Achieving Acceptable Structured eReferral Forms

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Abstract
This paper reports on the implementation of electronic referrals (eReferrals) from community to public secondary services in New Zealand, with a focus on contrast and comparison of the knowledge engineering processes of two distinct regional projects with respect to eReferrals in the colorectal domain. The study data was gathered from project documentation, visits to key sites, analysis of electronic transactional records and stakeholder interviews. Both regional projects demonstrated effective processes of engaging hospital and general practice clinicians in developing investigation-specific eReferral forms: one with an iterative approach, and the other with a structured process. These negotiation processes among the participating clinicians have been effective in presenting, integrating and transferring specialised and locally contextualized knowledge. The resulting structured colorectal eReferral forms have shown sustained uptake and acceptance in both regions. The knowledge embedded in the forms clarifies referring criteria and collects appropriate information for referral triage. Involving both specialists and general practitioners in the form development and refinement has been identified as a key to success in both cases. In conclusion, it is critical to facilitate a negotiation process among secondary and community clinicians in order to achieve acceptable eReferral forms.

Keywords: computer communication networks; electronic referral; knowledge engineering; professional practice.

1 Introduction
Medical referral from a general practitioner (GP) to a specialist is probably the most obvious and familiar kind of referral to a New Zealand health consumer (as compared to, for instance, an administrative referral between two services within a hospital). The key reasons for such GP-to-specialist referrals are for diagnosis or investigation (e.g. special tests), treatment, and reassurance of GP and/or patient. It has been found, however, that specialists are not generally satisfied with the letters from GPs because some letters do not include enough information: (1) to adequately address the problem; (2) about the reason for consultation, socio-psychological factors, or plans for follow up; or (3) on clinical findings, test results and details of prior treatment (Piterman and Koritsas, 2005, Gandhi et al., 2000, Jenkins, 1993, Williams and Peet, 1994, Tattersall et al., 2002). Overall, the most important information specialists need from GPs regards the problem to be addressed, the clinical questions to be answered, details the patient is unable or unlikely to provide, medical problems and medications (Gandhi et al., 2000).

Research has been conducted into improving GP-to-specialist communication through the use of form letters, that is, a structured or standardised referral letter. One study reported improvements in the quality of referral letters after introduction of a form letter (Couper and Henbest, 1996). It presents a type of knowledge engineering challenge, however, to convey the key criteria for clinical triage assessment using a structured form that GPs will accept. Knowledge engineering, in general, refers to the integration of knowledge into computer systems to solve complex problems normally requiring a high level of human expertise (Feigenbaum and McCorduck, 1983). The knowledge engineering task in developing electronic referral (eReferral) forms appears to focus on the representation of specialists’ knowledge about what information is required from the GP in order to adequately address the problem and support a clinical decision.

New Zealand has one of the highest bowel (colorectal) cancer death rates in the world, with a five-year survival rate of 60.8 percent in 2002-2006 (Statistics New Zealand, 2009). Moreover, the investigation of colorectal symptoms such as large bowel symptoms in New Zealand primary care is fraught with a number of issues, including multiple clinical pathways and long waiting lists, motivating exploration of structured eReferrals to improve clinical quality in this domain (Davis, 2009).

eReferrals technology is one of the underpinning technologies in The New Zealand National Health Information Technology (IT) Plan which proposes an improved and rationalised health IT infrastructure that will ultimately support a transformed and more sustainable healthcare system (National Health IT Board, 2010). eReferral systems for GP-to-specialist referral have been evaluated on a small scale in the United Kingdom, where
they were found to improve demographic content of referrals but worsen clinical content (Shaw and de Berker, 2007). We have evaluated four eReferral implementations during 2010-2011: the systems already in operation at Hutt Valley, Northland and Canterbury District Health Boards; and the Auckland Metro region’s solution (entering pilot operation at the time of reporting). The Hutt Valley (Warren et al., 2011d), Northland (Day et al., 2011), and Canterbury (Warren et al., 2011b) findings individually, and the results of the four evaluations collectively (Warren et al., 2011a), are available through the Health Innovation Exchange website (the HIVE, http://hive.org.nz/).

