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HealthPathways implementation in a New Zealand health region: a qualitative study

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ABSTRACT

Objectives To explore the process of implementation of an online health information web-based portal and referral system (HealthPathways) using relevant implementation science theory: the Consolidated Framework for Implementation Research (CFIR).

Setting The Southern Health Region of New Zealand (Otago and Southland).

Participants Key Informants (providers and planners of health care) (n=10) who were either involved in the process of implementing HealthPathways or who were intended end-users of HealthPathways.

Methods Semi-structured interviews were undertaken. A deductive thematic analysis using CFIR was conducted using the framework method.

Results CFIR postulates that for an intervention to be implemented successfully account must be taken of both the intervention's core components and the adaptable periphery. The core component of the HealthPathways intervention – the web portal and referral system – had been addressed well by the product developers. Little attention had, however, been paid to the adaptable periphery – it was seen as sufficient to deliver the web portal populated with new HealthPathways to effect successful implementation. In terms of CFIR's "inner setting" corporate and professional cultures, the implementation climate and readiness for implementation were not properly addressed during implementation. There were also multiple failures of the implementation process. As a consequence, implementation of HealthPathways was highly problematic.

Conclusions The use of implementation science theory (CFIR) has furthered our understanding of the factors needed for the successful implementation of a complex health intervention (HealthPathways) in the New Zealand health system. Those charged with implementing complex health interventions should always consider the local context within which they will be implemented and tailor their implementation strategy to address these.

Word Count: 259

Strengths and limitations of this study
• This is the first process evaluation of HealthPathways implementation in New Zealand using qualitative methods and the first evaluation internationally to use an implementation science theory framework.
• The use of implementation science theory (Consolidated Framework for Implementation Research) allowed us to "unpack" the reasons why the implementation of HealthPathways in the Southern Region of New Zealand was so challenging.
• The study focused on a single health region as it was designed in partnership with the local health system to provide context specific findings that would be of benefit to the local health system.
• We were only able to recruit small number of participants who were not involved with the implementation process.

INTRODUCTION

The New Zealand (NZ) health system, in common with those of other jurisdictions,[1] struggles to provide integration of health services across primary and secondary care. One important quality improvement initiative promoted internationally since the 1980s to improve health care integration is care pathways. Care pathways have five key characteristics, they: 1) provide a structured multidisciplinary plan of care; 2) translate national evidence-based clinical guidelines into local structures; 3) detail the components of care required in an algorithm or pathway; 4) provide a time frame or criterion-based progression through the health system; and 5) aim to standardise care for a specific clinical condition in a specific local population.[2] In NZ a key adaptation has been the embedding of a web-based pathway into general practice-hospital electronic referral management systems (ERMS). The use of care pathways in NZ has been championed by Canterbury District Health Board (DHB), who in 2008 developed an online health information web-based portal and referral system called HealthPathways.[3] Currently HealthPathways provides health practitioners with guidance and a referral pathway for over 550 conditions (https://www.healthpathwayscommunity.org/About.aspx). There has been rapid adoption of HealthPathways and similar systems across NZ's DHBs and in Australia.[4-6] Its advocates claim that HealthPathways is an important means of achieving health care integration, [7 8] which has been a NZ government priority since the 2009 publication of *Better Sooner More Convenient.*[9] This claim is supported by an emerging evidence base, chiefly uncontrolled before and after studies, which suggest that HealthPathway use is associated with an improvement in referral quality from primary care to secondary

care and more timely access to secondary care.[3] End users of HealthPathways also report, in online surveys[8] and qualitative case studies,[5 6 10] that they improved their knowledge of local services and changed their clinical management decisions.

One key challenge in evaluating the implementation of HealthPathways is that they can be conceptualised as a complex health care intervention[11] and thus without a qualitative process evaluation it is not possible to determine which aspects of the intervention in a defined health care context are likely to lead to its success. In understanding how quality improvement initiatives work there is also increasing emphasis on the use of theory drawn from the social sciences to better develop quality improvement interventions, optimise their design and identify aspects of context necessary for their success.[12 13]

In the Southern Health Region of NZ's South Island (Otago and Southland), the Southern DHB and the WellSouth Primary Health Network (Primary Health Organisation: PHO) are working to further health service integration through Alliance South[14], which is a contractual alliance between the two organisations aimed at improving care coordination and integration. In 2013 Alliance South embarked upon the implementation of HealthPathways in the Southern Region – Southern HealthPathway - and by 2017 over 400 HealthPathways had been developed (https://southern.healthpathways.org.nz/). In 2016 a team of researchers from the Dunedin School of Medicine, University of Otago, partnered with the local health system through Alliance South to conduct a mixed methods evaluation of the Southern

HealthPathway programme. The overall aim of the collaboration was consistent with the United Kingdom's successful Collaborations for Leadership in Applied Health Research and Care (CLAHRC) which is to improve patient outcomes through the conduct and application of applied health research.[15]

We report here the findings of the qualitative process evaluation. Our study aim was to understand the process by which Southern HealthPathways were being implemented using a commonly used implementation science theory: the Consolidated Framework for Implementation Research (CFIR).[16 17]

Consolidated Framework for Implementation Research (CFIR)

The CFIR provides an overarching typology of implementation, providing a comprehensive, standardised list of constructs which allow researchers to identify variables that are most relevant to a particular intervention. The CFIR addresses intervention delivery (context; implementation; mechanisms of action) through 26 constructs organized into five major domains: intervention characteristics (eight constructs), outer setting (four constructs), inner setting (five constructs), characteristics of the individuals involved (five constructs), and the process of implementation (four constructs) (Table 1) [insert Table 1 here]. CFIR has been widely used to inform qualitative process evaluations across a range of complex interventions.[17]

METHODS

Design and sampling

Semi-structured interviews were conducted by ET between May and November 2016 with key informants (providers and planners of care) from the Southern DHB catchment area (Otago and Southland). The Southern DHB is the southernmost DHB in NZ and is responsible for planning, funding and providing health and disability services to a population of over 300,000 and serves the largest geographic region of all NZ's DHBs (https://www.southerndhb.govt.nz/index.php?page=654). The key informants were sampled purposively in order to construct a maximum variation sample that aimed to include primary care (general practitioners), hospital specialists, community nursing services and service planners from the Southern DHB and WellSouth PHO who were to a greater or lesser extent involved in implementing Southern HealthPathways.

Data collection

The semi-structured interviews used a topic guide based on a literature review and discussions within the research team. The topic guide (see Additional File 1) covered: a) views concerning the acceptability and utility of HealthPathways; b) the implementation of the HealthPathways initiative in Southern Region, with a focus on context specific barriers and facilitators to implementation; and c) any specific issues relating to the actual use of HealthPathways by participants (if a health care practitioner). The topic guide was used flexibly to allow participants to construct their accounts in their own terms. All interviews were digitally-recorded and transcribed verbatim.

Data analysis

A deductive thematic analysis was conducted using the framework method.[18] Interviews were coded deductively by ET, assisted by NVivo 10 qualitative analysis software, into the five domains of the Consolidated Framework for Implementation Research (http://www.cfirguide.org/qual.html) and, as appropriate, into each domains' constructs. TS independently checked the assignment of a sample of data to the domains and constructs. Interpretation of the data, in particular the linkage between the CFIR domains and constructs, was an iterative process which was led by ET and TS, with input from FDN and RG. In addition, reports and relevant documents were sought from the Alliance South HealthPathways Steering Group to provide background information and timelines.

RESULTS

Five general practitioners (GPs) and five hospital specialists were interviewed. Of the ten participants four had a Southern DHB planning/management, Alliance South or other clinical leadership role. Three participants had direct involvement with the Alliance South Health Pathways work programme.

As the interviews progressed and analysis was undertaken it became apparent that there were significant problems with the implementation of HealthPathways in the Southern Region. Thus the focus of the analysis shifted to using the relevant CFIR domains and constructs (Table 1) to systematically explore the question as to why implementation was proving problematic. Illustrative participant quotes are presented.

Domain 1: Intervention Characteristics

Core component and adaptable periphery

The CFIR framework conceptualizes complex interventions as having both core components (defined as the essential and indispensable elements of the intervention itself) *and* an adaptable periphery (adaptable elements, structures and systems related to the intervention and the organization into which it is being implemented).[16] In order for an intervention to be implemented successfully account must be taken of both the core components and the adaptable periphery.

Participants reported that the core component of the HealthPathways intervention – the web portal – had been addressed well by the product developers. It was considered to be well designed and easy to access, the pathways for each clinical condition were appropriate and the web portal supported use of the ERMS that generated the referral letter from primary to secondary care:

> *This has changed my life in primary care. This is the best thing …. If I have a problem, if I have a woman come in with postmenopausal bleeding I go tick, tick, tick, there it is. "Have you done this, this, and this? Is it this or that?" Do that. If it is this and this, then refer here [ERMS] and she will get an appointment. It's just e-mail off, she'll get an appointment within three weeks. (Participant 4)*

> *On the whole I'm a big fan of Health Pathways. I'm a fan of it and ERMS linking up well together …. General Practice in New Zealand is probably more electronically savvy than any other place in the world. (Participant 5)*

What was apparent, however, in participants' accounts of how the core component (web portal) was implemented was limited or no consideration of the adaptable periphery. There was no clear understanding by the local team leading the implementation process of the need to both construct and populate a web portal (core component) and to address related issues that were necessary for the Canterbury HealthPathways to be successfully adapted and used in the Southern Health System (adaptable periphery). As a consequence, the implementation project was resourced to deliver the web portal but not to do the necessary related activities. Thus there was little or no funding of primary care time to allow engagement with project development and with secondary care. Support for the key activity of communicating about the intervention, its benefits, and how it can be used to further integration across primary and secondary care was also lacking:

> *I don't think you can go back to what Canterbury did [to achieve successful implementation] because the time and resources aren't there. (Participant 3)*

In short, it was apparent that the adaptable periphery had not been addressed - it was seen as simply sufficient to deliver the web portal populated with minimally edited HealthPathways to effect successful implementation:

