways that support the appropriateness and the quality of referrals. CI is notable for starting with the HealthPathways (the electronic referral management system or ERMS, the eReferral solution introduced in July 2010, is a relatively late introduction) and for transfer of funding, along with service, into the community. Each of CI's 300 (as of May 2011) HealthPathways represents an agreement of the local pathway of management for a given condition, including referral criteria, contact information and fax-able templates. The extent of and the sustained high productivity in pathway authoring (of which ERMS eReferral form design is an outgrowth) is such that a substantial segment of the local providers would be directly involved in a process that was noted for building trust. The pathway definition process consists of a maximum of five 90-minute evening meetings, where general practitioners and specialists have ‘robust’ discussion regarding the issues, requirements and workflows relevant to the management, assessment, and referral for a condition. The CI facilitator related, “General Practitioners engaged with hospital colleagues in work groups and through education create an environment that enables change. Relationships provide the vehicle to progress.” CI also emphasises regular ‘Information Evenings’ to introduce further pathway innovations and get community feedback, with CME points awarded for participation.

In Canterbury, general practitioners are empowered to take on services where community based care was considered to be the most appropriate environment for care. Such empowerment included the explication of their role in the HealthPathways, training to take on additional roles (e.g. in skin lesion excision), GP to GP referral and funding for the increased services provided (e.g. in excisions, management of heavy menstrual bleeding and initiation of insulin). This approach to enabling general practice has significantly reduced the overall quantity of referrals into some services.

CRR service pioneers the use of ERMS-based electronic support for GP triaging teams to provide feedback to community-based referrers about appropriateness of public referrals and alternative management options. Pathway documents, referral forms, and referral decline message content (including from GP triagers) all serve to inform referrers of expectations. In particular, triagers communicate the agreed pathways and referral criteria back to general practice in decline reasons in an effort to remodel referral traffic. Furthermore, CI CRR staff indicated they wished to add explanatory messaging on referral acceptance, as well, to provide communication on referrals that were being accepted in the interest of the patient, but where in future other management options might be considered.

In brief, the philosophy of one health system is fundamental to the CI approach that focuses on facilitating appropriate use of resources by appropriate referrals and subsequently transforming how care is delivered. CI has encouraged general practitioners and practice nurses to take on additional roles in pathways, for instance by training of general practitioners to expand skin lesion excision services (and take referrals from other general practitioners for this). This has significantly reduced waiting lists in many cases, for example dermatology. Canterbury has demonstrated the power to transform health delivery by having the right team of dedicated champions, and putting aside conventional boundaries of primary and secondary services (including routing of funding to general practice where it takes up work previously done elsewhere). The positive results suggest that this philosophy and structure is worthy of emulation.

### **3.4. Auckland: IT Project**

The Auckland project promises the largest scope and greatest process interoperability of the projects reviewed, with the opportunity to learn from prior efforts and provide additional hard evidence of the benefits of eReferral to healthcare provision. The implementation process of Auckland solution is still at an early stage (entering pilot operation at the time of reporting). To minimise risk and maximise success, the Auckland project has been divided into three separate phases, with the phases focusing on primary care referrals, referral workflow (including internal and forwarded referrals), and decision support, respectively. The Auckland project is, on the surface, set to be more in the Hutt Valley 'project' mould, but it is positioned to learn from each of these earlier implementations.

### **3.5. Key Learnings from eReferral Implementations**

As a summary of the three approaches that were evaluated (excluding Auckland metro, where the implementation process is still at an early stage), each project has shown clear benefits to participants at an organisational and individual level. Patients have benefited from shorter referral cycles (e.g. reduction of waiting time for secondary services indicated at Hutt Valley and Canterbury); the increased clarity and comprehensiveness of data presented to their specialists; and the potential, not yet fully explored, to engage more directly with their treatment by the option of accessing their referral record in conjunction with their physician. Clinicians have benefited by referrals now being screened, either within the primary sector (Canterbury) or within the hospital (Northland), resulting in specialists only having to see patients whose condition indeed warrants their involvement and, when seeing referred patients, having more appropriate information, including test results, to hand. In brief, each implementation provides a distinctive and complementary message.

All eReferral solutions offer the opportunity for a stronger link between community and secondary services. Decline messages, in particular, open the potential for relatively spontaneous conversation wherein specialists explain referral criteria to GPs. Moreover, the speed and reliability of eReferral may be encouraging GPs to use the referral mechanism for a 'virtual consult' – where the expectation is to receive information rather than to actually transfer the patient. In the Northland solution, this is explicitly labelled as 'advice only' referrals. The growth of total GP referral volume at Hutt Valley suggests that something along these lines is also happening. And, in fact, Canterbury ERMS forms allow the virtual consult option to be selected explicitly.

The process of developing eReferral forms opens community / secondary communication of a different kind. The eReferral implementation offers the opportunity for specialists and GPs to communicate around the process of designing (and iteratively re-designing) eReferral forms. Canterbury offers a distinctive perspective where the HealthPathway is the leading artefact and referral forms (for fax and for online completion) are subsidiary related components. This approach places more explicit emphasis on the effort to negotiate a transformation of health service delivery.