The current paper concentrates on the learning from the Northland solution and the Canterbury referral management innovations (the Canterbury Initiative, CI) using the example of referral to investigation of colorectal symptoms. Our findings in Northland and Canterbury are compared in terms of their approaches, uptake and acceptance to shed light on the nature of an appropriate process for creation of acceptable eReferral forms.

2 Methodology
Evaluation data 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 overall study protocol was approved by the Multiregional Ethics Committee, approval MEC/10/066/EXP. The qualitative and quantitative study design was based on our evaluation framework for innovative health IT initiatives (Warren et al., 2011c), eReferrals requirements by Health Information Strategy Advisory Board (HISAC) (HISAC, 2005) and the criteria pool utilised by Lau and colleagues for health information systems evaluation (Lau et al., 2007). Quantitative data such as electronic transactional records and system access logs were analysed to assess the uptake and usage pattern of eReferrals as well as the impact of system implementation. Qualitative data was also collected to capture the “voices” of those involved in and impacted by the innovations, including clinical, operational and management stakeholders. Additional information was gained by review of Northland eReferrals evaluation studies previously conducted (Davis, 2009, Davis, 2011). Using these data, for each project (Northland and Canterbury), we examine the development approach, the knowledge engineering products, and the evidence of uptake and acceptance.

3 Results

3.1 Northland’s eReferral Project
Northland grew their project organically on a relatively low budget. 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 public hospital.

3.1.1 An Iterative Approach
Origin of the Northland project lies in an attempt by a general surgeon to resolve the issue of inadequate referral information for colorectal problems by collecting more and better focussed data from referring GPs. The surgeon drafted a scoring referral form in 2008 to address the problem of lack of information in terms of content (what data is required for the specialist to be able to act) and format (the best data structure for easy access to the content). It was suggested this draft be developed as an electronic form attached to the primary care practice management system (PMS). GPs were then invited in an iterative process of development, refinement, and pilot implementation of the colorectal eReferral form which was based on the surgeon’s draft. Dialogue continued among specialists, GPs, technology vendors, and management regarding the form design and review in face-to-face meetings, group emails, and the pilot project communications. At the end of this process, the form was released to the wider Northland GP community, achieving immediate acceptance and uptake.

Northland’s colorectal form and their other well accepted structured eReferral forms, succeeded from an iterative approach that was often initiated by hospital specialists then involved primary clinicians in later cycles. Learning from the experience with colorectal form development that demonstrated the importance of involving primary care providers, the Northland project team has recognized and implemented open dialogue involving the GP users. The project leader commented, “One of the lessons we have learnt which is valuable is that involving ALL people who work in the workflow (both clinical and non-clinical) is important to ensure the mechanisms of the developed pathway are feasible.”

Specialists were enthusiastic to design structured referral forms in conjunction with primary health; they were also actively involved in form training at “road shows”. The analytical capacity around system design brought in by clinical leaders is highly regarded. The specialists expressed a need to provide some form of guidelines for GPs for appropriate referral content, e.g. asking specific questions to prompt the inclusion of certain data. Then input from both specialists and GPs was captured in an iterative process of eReferral design and refinement through open communication. One specialist related a story about creating what he thought of as a well-designed and informative form for patients referred to him. When he met with some GPs to show them the structure, they presented an entirely different perspective that resulted in a very different final version of the form. GP involvement from the design phase of eReferral forms appears essential to the form acceptance.

The Northland experience demonstrates their ability to iteratively refine eReferral forms and for process improvement. The development and implementation of all their forms, and the associated new business processes, occurred as a series of reflective, self-correcting cycles. Each step was analysised 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, but unexpected software development and iterative implementation as each component of the project became ready for use.