> *What they would do would be to take the Pathways that had been developed in Canterbury and simply cross out Canterbury and write Southern on them, and that would be fine and behaviours would change and everything would be hunky-dory. This mistaken view that what's on the flowchart on the piece of paper at the end is the process, which it isn't. I said to them on numerous occasions it is like*

taking somebody else's holiday snapshots and thinking that you've then had a holiday, which is complete nonsense. Most of them you won't understand. The essential part of HealthPathways is the conversation. (Participant 1)

Domain 3 – Inner Setting

CFIR's "inner setting" is defined as the structural and cultural contexts through which the implementation process occurs.[16]

Culture

Implementation of the HealthPathways took place in a local health system where two strong corporate and professional cultures mitigated against the successful implementation of an intervention that straddled both primary and secondary care. The first of these, the local corporate culture – expressed through the relationships between the DHB, PHO, secondary care clinicians and general practice – was seen as being both resistant to change and characterized by a low trust relationship between the DHB and the other actors in the system. Resistance to change was considered at least in part due to a continued environment of financial austerity and a need for the DHB to "balance its books":

A resistance to change, which I think was about the whole health system being so stressed at the time with focus on financial deficit. (Participant 8)

A low trust relationship was considered to exist between the DHB and the other actors, notably general practice. Participants considered HealthPathways was yet another

transient initiative to improve health care, which would likely fail to deliver its intended outcomes:

> *Mistrust, it's being done to us and what are the DHB, they're sending me negative vibes about management in this DHB. This is another effort and just one of their things, and like other things it will come and go. (Participant 2).*

The second prevalent culture was one where secondary care (hospital specialists) and primary care (GPs) were seen as having different cultures based on their different scopes of medical practice and funding models. This culture of an embedded division between primary and secondary care had not to date been addressed in the Southern Region through formal facilitated initiatives to get both groups working collaboratively across primary and secondary care:

> *I don't think that there's any particular antipathy. The way I see it from the secondary care perspective, by and large, and I don't really know what our colleagues in primary care think, but I do think that from secondary care clinicians, they've never had the opportunity of being in the same room and working out processes with primary care. I don't think they're opposed to it, it's just a foreign idea. (Participant 1)*

Implementation climate

A key aspect of the implementation climate that was not addressed properly was organizational incentives and rewards. The implementation process failed to consider ways in which using the Pathways would be rewarded for either secondary or primary care. That is to say, for clinicians that understood the purpose of pathways then using

them made sense and was rewarding because there was an appreciation that things were being done more efficiently. For clinicians who had not yet bought into pathways not using them meant business as usual (i.e. no direct penalty was incurred other than having to either write referrals that were denied or receive referrals that did not include all the information). Thus, there was little incentive to engage with the intervention which required getting used to a new system and undertaking extra effort (i.e. for GPs more tests prior to referral in primary care; for hospital specialists more explicit triaging of referrals based on pathway criteria):

> *I know the secondary care champion on the steering group is finding it very difficult to engage other clinicians. Until there's some pressure to treat people, or to manage and triage people according to Health Pathways there, then you won't get the buy-in. (Participant 9)*

Readiness for implementation

This CFIR construct is defined as the tangible and immediate indicators of the organisation's decision to implement an intervention[16] (in this case the organisation is defined as the DHB and the PHO working together through an Alliancing framework). It consists of three sub-constructs (leadership engagement, available resources and access to information and knowledge). Overall, readiness for implementation was limited. Apart from the HealthPathways steering group, which was engaged with the project, there was variable leadership engagement with primary and secondary care. In terms of access to information and knowledge about HealthPathways this was strong in primary care, but less so in secondary care:

Buy-in is very limited from the secondary care system, whereas the PHO have helped to put Health Pathways on everyone's workstation, or nearly everyone's workstation, and so at least it's there, available to use, and there's some buy-in that way. (Participant 3)

As already explored in Domain 1, lack of available resources was a main reason why there was a lack of readiness to implement HealthPathways. Most participants considered an appropriately funded adaptation would have included dedicated time for secondary and primary care to meet and interact meaningfully. This had not been the case:

The key to it [Canterbury HealthPathways] was that people in the primary care sector were able to sit down in a room with secondary care clinicians and talk about the experience for patients and what that meant. (Participant 1)

Domain 5 – Process

Participants considered that there had been multiple failures of the implementation process across all its four components: planning, engaging, executing and reflecting/evaluating.

Planning

This was perceived as an omission by participants. They considered that those who set up the programme to take the Canterbury HealthPathways and adapt them for use in the Southern region had only planned for the technical production of a suite of adapted

pathways and a basic “roll out”, with a limited amount of promotion. This was considered to show a lack of understanding about what was achieved in Canterbury during the planning phase and what was important to the successful uptake and use of HealthPathways. Various initiatives were then undertaken after the fact with champions appointed in secondary and primary care and communications disseminated more regularly across the health sector.

Engagement

Engagement with the actual users of the HealthPathways was limited. Participants raised the issue of a lack of planning to ensure the socialization of HealthPathways with the wider community in primary and secondary care:

> *Then I think the hardest part is probably how do you actually socialize it amongst clinicians so that they regularly use the pathways. (…) I think that's probably where things have not gone as well as they need to or could have. (Participant 7).*

> *It's an uphill battle to get access to my secondary care colleagues, and when I meet up with them, the first question I ask is, "How many of you know about HealthPathways?" One or two might put up their hands. "How many of you use it?" Then it's sort of deafening silence. A huge lack of knowledge about what HealthPathways are and how they can benefit everybody, primarily the patient, but they can help all of us in what we do. A lack of knowledge, and there's been still no concerted drive from the powers that be to propagate the concept of HealthPathways and how everybody can benefit from it. (Participant 2)*

Although a secondary care and a primary care clinician (hospital specialist and GP) had been identified as champions for Pathways (both formally and informally) their work was frustrated by a lack of managerial support during the implementation process:

> *If you have something taken from outside and imposed on you, without any background and information as to how you can benefit from this, individuals like me trying to propagate that, I can easily be seen as just somebody the DHB has put there to try and wave the flag. With no support from above, I'm fighting a losing battle. (Participant 2)*

Executing

Executing the implementation was problematic for the reason, as explored in Domain 1, that it focused on the core component (web portal) and not on the adaptable periphery. What this meant was that significant work was devoted to technology (website and web portal) development – thus clinical editors (GPs who consulted with selected secondary care clinicians) were contracted by the DHB to produce a large suite of edited pathways - but there was inadequate resourcing to allow meaningful engagement with the wider secondary care community. As a consequence buy in was limited.

Evaluation/Reflection

There appeared to be very limited evaluation of the implementation. The only data that was reported were regular updates on the number of live HealthPathways. Information on the numbers of health practitioners actually using the pathways was not consistently reported across speciality areas.

DISCUSSION

This is the first process evaluation of HealthPathways implementation in NZ using qualitative methods and the first evaluation internationally to use an implementation science theory framework. The use of implementation science theory (CFIR) allowed us to "unpack" the reasons why the implementation of HealthPathways in the Southern Region of NZ was so challenging. CFIR postulates that for an intervention to be implemented successfully account must be taken of both the intervention's core components and the adaptable periphery. We found that the core component of the HealthPathways intervention – the web portal – had been addressed well by the product developers. Little attention had, however, been paid to the adaptable periphery – it was seen as sufficient just to deliver the web portal populated with new HealthPathways to effect successful implementation. In terms of CFIR's "inner setting" corporate and professional cultures, the implementation climate and readiness for implementation were not properly addressed during implementation. There was a culture of low trust between the DHB and other actors in the health system and an embedded division between primary and secondary care clinicians. There were no organizational rewards or incentives for end users to use HealthPathways (poor implementation climate). There was also a lack of readiness to implement, notably a lack of funding to allow for dedicated time for secondary and primary care clinicians to meet and interact meaningfully as part of HealthPathway development. There were also multiple failures of the implementation process across all its four components: planning, engaging, executing and reflecting/evaluating.

This qualitative interview study utilised purposive sampling to recruit a sample that varied by health care professional group (primary care and secondary care) and by degree of involvement with the Southern HealthPathways programme. The choice of individual interviews was appropriate as it allowed participants to talk openly about the problems that were being encountered with the HealthPathways programme. It was appropriate that the study focused on a single NZ health region as it was designed in partnership with the local health system (Alliance South) to provide context specific findings that would be of benefit to the local health system.[15] Accepting that context will differ in other settings, it is likely that the findings are transferable to other NZ health regions and other health systems in which HealthPathways are being implemented. A strength of the chosen implementation science framework (CFIR) is that it is "meta-theoretical", including constructs from a synthesis of existing implementation theories, and it is designed to allow researchers to test out empirically mechanisms theorized to promote or hinder implementation of a given intervention.[16] It is also intended to be used flexibly, with the researchers selecting and identifying constructs which best explain their findings. We did not have an a priori view of which CFIR domains would explain the problems in the implementation process, we deductively coded into all of the five CFIR domains and through an iterative process of reviewing the domain categories we were able to identify those which were most relevant to HealthPathways implementation and thereby explain why the implementation had been problematic in this specific context.

We found the recruitment of participants challenging and, while we had not set a fixed number of planned interviews, were only able to recruit small number of participants (three) who were not involved with the implementation process. We believe this difficulty reflects the findings, in that the project was not well planned and implemented and so interest in speaking about HealthPathways was adversely affected. We had originally intended to combine this qualitative process evaluation with a quantitative component to determine if HealthPathways were effective in improving care of people with two exemplar clinical conditions through a before and after comparison of key process and outcome measures. We were unable to meet this second objective as we were informed, after award of the research grant, that the Health Pathways team would not be able to collect this data due to delays in implementing the project and project planning. It was a requirement of the study that Alliance South would set up the data collection process, not the research team.