## **4. Discussion**

Lessons drawn from this eReferrals evaluation have some implications for health innovation projects in general. Such projects must recognise the pioneering nature of the enterprise, one that puts aside entrenched notions of a divide between primary and secondary services, and requiring an approach that in many key respects differs from more routine system implementations. Specifically there is a need for continuing support of a range of leaders and ongoing, iterative expansions and revisions of the referral management support services.

Whatever specific approach is taken in innovative health IT initiatives, the importance of iterative refinement, user engagement and feedback must be emphasised. They should not be viewed as just a 'project' that comes to an end at a set date; they must be ongoing initiatives, with ongoing capacity. Moreover, an understanding of the workflow and requirements of multiple stakeholders should be established early in the planning phase of projects. This is to establish

an end-to-end business process, as well as to identify and plan for any necessary change management. Based on eReferrals experiences, a process that realises the full benefits of health innovations would appear to need several inter-related elements:

- Iteration – Innovation systems will never be perfect on the first effort; revision should be planned. Moreover, it is inappropriate to delay the benefits of innovations until a comprehensive solution is formulated. Taking eReferrals as an example, a general referral form offers advantages over no eReferral form, even if a form with investigation-specific content and active decision support may be better. The multi-phase approach to technology implementation and workflow management in the Auckland project is a good step in this direction.
- Engagement – It is very easy to leave out the concerns of stakeholders. It is natural for one group to be unaware of the needs of another. General practitioners and specialists do not have a natural empathy for each other's needs; for this reason the CI process involves them workshoping together in five focused 90-minute sessions for each pathway. Similarly with clinicians and administrative staff, input from both is needed to understand workflow requirements. IT staff and management, who are apt to make decisions on systems such as eReferral, are yet further and distinct stakeholders.
- Leadership and change management – a transformative innovation will change the way of working for busy staff. This will not be entirely easy or positive. For instance, eReferral applies pressure on general practitioners to change from dictation to typing and on specialists for online rather than paper/printout review. Users can easily miss major system features that designers thought were obvious. Clinicians will disengage when encountering even very minor problems without further support and encouragement. The process of transition must be given explicit attention.
- Feedback and evaluation – even simple feedback can be very informative to reveal the most important usability and workflow problems. Moreover, there is a strong need to continue to gather evidence about the impact of innovative health IT systems, including eReferrals. Evidence of impact is needed to create the case for sustained iterative improvements. Evaluation must be integral to all such projects, not a separate project that may or may not happen long after implementation has been completed.

Extending the last point above, evaluation for health innovation projects should be planned, especially for iterative feedback to improve the implementation process, to measure the benefits, and to sustain the success [11, 12]. Such projects need to be managed and resourced from the start to embed evaluation, iterative refinement and diffusion of findings, and with careful management of expectations. In general, specific measurement of health outcomes are beyond the scope of these types of evaluation, as health impacts will normally arise over the long term and cannot be measured with credibility without the use of Randomised Controlled Trials. However, what this type of evaluation should be able to measure is intermediary (or process) measures; that is, impacts on the system, the clinical and administrative users and the patients. Examples may include reduced elapsed times, reduced levels of referral, changes in clinical and administrative roles, or reduction in unplanned admission rates.

A key limitation of the present study is that it was retrospective for the three operational eReferral implementations. There would be many advantages to collection of baseline data prior to implementation. This applies particularly to cost/benefit analysis. Evaluations that are planned at the time of the project business case can align to the business cases cost/benefit analysis. Measurement of the assumptions of the business case should be integral to the implementation plan. For example, if the business case is based on savings of staff time, then baseline and post-implementation staff time should be measured (by time-and-motion studies or indirect methods). If the case is based on patient safety, then this needs to be defined and measured (again, at baseline and post-implementation). The Auckland project is well-positioned to contribute valuable evidence of eReferral benefits as it has well-articulated benefits that aligned substantially with our observations from the other three implementations. The evaluation did not include content analysis to determine changes in referral quality, nor did we conduct a 'time and motion' analysis of GP or specialist user effort. Moreover, we cannot differentiate improvements due to eReferral implementation from other process improvements that may have happened concurrently.

Health innovation projects succeed best where there are agile and responsive relationships between the software vendors and healthcare providers. Persistence in difficult times and the ability to respond creatively to unanticipated consequences of an innovation project are valuable components of vendor-provider relationships. The exchange, sharing and building of knowledge throughout the project's duration are reliant on these relationships. It is important to reflect this 'partnering' style of relationship in terms of the contractual and commercial frameworks, the approach to sharing understandings and insights, the division of responsibilities and most importantly the culture that is developed within the project. Too often projects develop an adversarial culture when as inevitably happens, the project encounters difficulties, and this is especially true of projects with a significant component of innovation.

## 5. Conclusion

Based on an evaluation of electronic referrals implementations, this paper discussed the implications of their distinct approach to health innovation projects. Hutt Valley was implemented as a traditional IT project; Northland grew their project organically out of a clinical quality improvement initiative; Canterbury have undertaken a 'whole of system' approach combining strong clinical leadership with active participation from Funding and Planning. Learnings from these implementation processes emphasise the importance of iterative refinement, user engagement, leadership and change management, as well as feedback and evaluation. Innovative projects have to recognise the pioneering nature of the enterprise, one that puts aside entrenched notions of a divide between primary and secondary services, requiring an iterative and engaging approach and a relationship between vendor and implementer that places an emphasis on collaboration.

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