3.1.2 Northland’s Colorectal Form
Figure 1 is a screenshot of the clinical section of Northland’s colorectal eReferral form (Surgery –
Colorectal Referral for Outpatient Appointment), consisting of three key assessment criteria: symptoms, family history, and personal history. Figure 2-4 show the expanded views once each criterion is met; these pages
Figure 3: Northland's colorectal form – clinical section: ‘Family history’ expanded

Figure 4: Northland's colorectal form – clinical section: ‘Personal history’ expanded
collect the most valuable information that specialists and GPs agreed as appropriate and adequate in the referral. The interface design endeavours to capture these key data for clinical triage decision making in a quick and easy fashion for the referrers. The information required includes high risk symptoms and low risk symptoms as a list of tick boxes, and the relevant family and personal histories with tick boxes complemented by free text.

The form is integrated with Medtech Global’s Medtech32 Practice Management System (PMS), the market leading product for GPs in New Zealand. The eReferral form is auto-populated with relevant PMS data such as medical history (including long term conditions), medications, and allergies, reducing the data entry burden.

3.1.3 eReferral Acceptance

After its initial iterative development cycles, Northland’s colorectal eReferral form achieved steady and sustained uptake. The number of colorectal eReferrals received each month since its implementation in 2009 is recorded in Figure 5. (Note the two major downturns can be attributed to the Christmas / summer holiday period; similar dips were observed for total eReferral volume at Hutt Valley (Warren et al., 2011d)). A survey of 41 GPs shortly after the introduction of the colorectal eReferral form found 57% uptake and universal support for the improved service pathway, as well as 88% support that the form has made the referral task at least somewhat faster (Davis, 2009).

![Figure 5: Northland’s colorectal eReferrals monthly volume](image)

The content of the colorectal form has shown evidence of significant improvement in terms of the adequacy of referral information leading to more accurate prioritisation and patient quality improvement (Davis, 2009). The evolution of structured colorectal eReferral is such that it provides a knowledge framework to referring GPs so that they can draw their own conclusions about the urgency and complexity of the colorectal problems they refer. As stated by the surgeon, “we’ve structured the colorectal form so that the GPs do a kind of triage of their own because of the data they insert and how they’re asked for it. This is very helpful for both them and us.” GPs appeared to find this helpful, as one related, “in situations like a colorectal referral or in a diabetes referral, and in selected other referrals as well, the receiving specialists have identified for us the key bits of information that they require in our referrals. And other fields are automatically brought up for us to fill in as we’re doing the eReferral. So the effect is that the receiving specialists are getting higher quality information more reliably through eReferrals than they would have been otherwise.”

The implementation of eReferrals in Northland has promoted and facilitated continuous improvement of referral quality. By the end of February 2011, eReferral has been widely taken up by Northland GPs using six structured forms (Colorectal, Breast, Diabetes-retinal, Diabetes-pregnancy, Diabetes-general, and Acute) and one generic form. Northland specialists have reported that these forms contain “good quality transfer of care data.” “The information presentation has changed substantially.” “[The structured eReferral form] allows us to address the problem.” and “This was a huge opportunity to get GPs to include information that they don’t normally think about when writing a referral but that’s important to us.”

3.1.4 Ongoing Improvement

Northland are also becoming increasingly aware of some unintended negative consequences with customisation in structured forms that requires further investigation to learn and avoid replicating these problems across more forms and over wider areas. For instance, the structured data fields offer GPs the ability to use them as prompts, aiming at completeness that satisfies both GP and specialist. But comments from both GPs and specialists about the structured fields reflected a concern that data becomes inaccurate when a GP has a particular word or phrase in mind and ends up selecting the “best fit” from the structured fields. Northland has discovered that free text is invaluable and forms need to support the inclusion of the patient story. As put by the project leader, “we have identified that we need to support more free text in general but specifically in relation to the inflammatory bowel referral option as ticking this box gives insufficient information to prioritise…. This is a problem with using symptom complexes rather than binary or limited choice structured answers. We are looking at simple education in the first instance to combat this problem.” The resulting lack of clarity potentially puts patient safety at risk, something both sets of doctors are acutely aware of. There is a sense that the structured data “puts words in my mouth” when the narrative would have sufficed in presenting the patient’s case. The colorectal form has been in use for three years and the Northland experience has identified weaknesses that could be improved upon, but there is a financial burden to this. The Northland project leader related, “While we are trying to be evidence based in medicine in our clinical interventions, there is a worrying blind spot to taking this approach with the „tools” we are adopting.”