There has to date been no formative evaluation of HealthPathways in NZ. The Canterbury HealthPathways programme, for example, has conducted a limited evaluation consisting of an online survey of primary and secondary care clinicians and audits of pathways use.[3 8 19]. In contrast, two different Australian states have conducted a process evaluation of HealthPathways using a qualitative case study approach: New South Wales (Hunter and New England)[5] and Victoria (Barwon).[6 10] Neither Australian studies used an explicit implementation science framework; instead, they descriptively list the “barriers” and “facilitators” to implementation. These two evaluations considered that implementation had been successful and the Hunter and New England study’s list

of “critical success factors” are the mirror image of a number of the key implementation issues identified in this study: senior management support, senior clinical leadership, involvement of clinicians in development, need for pathways to add value for clinicians and engagement with hospital specialists.[5] Both evaluations’ list of “barriers” highlighted lack of awareness by GPs of the HealthPathways programme.[5 6]

CFIR now has a good evidence base as it has been applied across a wide variety of implementation study designs and settings.[17] A recent CFIR-informed qualitative process evaluation study (exploring the barriers affecting implementation of an online frailty tool into primary care), using a similar methodology, also found that it was necessary to report empirical findings that related to the most important CFIR domains to best “make sense” of the data.[20]

Given we intended that this evaluation should help Alliance South in its implementation of HealthPathways in line with a university-health sector collaboration[15] we are able to report how these findings have been used. During the study interview phase (2016) we were able to feedback highlights of our emerging findings to the Alliance South HealthPathways workstream who then shared with us their own internal report (Bridget-Mary McGown, Alliance South, personal communication). The latter report independently highlighted several of our emerging findings. On completion of our preliminary analysis (2017) our findings were presented to the Alliance South HealthPathways Steering Group. At the same time the DHB had undergone a restructure with a new Chief Executive who wished to prioritise HealthPathways

implementation. There was therefore senior management team support to initiate a re-launch of the programme which has taken account of the key findings of this study.

It is not always the case that quality improvement initiatives, such as HealthPathways, are successfully implemented and thereby lead to positive outcomes for patients and health practitioners. Publication bias may also mean that there are less published studies reporting negative quality improvement research findings.[21] We argue there is great benefit in understanding why, and under what circumstances and in which contexts, some quality improvement interventions fail. Although we currently have limited evidence as to whether HealthPathways improve health outcomes for patients (as opposed to being viewed by health practitioners as improving referral quality and promoting integration of care) it is clear that there is rapid adoption of HealthPathways both within other regions of NZ, Australia and also in the UK.[6] A consequence of this is that they are being implemented in very different contexts than those present in Canterbury NZ in 2007-2008 when the programme was first developed and implemented. What we have shown, using the CFIR framework, is that a focus on the core component of HealthPathways (web-portal and referral system) without adequate consideration of the adaptable periphery (which is context dependent) when implementing HealthPathways into a health system means implementation will likely fail. Others have similarly shown the importance of the local context in determining whether or not local implementation works or fails when rolling out a national quality improvement programme in secondary care.[22] We therefore consider that the

implication of our work for future implementers of HealthPathways and similar complex interventions is always to consider the local context within which they are to be implemented and to tailor the implementation approach to address these.

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Contributors

TS conceived and designed the study with input from RG and FDN. ET conducted the interviews and led on the data analysis with input from TS. TS drafted the manuscript. All authors read, provided critical review and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Authors' information

RG was independent chair of Alliance South at the time the study was conducted.

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Ethics approval and consent to participate

Ethical approval was obtained from the Otago University Human Ethics Committee (16/024). Written informed consent was obtained from all participants.

Data sharing statement

Full de-identified interview transcripts will not be shared. Informed consent, in line with the approving ethics committee, only allows for the use of de-identified extracts within research reporting and writing, in order to maintain the privacy of participants based in a defined regional area and population, thus making their identification with full transcripts more likely.

Table 1 CFIR Domains and associated constructs. Domains and constructs used in the study are in bold.

1. Intervention Characteristics	**3. Inner Setting**
• *Intervention source*	• *Structural characteristics*
• *Evidence strength and quality*	• *Networks and communication*
• *Relative advantage*	• ***Culture***
• ***Adaptability***	• ***Implementation climate***
• *Trialability*	• ***Readiness for implementation***
• *Complexity*	4. Characteristics of Individuals
• *Design quality and packaging*	• Knowledge and beliefs about the intervention
• *Cost*	• Self-efficacy
2. Outer Setting	• Individual stage of change
• *Patient needs and resources*	• Other personal attributes
• *Cosmopolitanism*	**5. Process**
• *Peer pressure*	• ***Planning***
• *External policy and incentives*	• ***Engaging***
	• ***Executing***
	• ***Reflecting and Evaluating***

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INTERVIEW GUIDE:

So following on from the information sheet, just to reiterate, we're hoping to explore your views and experiences of the HealthPathways initiative in the Southern Region, including what has been challenging or beneficial in relation to their implementation."

"CONSENT PROCESS"

Before we begin, do you have any further questions?

The following questions are examples rather than a set of specific questions.

Question
When did you first hear about HealthPathways in the Southern Region? What do you understand them to be? What were your initial thoughts? Did you feel they met a need?
What do you know about how HealthPathways in the Southern Region came about and how they created? Who was involved? What did you think of the process?
How useful do you think the HealthPathways initiative in the Southern Region is? How were you introduced to them? What were your initial thoughts? Did you feel they met a need? What gap does it fill? What problem does it solve? If not, why not? What is not being addressed? Is this a fix to a problem you don't perceive? Is there a problem about communication/process, etc. rather than concept/content?
What has been your experience of using a pathway? Did they fit well with normal practice? Have you used a healthpathway; if yes which one? How was that for you? What was better than before/what wasn't so good?
What has worked well in Southern Region initiative to implement HealthPathways in your opinion? Why? Communication; resourcing; support; clinical leadership; IT; patient information; effective governance of the work etc.
What has not worked so well in Southern Region initiative to implement HealthPathways in your opinion? Why? Communication; resourcing; support; clinical leadership; IT; patient information; effective governance of the work etc.
If you were asked to make a recommendation about the continuation of HealthPathways, what recommendation would you make? Why?
If you were asked to suggest further conditions for HealthPathways what would you suggest? Why? Are these conditions, particular prevalent or is the care (care coordination) for these conditions particularly fractured/complicated?
Is there anything else you would like to make comment on in regard to HealthPathways in general or the HealthPathways initiative in the Southern Region?

COREQ (COnsolidated criteria for REporting Qualitative research) 32 item Checklist

Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. International Journal for Quality in Health Care. 2007. Volume 19, Number 6: pp. 349 – 357

Domain	Item Number	Comment	Reported on page number or not applicable (N/A)
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	The Assistant Research Fellow (Dr Emma Tumilty) conducted the interviews	7
Credentials	2	All four research team members have extensive experience of conducting qualitative health research	N/A
Occupation	3	ET was an Assistant Research Fellow at the University of Otago at the time of conducting the research	1
Gender	4	Two male-identifying and two female identifying researchers (interviewer, female-identifying)	
Experience and training	5	All four research team members have extensive experience of conducting qualitative health research	N/A
Relationship with participants			
Relationship established	6	The assistant research fellow had no relationships with participants prior to the study, while the broader research team had varying relationships with the health community at large. It was felt the interviewer should be seen as an unbiased enquirer rather than a person with a particular stance or opinion about the topic.	5-6
Participant knowledge of the interviewer	7	The interviewer introduced herself to participants stating she was not a medical professional, etc. as well as describing the research team, its funding, the purpose of the project and answering any questions participants may have had about the project and those involved in it.	N/A
Interviewer characteristics	8	The interviewer was not a medical professional, but aware of the medical system in New Zealand and had read the literature on care pathways prior to beginning the project.	N/A

Domain 2: Study design			
Theoretical framework			
Methodological orientation and theory	9	Deductive thematic analysis using the Consolidated Framework for Implementation Research	8
Participant selection			
Sampling	10	Purposive sampling was used	7
Method of approach	11	Various methods of approach were used, group emails were sent via a third party, invitations were added to newsletters, emails were sent to practices, and then those taking part or responding were also asked to pass on information to others.	N/A
Sample size	12	Ten	8
Non-participation	13	A number of key informants did not respond to the invitation to participate, however no person responded directly to decline taking part, nor did anybody drop out once agreeing to take part.	N/A
Setting			
Setting of data collection	14	Participants could determine whether the interview took place in their place of work or in a private meeting room arranged by the interviewer on the university campus.	N/A
Presence of nonparticipants	15	None	N/A
Description of sample	16	Fully presented in results section	8
Data collection			
Interview guide	17	The interview guide was open, but listed a number of key questions and potential prompts. Interviews generally followed a similar approach although questions themselves varied depending on the participant.	Supplemental file
Repeat interviews	18	No	N/A
Audio/visual recording	19	All interviews were audio-recorded and later transcribed.	7
Field notes	20	Yes, the interviewer wrote brief field notes after each interview regarding the nature of the interview and her perceptions of the participants responses, etc.	N/A
Duration	21	Interview times varied but were generally around 60mins	N/A
Data saturation	22	Not applicable as a deductive thematic analysis	N/A
Transcripts returned	23	No	N/A
Domain 3: analysis and			

findings			
Data analysis			
Number of data coders	24	The interviewer coded the data and described codes and these were discussed with all members of the interview team on a regular basis	8
Description of the coding tree	25	Codes had tags and description within the software except for where they were self-explanatory	8
Derivation of themes	26	The themes were those used in the Consolidated Framework for Implementation Research	8
Software	27	nVivo 11 was used	8
Participant checking	28	No	N/A
Reporting			
Quotations presented	29	Yes quotations are presented and identified in a manner protecting participants confidentiality	9-16
Data and findings consistent	30	Consistency between the data and the findings exists	9-16
Clarity of major themes	31	Yes, major themes are clearly identified	9-16
Clarity of minor themes	32	Yes, minor themes (CIFR constructs) are clearly identified and related to major themes.	9-16

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HealthPathways implementation in a New Zealand health region: a qualitative study using the Consolidated Framework for Implementation Research

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HealthPathways implementation in a New Zealand health region: a qualitative study using the Consolidated Framework for Implementation Research

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ABSTRACT

Objectives To explore the process of implementation of an online health information web-based portal and referral system (HealthPathways) using relevant implementation science theory: the Consolidated Framework for Implementation Research (CFIR).