3.2 Canterbury Initiative

The „Canterbury Initiative“ (CI) is a healthcare transformation programme that subsumes referral management innovations for Canterbury District Health Board and is notable for its 300 HealthPathways (as of May 2011). These pathways are local agreements between GPs and specialists on the criteria, procedures and fax-able templates for appropriate referrals to public secondary services. Extended from these paper-based referral templates, CT’s eReferral solution became operational in
July 2010, providing GPs with standardised online referral forms with data pre-population from their desktop PMS (Medtech32).

3.2.1 A Structured Process
CI has established a structured HealthPathway definition process that consists of a maximum of five 90-minute evening meetings, where GPs and specialists have „robust” discussion regarding the issues, requirements and workflows relevant to the management, assessment, and referral for a condition. These discussions are both informative and conclusive for iterative drafting of the pathways until agreement is reached. The CI facilitator described this process as follows, “at the initial meeting issues and opportunities are identified – a blank white board session. The actions required to address the issues are agreed and assigned. The second meeting doesn’t occur until actions have been progressed. This provides confidence to group members that they are investing their time in activity that actually delivers change. The same applies to subsequent meetings – a maximum of five meetings, which are all in the evenings. All clinicians are paid to attend these hour and a half long meetings. The process takes from 6 to 12 months.” This series of meetings, at its core, is a platform to enable negotiation between GPs and specialists regarding the local way of working with the resources that are available.

By engaging both secondary and primary clinicians, the HealthPathway authoring process, not just the direct product itself, is viewed as part of the reason for CI’s success, particularly because of the trust and relationships it builds. The CI facilitator related, “over time individuals and groups gain confidence and begin to trust each other –– they are all working within constrained resources and that they need to work together to get the best outcome for patients –– the whole of system solution. 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 emphasizes regular „Information Evenings”, with continuing medical education (CME) points awarded for participation, to introduce pathway innovations by face-to-face communication with GPs and get community feedback for further improvement.

3.2.2 Canterbury’s Colorectal Pathway
CT’s „colorectal symptom pathway” is accessible to Canterbury area health providers via the HealthPathways website (http://healthpathways.org.nz/) under „Gastroenterology” or „General Surgery” or through direct search. This pathway employs quantitative scoring (as shown in Table 1) in its „colorectal symptom flow chart” which gives the threshold scores for referrals to secondary public services and other management options (see Figure 6).

The „Gastroenterology / Endoscopy CT Colonography / Colonoscopy Diagnostic Request Referral” form is indicated for if the required score is met, and is available both as a paper-based template and as an eReferral form (a screenshot of the clinical section on electronic version is shown in Figure 7). The interface design applies the same principle as in Northland to minimize referrer’s effort by dropdown buttons and tick boxes.

3.2.3 Canterbury Uptake
The information in CI pathways and the associated referral forms guides GPs in collating assessment, examination, and investigation findings. Figure 8 shows the sustained access to the „colorectal symptom pathway” pages during a 12-month period from 1 August 2010 to 31 July 2011. These pages were viewed a total of 2,351 times with clear pattern of use during working days (i.e. on a case-by-case basis when doctors are seeing patients, not during out-of-hours times that might be used for discretionary up-skilling).

A sense of improved appropriateness of all referrals as a result of pathway implementation has been repeatedly mentioned in Canterbury interviews. It was described as „right cases with right information most of the time.” This perceived appropriateness has resulted in fewer declines. As stated by a referral triager, “in terms of just the request for a CTC [computed tomographic colonography], a simple answer is no: we decline very very few, because very very few inappropriate referrals come in anymore.” CI’s approach has transformed care delivery in Canterbury in terms of reducing demand for secondary public services by providing explicit scoring to prioritise the use of the limited resources for publicly funded colonoscopies, with the scoring serving to dissuade referral in cases that will fall below the public service threshold. One of the CI leadership team members stated, “This tool is used for resource allocation in a constrained resource environment and some patients do not receive treatment meeting recommended guidelines.”