Setting The Southern Health Region of New Zealand (Otago and Southland).

Participants Key Informants (providers and planners of health care) (n=10) who were either involved in the process of implementing HealthPathways or who were intended end-users of HealthPathways.

Methods Semi-structured interviews were undertaken. A deductive thematic analysis using CFIR was conducted using the framework method.

Results CFIR postulates that for an intervention to be implemented successfully account must be taken of both the intervention's core components and the adaptable periphery. The core component of HealthPathways – the web portal and referral system which contains a large number of localized clinical care pathways – had been addressed well by the product developers. Little attention had, however, been paid to the adaptable periphery (adaptable elements, structures and systems related to HealthPathways and the organization into which it was being implemented) – it was seen as sufficient just to deliver the web portal and referral system and the set of clinical care pathways to effect successful implementation. In terms of CFIR's "inner setting" corporate and professional cultures, the implementation climate and readiness for implementation were not properly addressed during implementation. There were also

multiple failures of the implementation process (for example, lack of planning and engagement with clinicians). As a consequence, implementation of HealthPathways was highly problematic.

Conclusions The use of CFIR has furthered our understanding of the factors needed for the successful implementation of a complex health intervention (HealthPathways) in the New Zealand health system. Those charged with implementing complex health interventions should always consider the local context within which they will be implemented and tailor their implementation strategy to address these.

Word Count: 297

Strengths and limitations of this study
• This is the first process evaluation of implementing HealthPathways in New Zealand using qualitative methods.
• The use of implementation science theory (Consolidated Framework for Implementation Research) allowed us to “unpack” the reasons why the implementation of HealthPathways in the Southern Region of New Zealand was so challenging.
• The study focused on a single health region as it was designed in partnership with the local health system to provide context specific findings that would be of benefit to the local health system.
• We were only able to recruit small number of participants who were not involved with the implementation process.

INTRODUCTION

The New Zealand (NZ) health system, in common with those of other jurisdictions, struggles to provide integration of health services across primary and secondary care.[1] One important quality improvement initiative promoted internationally since the 1980s to improve health care integration is care pathways. Care pathways have five key characteristics, they: 1) provide a structured multidisciplinary plan of care; 2) translate national evidence-based clinical guidelines into local structures; 3) detail the components of care required in an algorithm or pathway; 4) provide a time frame or criterion-based progression through the health system; and 5) aim to standardise care for a specific clinical condition in a specific local population.[2] In NZ a key adaptation has been the embedding of web-based clinical care pathways into general practice-hospital electronic referral management systems (ERMS). The use of care pathways in NZ has been championed by Canterbury District Health Board (DHB), who in 2008 developed an online health information web-based portal (containing the individual care pathways for specific clinical conditions) and referral system called HealthPathways.[3] Currently HealthPathways provides health practitioners with guidance and a referral pathway for over 550 clinical conditions (https://www.healthpathwayscommunity.org/About.aspx). There has been rapid adoption of HealthPathways and similar systems across NZ's DHBs and in Australia.[4-7] Its advocates claim that HealthPathways is an important means of achieving health care integration, [8 9] which has been a NZ government priority since the 2009 publication of *Better Sooner More Convenient.*[10] This claim is supported by an emerging evidence base which suggests that HealthPathway use is associated with an improvement in referral quality from primary care to secondary care and more

timely access to secondary care.[3] End users of HealthPathways also report, in online surveys[9] and qualitative case studies,[5 6 11] that HealthPathways improved their knowledge of local services and changed their clinical management decisions.

In the Southern Health Region of NZ's South Island (Otago and Southland), the Southern DHB and the WellSouth Primary Health Network (Primary Health Organisation: PHO) are working to further health service integration through Alliance South,[12] which is a contractual alliance between the two organisations aimed at improving care coordination and integration. In 2013 Alliance South embarked upon the implementation of the Canterbury HealthPathways in the Southern Region – Southern HealthPathways. The approach used Clinical Editors ((general practitioners (GPs) who consulted with selected Southern Region secondary care clinicians)) to localize/adapt each individual Canterbury clinical care pathway: by 2017 over 400 individual clinical care pathways had been localized and could be accessed through the Southern HealthPathways web portal and referral system (https://southern.healthpathways.org.nz/). The focus was on the technical development of a suite of adapted pathways. In 2016 a team of researchers from the Dunedin School of Medicine, University of Otago, partnered with the local health system through Alliance South to conduct a mixed methods evaluation of the Southern HealthPathways programme. The rationale for this university-health service partnership was to build evaluation capacity in the Southern Region and the HealthPathways initiative was identified as a strategic priority for evaluation by Alliance South.

We report here the findings of the qualitative process evaluation. One key challenge in evaluating the implementation of HealthPathways is that they can be conceptualised as a complex health care intervention[13] and thus without a qualitative process evaluation it is not possible to determine which aspects of the intervention in a defined health care context are likely to lead to its success. Our study aim was therefore to understand the process by which Southern HealthPathways were being implemented using a commonly used implementation science theory: the Consolidated Framework for Implementation Research (CFIR).[14 15]

METHODS

Consolidated Framework for Implementation Research (CFIR)

In understanding how quality improvement initiatives work there is increasing emphasis on the use of theory drawn from the social sciences to better develop quality improvement interventions, optimise their design and identify aspects of context necessary for their success.[16 17] The CFIR Is a "meta-theoretical" framework that provides an overarching typology of implementation. It offers a comprehensive, standardised list of constructs which allow researchers to identify variables that are most relevant to a particular intervention.[14] The CFIR addresses intervention delivery (context; implementation; mechanisms of action) through 26 constructs organized into five major domains: intervention characteristics (eight constructs), outer setting (four constructs), inner setting (five constructs), characteristics of the individuals involved (five constructs), and the process of implementation (four constructs) (see Table 1)

[insert Table 1 here]. CFIR has been widely used to inform qualitative process evaluations across a range of complex interventions.[15]

Design and sampling

Semi-structured interviews were conducted by ET between May and November 2016 with key informants (providers and planners of care) from the Southern DHB catchment area (Otago and Southland). The Southern DHB is the southernmost DHB in NZ and is responsible for planning, funding and providing health and disability services to a population of over 300,000 and serves the largest geographic region of all NZ's DHBs (https://www.southerndhb.govt.nz/index.php?page=654). Key informants were sampled purposively in order to construct a maximum variation sample that aimed to include primary care (GPs), hospital specialists, community nursing services and health service planners from the Southern DHB and WellSouth PHO. From this group of stakeholders we also aimed to include those who had a Southern DHB planning/management, Alliance South or other clinical leadership role, had direct involvement with the Alliance South HealthPathways work programme or who were end users of the HealthPathways (GPs).

Data collection

The semi-structured interviews used a topic guide based on a literature review, relevant CFIR guidance (https://cfirguide.org/) and discussions within the research team. The topic guide (Supplementary File 1) covered: a) views concerning the acceptability and utility of HealthPathways; b) the implementation of the HealthPathways initiative in Southern Region, with a focus on context specific barriers and facilitators to

implementation; and c) any specific issues relating to the actual use of HealthPathways by participants (if a health care practitioner). The topic guide was used flexibly to allow participants to construct their accounts in their own terms. All interviews were digitally-recorded and transcribed verbatim.

Data analysis

A deductive thematic analysis was conducted using the framework method.[18] Interviews were coded deductively by ET, assisted by NVivo 10 qualitative analysis software, into the five domains of the Consolidated Framework for Implementation Research (http://www.cfirguide.org/) and, as appropriate, into each domains' constructs. TS independently checked the assignment of a sample of data to the domains and constructs. Interpretation of the data, in particular the linkage between the CFIR domains and constructs, was an iterative process which was led by ET and TS, with input from FDN and RG. In addition, reports and relevant documents were sought from the Alliance South Southern HealthPathways Steering Group to provide background information and timelines.

The consolidated criteria for reporting qualitative research (COREQ)[19] were used to structure reporting of the methods and the findings (Supplementary File 2).

Patient and Public Involvement

No patients or the public were involved in this study.

RESULTS

Five GPs and five hospital specialists were interviewed. Of the ten participants four had a Southern DHB planning/management, Alliance South or other clinical leadership role. Three participants had direct involvement with the Alliance South Health Pathways work programme. Three participants were end users of HealthPathways.

As the interviews progressed and analysis was undertaken it became apparent that there were significant problems with the implementation of HealthPathways in the Southern Region. Thus the focus of the analysis shifted to using the relevant CFIR domains and constructs (Table 1) to systematically explore the question as to why implementation was proving problematic. Illustrative participant quotes are presented.

Domain 1: Intervention Characteristics

Core component and adaptable periphery

The CFIR framework (Table 1) conceptualizes complex interventions as having both core components (defined as the essential and indispensable elements of the intervention itself) *and* an adaptable periphery (adaptable elements, structures and systems related to the intervention and the organization into which it is being implemented).[14] In order for an intervention to be implemented successfully account must be taken of both the core components and the adaptable periphery.