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Table 1: The scoring criteria of CI’s „colorectal symptom pathway”

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectal Bleeding (&gt; 6 weeks)</td>
<td></td>
</tr>
<tr>
<td>Sinister or</td>
<td>12.5</td>
</tr>
<tr>
<td>Outlet</td>
<td>5</td>
</tr>
<tr>
<td>Change in Bowel Habit (&gt; 6 weeks)</td>
<td></td>
</tr>
<tr>
<td>Choose one only</td>
<td></td>
</tr>
<tr>
<td>Loose</td>
<td>10</td>
</tr>
<tr>
<td>Weight Loss (&gt; 5 kg)</td>
<td>5</td>
</tr>
<tr>
<td>Examination Findings</td>
<td></td>
</tr>
<tr>
<td>Abdominal Mass</td>
<td>20</td>
</tr>
<tr>
<td>PR Mass</td>
<td>20</td>
</tr>
<tr>
<td>Bloods</td>
<td></td>
</tr>
<tr>
<td>Unexplained Iron Def Anaemia</td>
<td>20</td>
</tr>
<tr>
<td>FOB positive (with any symptoms above)</td>
<td>10</td>
</tr>
<tr>
<td>If Diarrhoea/Loose Motions</td>
<td></td>
</tr>
<tr>
<td>CRP &gt; 10</td>
<td>10</td>
</tr>
<tr>
<td>Family History CRC</td>
<td></td>
</tr>
<tr>
<td>Cat 1</td>
<td>0</td>
</tr>
<tr>
<td>Cat 2</td>
<td>5</td>
</tr>
<tr>
<td>Cat 3</td>
<td>10</td>
</tr>
<tr>
<td>Personal History Adenoma</td>
<td>5</td>
</tr>
<tr>
<td>Personal History CRC</td>
<td>5</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>&gt;=60</td>
<td>10</td>
</tr>
<tr>
<td>40 - 59</td>
<td>0</td>
</tr>
<tr>
<td>&lt;40</td>
<td>-5</td>
</tr>
</tbody>
</table>

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1 CI’s HealthPathways is password protected. CI has indicated that readers may request temporary access by emailing HealthPathways.
The red boxes are clickable; e.g., „Scoring tool outcome?“ links to a referral form with scoring criteria (see Table 1).

**Figure 6:** Screenshot of CI’s ‘colorectal symptom flow chart’ on the ‘colorectal symptom pathway’

**Condition Specific Information Requirements**

(Please specify any conditions (and severity) which may affect the patient’s ability to tolerate sedation and/or bowel preparation. Tick to answer Yes.)

- **Artificial heart valve**
  - [ ]

- **On Warfarin or Clopidogrel**
  - [ ]

- **Too frail to tolerate sedation and/or bowel preparation**
  - [ ]

**Symptoms**

- **Rectal bleeding (>6 weeks)**
  - [ ]
  - Score: 0.00

- **Change in bowel habit (>6 weeks)**
  - [ ]
  - Score: 0.00

- **Weight loss (>5 kg)**
  - [ ]
  - Score: 0.00

**Examination Findings**

- **Abdominal mass**
  - [ ]
  - Score: 0.00

- **PR mass**
  - [ ]

- **Lab Tests**

- **Unexplained iron deficiency anaemia**
  - [ ]
  - Score: 0.00

Enter the value for these tests:

- **Hb**
  - [ ]

- **NCV**
  - [ ]

- **Ferritin**
  - [ ]

- **FOB positive & no overt bleeding (with any symptoms above)**
  - [ ]
  - Score: 0.00

- **If diarrhoea/loose motions CRP > 10**
  - [ ]
  - Score: 0.00

- **Family history CRC**
  - [ ]
  - Score: 0.00

- **Personal history adenoma**
  - [ ]
  - Score: 0.00

- **Personal history CRC**
  - [ ]
  - Score: 0.00

- **Age**
  - [ ]
  - Score: -5.00

**Total Score**: -5.00

**Figure 7:** Screenshot of CI’s ‘Gastroenterology / Endoscopy CT Colonography / Colonoscopy Diagnostic Request Referral’ eReferral form – clinical section
3.2.4 Ongoing Improvement

While developed with careful consideration of the best evidence, as well as local workflow and demand, the scoring system and thresholds implemented (as per Table 1 and Figures 6 and 7) are as yet unvalidated in the clinical setting. A research study is underway to assess clinical limitations and potential patient risks. The will inform further refinement of the pathway.