Participants reported that the core component of the HealthPathways intervention – the web portal and referral system which contained a large number of individual clinical care

pathways – had been addressed well by the product developers. It was considered to be well designed and easy to access, the pathways for each clinical condition were appropriate and the web portal supported use of the ERMS that generated the referral letter from primary to secondary care:

> *This has changed my life in primary care. This is the best thing …. If I have a problem, if I have a woman come in with postmenopausal bleeding I go tick, tick, tick, there it is. "Have you done this, this, and this? Is it this or that?" Do that. If it is this and this, then refer here [ERMS] and she will get an appointment. It's just e-mail off, she'll get an appointment within three weeks. (Participant 4)*

> *On the whole I'm a big fan of Health Pathways. I'm a fan of it and ERMS linking up well together …. General Practice in New Zealand is probably more electronically savvy than any other place in the world. (Participant 5)*

What was apparent, however, in participants' accounts of how the core component (web portal and referral system) was implemented was limited or no consideration of the adaptable periphery. There was no clear understanding by the local team leading the implementation process of the need to both construct and populate a web portal and referral system (core component) and to address related issues that were necessary for the Canterbury HealthPathways to be successfully adapted and used in the Southern Health System (adaptable periphery). As a consequence, the implementation project was resourced to deliver the web portal and referral system but not to do the necessary related activities. Thus there was little or no funding of primary care time to allow engagement with project development and with secondary care. Support for the key

activity of communicating about the intervention, its benefits, and how it can be used to further integration across primary and secondary care was also lacking:

> *I don't think you can go back to what Canterbury did [to achieve successful implementation] because the time and resources aren't there. (Participant 3)*

In short, it was apparent that the adaptable periphery had not been addressed - it was seen as simply sufficient to deliver the web portal and referral system populated with a minimally edited set of individual clinical care pathways (the core component of HealthPathways) to effect successful implementation:

> *What they would do would be to take the Pathways that had been developed in Canterbury and simply cross out Canterbury and write Southern on them, and that would be fine and behaviours would change and everything would be hunky-dory. This mistaken view that what's on the flowchart on the piece of paper at the end is the process, which it isn't. I said to them on numerous occasions it is like taking somebody else's holiday snapshots and thinking that you've then had a holiday, which is complete nonsense. Most of them you won't understand. The essential part of HealthPathways is the conversation. (Participant 1)*

Domain 3 – Inner Setting

CFIR's "inner setting" (Table 1) is defined as the structural and cultural contexts through which the implementation process occurs.[14]

Culture

Implementation of the HealthPathways took place in a local health system where two strong corporate and professional cultures mitigated against the successful implementation of an intervention that straddled both primary and secondary care. The first of these, the local corporate culture – represented through the relationships between the DHB, PHO, secondary care clinicians and general practice – was seen as being both resistant to change and characterized by a low trust relationship between the DHB and other actors in the system. Resistance to change was considered at least in part due to a continued environment of financial austerity and a need for the DHB to "balance its books":

> *A resistance to change, which I think was about the whole health system being so stressed at the time with focus on financial deficit. (Participant 8)*

A low trust relationship was considered to exist between the DHB and the other actors, notably general practice. Participants considered HealthPathways was yet another transient initiative to improve health care, which would likely fail to deliver its intended outcomes:

> *Mistrust, it's being done to us and what are the DHB, they're sending me negative vibes about management in this DHB. This is another effort and just one of their things, and like other things it will come and go. (Participant 2).*

The second prevalent culture was one where secondary care (hospital specialists) and primary care (GPs) were seen as having different cultures based on their different scopes of medical practice and funding models. This culture of an embedded division between primary and secondary care had not to date been addressed in the Southern

Region through formal facilitated initiatives to get both groups working collaboratively across primary and secondary care:

> *I don't think that there's any particular antipathy. The way I see it from the secondary care perspective, by and large, and I don't really know what our colleagues in primary care think, but I do think that from secondary care clinicians, they've never had the opportunity of being in the same room and working out processes with primary care. I don't think they're opposed to it, it's just a foreign idea. (Participant 1)*

Implementation climate

A key aspect of the implementation climate that was not addressed properly was organizational incentives and rewards. The implementation process failed to consider ways in which using the Pathways would be rewarded for either secondary or primary care. That is to say, for clinicians that understood the purpose of pathways then using them made sense and was rewarding because there was an appreciation that they made clinical processes more efficient. For clinicians who had not yet bought into pathways not using them meant business as usual (i.e. no direct penalty was incurred other than having to either write referrals that were denied or receive referrals that did not include all the information). Thus, there was little incentive to engage with the intervention which required getting used to a new system and undertaking extra effort (i.e. for GPs more tests to be done prior to referral to secondary care; for hospital specialists more explicit triaging of referrals based on the specific clinical pathway criteria):

I know the secondary care champion on the steering group is finding it very difficult to engage other clinicians. Until there's some pressure to treat people, or to manage and triage people according to Health Pathways there, then you won't get the buy-in. (Participant 9)

Readiness for implementation

This CFIR construct is defined as the tangible and immediate indicators of the organisation's decision to implement an intervention[14] (in this case the organisation is defined as the DHB and the PHO working together through an Alliancing framework). It consists of three sub-constructs (leadership engagement, available resources and access to information and knowledge). Overall, readiness for implementation was limited. Apart from the HealthPathways steering group, which was engaged with the project, there was variable leadership engagement with primary and secondary care. In terms of access to information and knowledge about HealthPathways this was strong in primary care, but less so in secondary care:

Buy-in is very limited from the secondary care system, whereas the PHO have helped to put Health Pathways on everyone's workstation, or nearly everyone's workstation, and so at least it's there, available to use, and there's some buy-in that way. (Participant 3)

As already explored in Domain 1, lack of available resources was a main reason why there was a lack of readiness to implement HealthPathways. Most participants considered an appropriately funded adaptation would have included dedicated time for

secondary and primary care to meet and interact meaningfully. This had not been the case:

> *The key to it [Canterbury HealthPathways] was that people in the primary care sector were able to sit down in a room with secondary care clinicians and talk about the experience for patients and what that meant. (Participant 1)*

Domain 5 – The implementation process

Participants considered that there had been multiple failures of the implementation process (Table 1) across all its four components: planning, engaging, executing and reflecting/evaluating.

Planning

This was perceived as an omission by participants. They considered that those who set up the programme to take the Canterbury HealthPathways and adapt them for use in the Southern region had only planned for the technical production of a suite of adapted pathways and a basic "roll out", with a limited amount of promotion. This was considered to show a lack of understanding about what was achieved in Canterbury during the planning phase and what was important to the successful uptake and use of HealthPathways. Various initiatives were then undertaken after the fact with champions appointed in secondary and primary care and communications disseminated more regularly across the health sector.

Engagement

Engagement with the actual users of the HealthPathways was limited. Participants raised the issue of a lack of planning to ensure that the wider community in primary and secondary care were given the opportunity to meaningfully engage with the HealthPathways initiative, which one participant referred to as “socialization”:

> *Then I think the hardest part is probably how do you actually socialize it amongst clinicians so that they regularly use the pathways. (…) I think that's probably where things have not gone as well as they need to or could have. (Participant 7).*

> *It's an uphill battle to get access to my secondary care colleagues, and when I meet up with them, the first question I ask is, "How many of you know about HealthPathways?" One or two might put up their hands. "How many of you use it?" Then it's sort of deafening silence. A huge lack of knowledge about what HealthPathways are and how they can benefit everybody, primarily the patient, but they can help all of us in what we do. A lack of knowledge, and there's been still no concerted drive from the powers that be to propagate the concept of HealthPathways and how everybody can benefit from it. (Participant 2)*

Although a secondary care and a primary care clinician (hospital specialist and GP) had been identified as champions for Pathways (both formally and informally) their work was frustrated by a lack of managerial support during the implementation process:

> *If you have something taken from outside and imposed on you, without any background and information as to how you can benefit from this, individuals like me trying to propagate that, I can easily be seen as just somebody the DHB has*

put there to try and wave the flag. With no support from above, I'm fighting a losing battle. (Participant 2)

Executing

Executing the implementation was problematic, as explored in Domain 1, because it focused on the core component and not on the adaptable periphery. What this meant was that significant work was devoted to technology development (website, web portal and localising existing individual care pathways) – thus the Clinical Editors were contracted by the DHB to produce a large suite of edited pathways - but there was inadequate resourcing to allow meaningful engagement with the wider secondary care community. As a consequence “buy in” from clinicians was limited.

Evaluation/Reflection

There appeared to be very limited evaluation of the Southern HealthPathways implementation. The only data that was reported were regular updates on the number of live HealthPathways. Information on the numbers of health practitioners actually using the individual clinical pathways was not consistently reported across speciality areas.

DISCUSSION

This is the first process evaluation of HealthPathways implementation in NZ using qualitative methods and the first such evaluation to use the CFIR framework. The use of implementation science theory (CFIR) allowed us to “unpack” the reasons why the implementation of HealthPathways in the Southern Region of NZ was so challenging.

CFIR postulates that for an intervention to be implemented successfully account must be taken of both the intervention's core components and the adaptable periphery. We found that the core component of HealthPathways – the web portal and referral system which contains a large number of individual clinical care pathways – had been addressed well by the product developers. Little attention had, however, been paid to the adaptable periphery (adaptable elements, structures and systems related to the intervention and the organization into which it is being implemented) – it was seen as sufficient just to deliver the web portal and referral system populated with a set of localized clinical care pathways to effect successful implementation. In terms of CFIR's "inner setting" corporate and professional cultures, the implementation climate and readiness for implementation were not properly addressed during implementation. There was a culture of low trust between the DHB and other actors in the health system and an embedded division between primary and secondary care clinicians. There were no organizational rewards or incentives for end users to use HealthPathways (poor implementation climate). There was also a lack of readiness to implement, notably a lack of funding to allow for dedicated time for secondary and primary care clinicians to meet and interact meaningfully as part of HealthPathway development. There were also multiple failures of the implementation process across all its four components: planning, engaging, executing and reflecting/evaluating.

This qualitative interview study utilised purposive sampling to recruit a sample that varied by health care professional group (primary care and secondary care) and by

degree of involvement with the Southern HealthPathways programme. The choice of individual interviews was appropriate as it allowed participants to talk openly about the problems being encountered with the HealthPathways programme. It was appropriate that the study focused on a single NZ health region as it was designed in partnership with the local health system (Alliance South) to provide context specific findings that would be of benefit to the local health system.[20] Nonetheless, it is likely that our key finding – the need to consider the adaptable periphery when implementing interventions – is transferable to other NZ health regions and other health systems in which HealthPathways are being implemented. A strength of the chosen implementation science framework (CFIR) is that it is "meta-theoretical", including constructs from a synthesis of existing implementation theories, and it is designed to allow researchers to test out empirically mechanisms theorized to promote or hinder implementation of a given intervention.[14] It is also intended to be used flexibly, with the researchers selecting and identifying constructs which best explain their findings. We did not have an a priori view of which CFIR domains would explain the problems in the implementation process, we deductively coded into all of the five CFIR domains and through an iterative process of reviewing the domain categories we were able to identify those which were most relevant to HealthPathways implementation and thereby explain why the implementation had been problematic in this specific context.

We found the recruitment of participants challenging and, while we had not set a fixed number of planned interviews, were only able to recruit a small number of participants (three) who were categorised as end users of Health Pathways and not involved with the implementation process. We believe this difficulty reflects the findings, in that the

project was not well planned and implemented and so interest in speaking about HealthPathways was adversely affected. We had originally intended to combine this qualitative process evaluation with a quantitative component to determine if HealthPathways were effective in improving care of people with two exemplar clinical conditions through a before and after comparison of key process and outcome measures. We were unable to meet this second objective as we were informed, after award of the research grant, that the Health Pathways team would not be able to collect this data due to delays in implementing the project and project planning. It was a requirement of the study that Alliance South would set up the data collection process, not the research team.

There has to date been no formative evaluation of HealthPathways in NZ. The Canterbury HealthPathways programme, for example, has conducted a limited evaluation consisting of an online survey of primary and secondary care clinicians and audits of pathways use.[3 9 21] In contrast, two different Australian states have conducted a process evaluation of HealthPathways using a qualitative case study approach: New South Wales (Hunter and New England)[5] and Victoria (Barwon).[6 11] Neither Australian studies used an explicit implementation science framework; instead, they descriptively list the “barriers” and “facilitators” to implementation. These two evaluations considered that implementation had been successful and the Hunter and New England study’s list of “critical success factors” are the mirror image of a number of the key implementation issues identified in this study: senior management support, senior clinical leadership, involvement of clinicians in development, need for pathways to add value for clinicians

and engagement with hospital specialists.[5] Both evaluations' list of "barriers" highlighted lack of awareness by GPs of the HealthPathways programme.[5 6]

CFIR now has a good evidence base as it has been applied across a wide variety of implementation study designs and settings.[15] A recent CFIR-informed qualitative process evaluation study (exploring the barriers affecting implementation of an online frailty tool into primary care), using a similar methodology, also found that it was necessary to report empirical findings that related to the most important CFIR domains to best "make sense" of the data.[22]

Given we intended that this evaluation should help Alliance South in its implementation of HealthPathways in line with a university-health sector collaboration[20] we are able to report how these findings have been used. During the study interview phase (2016) we were able to feedback highlights of our emerging findings to the Alliance South HealthPathways workstream who then shared with us their own internal report (Bridget-Mary McGown, Alliance South, personal communication). The latter report independently highlighted several of our emerging findings. On completion of our preliminary analysis (2017) our findings were presented to the Alliance South HealthPathways Steering Group. At the same time the DHB had undergone a restructure with a new Chief Executive who wished to prioritise HealthPathways implementation. There was therefore senior management team support to initiate a re-launch of the programme which has taken account of the key findings of this study,

notably the need to ensure dedicated time for secondary and primary care clinicians to meet and interact as part of HealthPathways development.

It is not always the case that quality improvement initiatives, such as HealthPathways, are successfully implemented and thereby lead to positive outcomes for patients and health practitioners. Publication bias may also mean that there are less published studies reporting negative quality improvement research findings.[23] We argue there is great benefit in understanding why, and under what circumstances and in which contexts, some quality improvement interventions fail. Although we currently have limited evidence as to whether HealthPathways improve health outcomes for patients (as opposed to being viewed by health practitioners as improving referral quality and promoting integration of care) it is clear that there is rapid adoption of HealthPathways both within other regions of NZ, Australia and also in the UK.[6] A consequence of this is that they are being implemented in very different contexts than those present in Canterbury NZ in 2007-2008 when the programme was first developed and implemented. What we have shown, using the CFIR framework, is that a focus on the core component of HealthPathways (web-portal and referral system) without adequate consideration of the adaptable periphery (which is context dependent) when implementing HealthPathways into a health system means implementation will likely fail. Others have similarly shown the importance of the local context in determining whether or not local implementation works or fails when rolling out a national quality improvement programme in secondary care.[24] We therefore consider that the

implication of our work for future implementers of HealthPathways and similar complex interventions is always to consider the local context within which they are to be implemented and to tailor the implementation approach to address these.

Word count: 4636

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Contributors

TS conceived and designed the study with input from RG and FDN. ET conducted the interviews and led on the data analysis with input from TS. TS drafted the manuscript. All authors read, provided critical review and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Authors' information

RG was independent chair of Alliance South at the time the study was conducted. ET was an Assistant Research Fellow in the Department of General Practice and Rural Health, Dunedin School of Medicine at the time of conducting the research.

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Ethics approval and consent to participate

Ethical approval was obtained from the Otago University Human Ethics Committee (16/024). Written informed consent was obtained from all participants.

Data sharing statement

Full de-identified interview transcripts will not be shared. Informed consent, in line with the approving ethics committee, only allows for the use of de-identified extracts within research reporting and writing, in order to maintain the privacy of participants based in a defined regional area and population, thus making their identification with full transcripts more likely.

Table 1 CFIR Domains and associated constructs. Domains and constructs used in the study are in bold.

1. Intervention Characteristics *Interventions have core components (essential elements) and an adaptable periphery (adaptable elements, structures and systems related to the intervention and the organization into which it is being implemented)*	**3. Inner Setting** *The structural and cultural contexts through which the implementation process occurs*
• *Intervention source*	• *Structural characteristics*
• *Evidence strength and quality*	• *Networks and communication*
• *Relative advantage*	• ***Culture***
• ***Adaptability***	• ***Implementation climate***
• *Trialability*	• ***Readiness for implementation***
• *Complexity*	4. Characteristics of Individuals *The individuals involved with the intervention and/or implementation process*
• *Design quality and packaging*	• Knowledge and beliefs about the intervention
• *Cost*	• Self-efficacy
2. Outer Setting *The economic, political and social context within which an organisation resides*	• Individual stage of change
• *Patient needs and resources*	• Other personal attributes
• *Cosmopolitanism*	**5. Implementation Process** *An active change process is usually required to deliver individual and organizational use of the intervention as designed*
• *Peer pressure*	• ***Planning***
• *External policy and incentives*	• ***Engaging***
	• ***Executing***
	• ***Reflecting and Evaluating***

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Supplementary file 1: INTERVIEW TOPIC GUIDE

So following on from the information sheet, just to reiterate, we're hoping to explore your views and experiences of the HealthPathways initiative in the Southern Region, including what has been challenging or beneficial in relation to their implementation."

"CONSENT PROCESS"

Before we begin, do you have any further questions?

The following questions are examples rather than a set of specific questions.

Question
When did you first hear about HealthPathways in the Southern Region? What do you understand them to be? What were your initial thoughts? Did you feel they met a need?
What do you know about how HealthPathways in the Southern Region came about and how they created? Who was involved? What did you think of the process?
How useful do you think the HealthPathways initiative in the Southern Region is? How were you introduced to them? What were your initial thoughts? Did you feel they met a need? What gap does it fill? What problem does it solve? If not, why not? What is not being addressed? Is this a fix to a problem you don't perceive? Is there a problem about communication/process, etc. rather than concept/content?
What has been your experience of using a pathway? Did they fit well with normal practice? Have you used a healthpathway; if yes which one? How was that for you? What was better than before/what wasn't so good?
What has worked well in Southern Region initiative to implement HealthPathways in your opinion? Why? Communication; resourcing; support; clinical leadership; IT; patient information; effective governance of the work etc.
What has not worked so well in Southern Region initiative to implement HealthPathways in your opinion? Why? Communication; resourcing; support; clinical leadership; IT; patient information; effective governance of the work etc.
If you were asked to make a recommendation about the continuation of HealthPathways, what recommendation would you make? Why?
If you were asked to suggest further conditions for HealthPathways what would you suggest? Why? Are these conditions, particular prevalent or is the care (care coordination) for these conditions particularly fractured/complicated?
Is there anything else you would like to make comment on in regard to HealthPathways in general or the HealthPathways initiative in the Southern Region?

Supplementary File 2

COREQ (COnsolidated criteria for REporting Qualitative research) 32 item Checklist

Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. International Journal for Quality in Health Care. 2007. Volume 19, Number 6: pp. 349 – 357

Domain	Item Number	Comment	Reported on page number or not applicable (N/A)
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	The Assistant Research Fellow (Dr Emma Tumilty) conducted the interviews	8
Credentials	2	All four research team members have extensive experience of conducting qualitative health research	N/A
Occupation	3	ET was an Assistant Research Fellow at the University of Otago at the time of conducting the research	1
Gender	4	Two male-identifying and two female identifying researchers (interviewer, female-identifying)	
Experience and training	5	All four research team members have extensive experience of conducting qualitative health research	N/A
Relationship with participants			
Relationship established	6	The assistant research fellow had no relationships with participants prior to the study, while the broader research team had varying relationships with the health community at large. It was felt the interviewer should be seen as an unbiased enquirer rather than a person with a particular stance or opinion about the topic.	8, 24
Participant knowledge of the interviewer	7	The interviewer introduced herself to participants stating she was not a medical professional, etc. as well as describing the research team, its funding, the purpose of the project and answering any questions participants may have had about the project and those involved in it.	N/A