It is not yet clear how many pathways and pathway-based referral forms will be required to support all areas of health service delivery in Canterbury where there is stakeholder demand. Established pathways will need maintenance, updating as well as refinement over time. For instance, one interview participant mentioned that the current information on a department pathway is far from adequate. Nevertheless, the content management solution is scaling well, with good enforcement of consistency in presentation that aids readability and gives reuse of successful design components, as well as ongoing enhancement of service-wide features such as online search. Moreover, the HealthPathways website provides a „feedback” button for users. And the scheduled review for each pathway is at one year after implementation and every two years after that. The review panel includes a clinical editor, clinical director, and the subject expert. One of the CI leadership team members related, “we look at which pathways are the most popular and if there’s any problems appearing because the referrals aren’t being managed – they can’t manage the demand for example, then we can review the pathway and see if there’s any areas that general practitioners could do more of. So we’ll look at them from a resource allocation aspect as well as the evidence base.”

4 Discussion

Organizational knowledge management theories have emphasized knowledge processing, including the codification, retention, integration, coordination, transfer, and sharing of knowledge (Alavi and Leidner, 2001, Argote et al., 2003, Sambamurthy et al., 2003). The negotiation process between specialists and GPs that occurred in both Northland and Canterbury has served as the mechanism that enables knowledge processing, particularly the knowledge codification, integration, and transfer. It is evident in both settings that there is a temptation for some specialists to attempt to bridge the knowledge gap by using structured (electronic) referral forms with decision support tools, such as quantitative scoring, to contextualize the patient’s condition in the discipline to which the patient is being referred. This works well with the colorectal forms in both regions, but it was not simply a process of codifying the specialists’ knowledge. Rather, their success lies in the negotiation processes undertaken that have been prolific in presenting, integrating and transferring the specialised and locally contextualized knowledge. The result encodes the negotiation, and incorporates both GP and specialist knowledge. Northland started with a knowledge engineering attempt to convert/model specialist’s knowledge into structured referral forms; but it soon turned into a negotiation process through GP involvement in form design that is critical to the form acceptance. Subsequently, both specialists and GPs were engaged in an iterative and effective process of form development, refinement and implementation. Similarly, Canterbury’s systematic approach of facilitating negotiation between primary and secondary clinicians aimed for and achieved local agreements on the criteria and procedures for appropriate referrals to public secondary services.

In the referral context, specialists and GPs are two main knowledge sources and users in the „network of relationships”; which according to social capital theory and knowledge management theory is where the collective knowledge is stored (Lindsey, 2002). The engagement of both GPs and specialists during eReferral form or HealthPathway design not only facilitated knowledge processing through their negotiation on the local way of working; it also enhanced the network of relationships among the healthcare providers across the traditional primary-secondary boundary.

In both Northland and Canterbury, condition- or investigation-specific eReferral forms (explicit pathways as well as forms in the CI case) are the result of robust discussion and negotiation between secondary and primary clinicians on the content, format, issues, requirements and workflows regarding referring a patient to a particular service. These knowledge-embedded structured forms clarify the referring criteria and collect appropriate information for referral triage. However, eReferrals 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, because the technology and evidence are constantly changing in medicine. For instance, with respect to evidence, a recent systematic review concluded that the common practice of performing colonoscopies to identify cancers in people with bowel
forms require further investigation, e.g. when a GP has to further differentiating the relevance of the symptoms. Moreover, eReferrals can provide a “hook” for electronic decision support and, potentially, for an IT-mediated social network among the stakeholders in the health of the referred patient.