Interviewer characteristics	8	The interviewer was not a medical professional, but aware of the medical system in New Zealand and had read the literature on care pathways prior to beginning the project.	N/A
Domain 2: Study design			
Theoretical framework			
Methodological orientation and theory	9	Deductive thematic analysis using the Consolidated Framework for Implementation Research	9
Participant selection			
Sampling	10	Purposive sampling was used	8
Method of approach	11	Various methods of approach were used, group emails were sent via a third party, invitations were added to newsletters, emails were sent to practices, and then those taking part or responding were also asked to pass on information to others (snowball sampling).	N/A
Sample size	12	Ten	10
Non-participation	13	A number of key informants did not respond to the invitation to participate, however no person responded directly to decline taking part, nor did anybody drop out once agreeing to take part.	N/A
Setting			
Setting of data collection	14	Participants could determine whether the interview took place in their place of work or in a private meeting room arranged by the interviewer on the university campus.	N/A
Presence of nonparticipants	15	None	N/A
Description of sample	16	Fully presented in results section	10
Data collection			
Interview guide	17	The interview guide was open, but listed a number of key questions and potential prompts. Interviews generally followed a similar approach although questions themselves varied depending on the participant.	Supplemental file
Repeat interviews	18	No	N/A
Audio/visual recording	19	All interviews were audio-recorded and later transcribed.	9
Field notes	20	Yes, the interviewer wrote brief field notes after each interview regarding the nature of the interview and her perceptions of the participants responses, etc.	N/A

Duration	21	Interview times varied but were generally around 60mins	N/A
Data saturation	22	Not applicable as a deductive thematic analysis	N/A
Transcripts returned	23	No	N/A
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	The interviewer coded the data and described codes and these were discussed with all members of the interview team on a regular basis	9
Description of the coding tree	25	Codes had tags and description within the software except for where they were self-explanatory	9
Derivation of themes	26	The themes were those used in the Consolidated Framework for Implementation Research	9
Software	27	nVivo 11 was used	9
Participant checking	28	No	N/A
Reporting			
Quotations presented	29	Yes quotations are presented and identified in a manner protecting participants confidentiality	10-18
Data and findings consistent	30	Consistency between the data and the findings exists	10-18
Clarity of major themes	31	Yes, major themes are clearly identified	
Clarity of minor themes	32	Yes, minor themes (CIFR constructs) are clearly identified and related to major themes.	10-18

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HealthPathways implementation in a New Zealand health region: a qualitative study using the Consolidated Framework for Implementation Research

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HealthPathways implementation in a New Zealand health region: a qualitative study using the Consolidated Framework for Implementation Research

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ABSTRACT

Objectives To explore the process of implementation of an online health information web-based portal and referral system (HealthPathways) using implementation science theory: the Consolidated Framework for Implementation Research (CFIR).

Setting Southern Health Region of New Zealand (Otago and Southland).

Participants Key Informants (providers and planners of health care) (n=10) who were either involved in the process of implementing HealthPathways or who were intended end-users of HealthPathways.

Methods Semi-structured interviews were undertaken. A deductive thematic analysis using CFIR was conducted using the framework method.

Results CFIR postulates that for an intervention to be implemented successfully account must be taken of the intervention's core components and the adaptable periphery. The core component of HealthPathways – the web portal and referral system which contains a large number of localized clinical care pathways – had been addressed well by the product developers. Little attention had, however, been paid to addressing the adaptable periphery (adaptable elements, structures and systems related to HealthPathways and the organization into which it was being implemented) – it was seen as sufficient just to deliver the web portal and referral system and the set of clinical care pathways as developed to effect successful implementation. In terms of CFIR's "inner setting" corporate and professional cultures, the implementation climate and readiness for implementation were not properly addressed during implementation.

There were also multiple failures of the implementation process (for example, lack of planning and engagement with clinicians). As a consequence, implementation of HealthPathways was highly problematic.

Conclusions The use of CFIR has furthered our understanding of the factors needed for the successful implementation of a complex health intervention (HealthPathways) in the New Zealand health system. Those charged with implementing complex health interventions should always consider the local context within which they will be implemented and tailor their implementation strategy to address these.

Word Count: 297

Strengths and limitations of this study
• This is the first process evaluation of implementing HealthPathways in New Zealand using qualitative methods.
• The use of implementation science theory (Consolidated Framework for Implementation Research) allowed us to “unpack” the reasons why the implementation of HealthPathways in the Southern Region of New Zealand was so challenging.
• The study focused on a single health region as it was designed in partnership with the local health system to provide context specific findings that would be of benefit to the local health system.
• We were only able to recruit small number of participants who were not involved with the implementation process.

INTRODUCTION

The New Zealand (NZ) health system, in common with those of other jurisdictions, struggles to provide integration of health services across primary and secondary care.[1] One important quality improvement initiative promoted internationally since the 1980s to improve health care integration is care pathways. Care pathways have five key characteristics, they: 1) provide a structured multidisciplinary plan of care; 2) translate national evidence-based clinical guidelines into local structures; 3) detail the components of care required in an algorithm or pathway; 4) provide a time frame or criterion-based progression through the health system; and 5) aim to standardise care for a specific clinical condition in a specific local population.[2] In NZ a key adaptation has been the embedding of web-based clinical care pathways into general practice-hospital electronic referral management systems (ERMS). The use of care pathways in NZ has been championed by Canterbury District Health Board (DHB), who in 2008 developed an online health information web-based portal (containing the individual care pathways for specific clinical conditions) and referral system called HealthPathways.[3] Currently HealthPathways provides health practitioners with guidance and a referral pathway for over 550 clinical conditions (https://www.healthpathwayscommunity.org/About.aspx). There has been rapid adoption of HealthPathways and similar systems across NZ's DHBs and in Australia.[4-7] Its advocates claim that HealthPathways is an important means of achieving health care integration, [8 9] which has been a NZ government priority since the 2009 publication of *Better Sooner More Convenient.*[10] This claim is supported by an emerging evidence base which suggests that HealthPathway use is associated with an improvement in referral quality from primary care to secondary care and more

timely access to secondary care.[3] End users of HealthPathways also report, in online surveys[9] and qualitative case studies,[5 6 11] that HealthPathways improved their knowledge of local services and changed their clinical management decisions.

In the Southern Health Region of NZ's South Island (Otago and Southland), the Southern DHB and the WellSouth Primary Health Network (Primary Health Organisation: PHO) are working to further health service integration through Alliance South,[12] which is a contractual alliance between the two organisations aimed at improving care coordination and integration. In 2013 Alliance South embarked upon the implementation of the Canterbury HealthPathways in the Southern Region – Southern HealthPathways. The approach used Clinical Editors - general practitioners (GPs) who consulted with selected Southern Region secondary care clinicians (hospital specialists) - to localize/adapt each individual Canterbury clinical care pathway for use in the Southern health region: by 2017 over 400 individual clinical care pathways had been localized and could be accessed through the Southern HealthPathways web portal and referral system (https://southern.healthpathways.org.nz/). The focus was on the technical development of a suite of adapted pathways. In 2016 a team of researchers from the Dunedin School of Medicine, University of Otago, partnered with the local health system through Alliance South to conduct a mixed methods evaluation of the Southern HealthPathways programme. The rationale for this university-health service partnership was to build evaluation capacity in the Southern Region and the HealthPathways initiative was identified as a strategic priority for evaluation by Alliance South.

We report here the findings of the qualitative process evaluation. One key challenge in evaluating the implementation of HealthPathways is that they can be conceptualised as a complex health care intervention[13] and thus without a qualitative process evaluation it is not possible to determine which aspects of the intervention in a defined health care context are likely to lead to its success. Our study aim was therefore to understand the process by which Southern HealthPathways were being implemented using a commonly used implementation science theory: the Consolidated Framework for Implementation Research (CFIR).[14 15]

METHODS

Consolidated Framework for Implementation Research (CFIR)

In understanding how quality improvement initiatives work there is increasing emphasis on the use of theory drawn from the social sciences to better develop quality improvement interventions, optimise their design and identify aspects of context necessary for their success.[16 17] The CFIR is a "meta-theoretical" framework that provides an overarching typology of implementation. It offers a comprehensive, standardised list of constructs which allow researchers to identify variables that are most relevant to a particular intervention.[14] The CFIR addresses intervention delivery (context; implementation; mechanisms of action) through 26 constructs organized into five major domains: intervention characteristics (eight constructs), outer setting (four constructs), inner setting (five constructs), characteristics of the individuals involved (five constructs), and the process of implementation (four constructs) (see Table 1)

[insert Table 1 here]. CFIR has been widely used to inform qualitative process evaluations across a range of complex interventions.[15]

Design and sampling

Semi-structured interviews were conducted by ET between May and November 2016 with key informants (providers and planners of care) from the Southern DHB catchment area (Otago and Southland). The Southern DHB is the southernmost DHB in NZ and is responsible for planning, funding and providing health and disability services to a population of over 300,000 and serves the largest geographic region of all NZ's DHBs (https://www.southerndhb.govt.nz/index.php?page=654). Key informants were sampled purposively in order to construct a maximum variation sample that aimed to include primary care (GPs), secondary care clinicians, community nursing services and health service planners from the Southern DHB and WellSouth PHO. From this group of stakeholders we also aimed to include those who had a Southern DHB planning/management, Alliance South or other clinical leadership role, had direct involvement with the Alliance South HealthPathways work programme or who were end users of the HealthPathways (GPs).

Data collection

The semi-structured interviews used a topic guide based on a literature review, relevant CFIR guidance (https://cfirguide.org/) and discussions within the research team. The topic guide (Supplementary File 1) covered: a) views concerning the acceptability and utility of HealthPathways; b) the implementation of the HealthPathways initiative in Southern Region, with a focus on context specific barriers and facilitators to

implementation; and c) any specific issues relating to the actual use of HealthPathways by participants (if a health care practitioner). The topic guide was used flexibly to allow participants to construct their accounts in their own terms. All interviews were digitally-recorded and transcribed verbatim.

Data analysis

A deductive thematic analysis was conducted using the framework method.[18] Interviews were coded deductively by ET, assisted by NVivo 10 qualitative analysis software, into the five domains of the Consolidated Framework for Implementation Research (http://www.cfirguide.org/) and, as appropriate, into each domains' constructs. TS independently checked the assignment of a sample of data to the domains and constructs. Interpretation of the data, in particular the linkage between the CFIR domains and constructs, was an iterative process which was led by ET and TS, with input from FDN and RG. In addition, reports and relevant documents were sought from the Alliance South Southern HealthPathways Steering Group to provide background information and timelines.