The present study has a number of limitations. It is just the result of two case studies. Despite this limitation, the uptake data are compelling, and difficult to explain in any terms other than end user acceptance (at least by a broad sub-population of the area GPs). The structured eReferral forms in both cases have provided clarification for referral criteria and protocols. This has effectively bridged common barriers to successful coordination of eReferrals such as lack of an institutional referral policy, lack of standardization in referral procedures, and ambiguity in roles and responsibilities, as pointed out by (Hysong et al., 2011). The engagement of end users, i.e. clinicians from primary and secondary settings, in a negotiation process regarding local referral-related knowledge is a key factor for the eReferral success at Northland and Canterbury. This is consistent to eReferral experience that requires collaborating actors – clinicians on both sides of the referral process – to understand each other’s needs and work processes (Heimly, 2010), and consistent with the general health information system literature that emphasises the importance of having developers as users, to integrate decision support and benchmark practices, and to address such contextual issues as provider knowledge and perception (Lau et al., 2010). The present paper has not emphasized quantitative evidence regarding the impact on health outcomes from the implementation of structured eReferral forms beyond the evidence of uptake per se. We have, however, presented interview data, including many direct quotations, to illustrate that the tenor of feedback indicates that the health impacts are positive and promising. These provide pointers for where to direct additional quantitative measurements.

Canterbury provides a fascinating contrast to Northland in the emphasis on explicit pathways. eReferrals were only introduced to CI in July 2010; and their period of introduction coincides with the major earthquake events that have been highly disruptive to the region. The strong uptake of pathways, generally transformed to structured referrals by faxed paper forms rather than eReferral from the GPs software, gives an indication that the negotiation and dissemination of its product is the key element, not the online population of data into a structured form per se.

Last but not least, the issue of form design and development needs to be elevated to a national level, with a library of forms, including information on their usage and related evaluation findings, being maintained for access by new eReferral implementers. One of the biggest barriers might be the lack of a central process for form evolution/iteration that respects and utilises the expertise and experience learnt from implementations such as in Northland and Canterbury. A library per se might not solve this issue. There is much to be gained from the negotiation process being local, in terms of team building, and in terms of tailoring to local preferences and limitations. It is notable that the Northland and CI forms have many differences as well as similarities. Some differences will reflect useful differences in locality appropriateness. However, the differences also serve as a reminder that these forms and protocols, while having passed the initial gates of user acceptance and uptake, are in need of deeper validation for clinical effectiveness and safety. In either case, the opportunity to share learning between regional projects should be developed for its potential to shorten the journey to more widespread and successful evidence-based structured clinical communications.

5 Conclusion and Recommendations
Structured colorectal electronic referral forms have been found in two New Zealand regional implementations to meet with widespread and sustained uptake by clinical users. Such forms, and associated clinical protocols, provide a foundation for clarified referring criteria, more appropriate information for clinical triage and transformation in health service delivery. Experience from both projects demonstrated effective processes of engaging hospital and general practice clinicians in developing investigation- or condition-specific structured forms: one with an iterative approach, and the other with a structured process. The Canterbury case is interesting for emphasising widespread acceptance of online protocols as the primary objective, with computer-based input and transfer of data as secondary. The innovations of both regions show that whatever specific approach is taken, the
importance of user engagement, iterative refinement, and feedback must be emphasized.

Any health innovation process that is knowledge intensive should include elements such as:

- Engagement – It is very easy to leave out the concerns of stakeholders. It is natural for one group to have „blind spots“ regarding the needs of another. GPs and specialists do not have a natural empathy for each other’s needs; CI’s systematic process of workshopping together in five focused 90-minute sessions for each pathway is worth emulating in similar innovations.
- Iteration – The system will not be perfect on the first effort; revision should be planned. Northland has demonstrated a successful case of iteratively refining and improving the structured forms.

In brief, the processes of engaging both specialists and GPs can effectively achieve presentation and transfer of specialised and locally contextualized knowledge, as well as enhancing the network of relationships among the providers.

6 Acknowledgments

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