The consolidated criteria for reporting qualitative research (COREQ)[19] were used to structure reporting of the methods and the findings (Supplementary File 2).

Patient and Public Involvement

No patients or the public were involved in this study.

RESULTS

Five GPs and five secondary care clinicians were interviewed. Of the ten participants four had a Southern DHB planning/management, Alliance South or other clinical leadership role. Three participants had direct involvement with the Alliance South Health Pathways work programme. Three participants were end users of HealthPathways.

As the interviews progressed and analysis was undertaken it became apparent that there were significant problems with the implementation of HealthPathways in the Southern Region. Thus the focus of the analysis shifted to using the relevant CFIR domains and constructs (Table 1) to systematically explore the question as to why implementation was proving problematic. Illustrative participant quotes are presented.

Domain 1: Intervention Characteristics

Core component and adaptable periphery

The CFIR framework (Table 1) conceptualizes complex interventions as having both core components (defined as the essential and indispensable elements of the intervention itself) *and* an adaptable periphery (adaptable elements, structures and systems related to the intervention and the organization into which it is being implemented).[14] In order for an intervention to be implemented successfully account must be taken of both the core components and the adaptable periphery.

Participants reported that the core component of the HealthPathways intervention – the web portal and referral system which contained a large number of individual clinical care

pathways – had been addressed well by the product developers. It was considered to be well designed and easy to access, the pathways for each clinical condition were appropriate and the web portal supported use of the ERMS that generated the referral letter from primary to secondary care:

> *This has changed my life in primary care. This is the best thing …. If I have a problem, if I have a woman come in with postmenopausal bleeding I go tick, tick, tick, there it is. "Have you done this, this, and this? Is it this or that?" Do that. If it is this and this, then refer here [ERMS] and she will get an appointment. It's just e-mail off, she'll get an appointment within three weeks. (Participant 4)*

> *On the whole I'm a big fan of Health Pathways. I'm a fan of it and ERMS linking up well together …. General Practice in New Zealand is probably more electronically savvy than any other place in the world. (Participant 5)*

What was apparent, however, in participants' accounts of how the core component (web portal and referral system) was implemented was there was limited or no consideration of the adaptable periphery. There was no clear understanding by the local team leading the implementation process of the need to both construct and populate a web portal and referral system (core component) and to address related issues that were necessary for the Canterbury HealthPathways to be successfully adapted and used in the Southern Health System (adaptable periphery). As a consequence, the implementation project was resourced to deliver the web portal and referral system but not to do the necessary related activities. Thus there was little or no funding of primary care time to allow engagement with project development and with secondary care. Support for the key

activity of communicating about the intervention, its benefits, and how it can be used to further integration across primary and secondary care was also lacking:

> *I don't think you can go back to what Canterbury did [to achieve successful implementation] because the time and resources aren't there. (Participant 3)*

In short, it was apparent that the adaptable periphery had not been addressed - it was seen as simply sufficient to deliver the web portal and referral system populated with a minimally edited set of individual clinical care pathways (the core component of HealthPathways) to effect successful implementation:

> *What they would do would be to take the Pathways that had been developed in Canterbury and simply cross out Canterbury and write Southern on them, and that would be fine and behaviours would change and everything would be hunky-dory. This mistaken view that what's on the flowchart on the piece of paper at the end is the process, which it isn't. I said to them on numerous occasions it is like taking somebody else's holiday snapshots and thinking that you've then had a holiday, which is complete nonsense. Most of them you won't understand. The essential part of HealthPathways is the conversation. (Participant 1)*

Domain 3 – Inner Setting

CFIR's "inner setting" (Table 1) is defined as the structural and cultural contexts through which the implementation process occurs.[14]

Culture

Implementation of the HealthPathways took place in a local health system where two strong corporate and professional cultures worked against the successful implementation of an intervention that straddled both primary and secondary care. The first of these, the local corporate culture – represented through the relationships between the DHB, PHO, secondary care clinicians and general practice – was seen as being both resistant to change and characterized by a low trust relationship between the DHB and other actors in the system. Resistance to change was considered at least in part due to a continued environment of financial austerity and a need for the DHB to "balance its books":

> *A resistance to change, which I think was about the whole health system being so stressed at the time with focus on financial deficit. (Participant 8)*

A low trust relationship was considered to exist between the DHB and the other actors, notably general practice. Participants considered HealthPathways was yet another transient initiative to improve health care, which would likely fail to deliver its intended outcomes:

> *Mistrust, it's being done to us and what are the DHB, they're sending me negative vibes about management in this DHB. This is another effort and just one of their things, and like other things it will come and go. (Participant 2).*

The second prevalent culture was one where secondary care (hospital specialists) and primary care (GPs) were seen as having different cultures based on their different scopes of medical practice and funding models. This culture of an embedded division between primary and secondary care had not to date been addressed in the Southern

Region through formal facilitated initiatives to get both groups working collaboratively across primary and secondary care:

> *I don't think that there's any particular antipathy. The way I see it from the secondary care perspective, by and large, and I don't really know what our colleagues in primary care think, but I do think that from secondary care clinicians, they've never had the opportunity of being in the same room and working out processes with primary care. I don't think they're opposed to it, it's just a foreign idea. (Participant 1)*

Implementation climate

A key aspect of the implementation climate that was not addressed properly was organizational incentives and rewards. The implementation process failed to consider ways in which using the Pathways would be rewarded for either secondary or primary care. That is to say, for clinicians that understood the purpose of pathways then using them made sense and was rewarding because there was an appreciation that they made clinical processes more efficient. For clinicians who had not yet bought into pathways not using them meant business as usual (i.e. no direct penalty was incurred other than having to either write referrals that were denied or receive referrals that did not include all the information). Thus, there was little incentive to engage with the intervention which required getting used to a new system and undertaking extra effort (i.e. for GPs more tests to be done prior to referral to secondary care; for hospital specialists more explicit triaging of referrals based on the specific clinical pathway criteria):

I know the secondary care champion on the steering group is finding it very difficult to engage other clinicians. Until there's some pressure to treat people, or to manage and triage people according to Health Pathways there, then you won't get the buy-in. (Participant 9)

Readiness for implementation

This CFIR construct is defined as the tangible and immediate indicator of the organisation's decision to implement an intervention[14] (in this case the organisation is defined as the DHB and the PHO working together through an Alliancing framework). It consists of three sub-constructs (leadership engagement, available resources and access to information and knowledge). Overall, readiness for implementation was limited. Apart from the HealthPathways steering group, which was engaged with the project, there was variable leadership engagement with primary and secondary care. In terms of access to information and knowledge about HealthPathways this was strong in primary care, but less so in secondary care:

Buy-in is very limited from the secondary care system, whereas the PHO have helped to put Health Pathways on everyone's workstation, or nearly everyone's workstation, and so at least it's there, available to use, and there's some buy-in that way. (Participant 3)

As already explored in Domain 1, lack of available resources was a main reason why there was a lack of readiness to implement HealthPathways. Most participants considered an appropriately funded adaptation would have included dedicated time for

secondary and primary care to meet and interact meaningfully. This had not been the case:

> *The key to it [Canterbury HealthPathways] was that people in the primary care sector were able to sit down in a room with secondary care clinicians and talk about the experience for patients and what that meant. (Participant 1)*

Domain 5 – The implementation process

Participants considered that there had been multiple failures of the implementation process (Table 1) across all its four components: planning, engaging, executing and reflecting/evaluating.

Planning

This was perceived as an omission by participants. They considered that those who set up the programme to take the Canterbury HealthPathways and adapt them for use in the Southern region had only planned for the technical production of a suite of adapted pathways and a basic "roll out", with a limited amount of promotion. This was considered to show a lack of understanding about what was achieved in Canterbury during the planning phase and what was important to the successful uptake and use of HealthPathways. Various initiatives were then undertaken after the fact with champions appointed in secondary and primary care and communications disseminated more regularly across the health sector.

Engagement

Engagement with the actual users of the HealthPathways was limited. Participants raised the issue of a lack of planning to ensure that the wider community in primary and secondary care were given the opportunity to meaningfully engage with the HealthPathways initiative, which one participant referred to as “socialization”:

> *Then I think the hardest part is probably how do you actually socialize it amongst clinicians so that they regularly use the pathways. (…) I think that's probably where things have not gone as well as they need to or could have. (Participant 7).*

> *It's an uphill battle to get access to my secondary care colleagues, and when I meet up with them, the first question I ask is, "How many of you know about HealthPathways?" One or two might put up their hands. "How many of you use it?" Then it's sort of deafening silence. A huge lack of knowledge about what HealthPathways are and how they can benefit everybody, primarily the patient, but they can help all of us in what we do. A lack of knowledge, and there's been still no concerted drive from the powers that be to propagate the concept of HealthPathways and how everybody can benefit from it. (Participant 2)*

Although a secondary care and a primary care clinician (hospital specialist and GP) had been identified as champions for Pathways (both formally and informally) their work was frustrated by a lack of managerial support during the implementation process:

> *If you have something taken from outside and imposed on you, without any background and information as to how you can benefit from this, individuals like me trying to propagate that, I can easily be seen as just somebody the DHB has*

put there to try and wave the flag. With no support from above, I'm fighting a losing battle. (Participant 2)

Executing

Executing the implementation was problematic, as explored in Domain 1, because it focused on the core component and not on the adaptable periphery. What this meant was that significant work was devoted to technology development (website, web portal and localising existing individual care pathways) – thus the Clinical Editors were contracted by the DHB to produce a large suite of edited pathways - but there was inadequate resourcing to allow meaningful engagement with the wider secondary care community. As a consequence “buy in” from clinicians was limited.

Evaluation/Reflection

There appeared to be very limited evaluation of the Southern HealthPathways implementation. The only data that was reported were regular updates on the number of live HealthPathways. Information on the numbers of health practitioners actually using the individual clinical pathways was not consistently reported across speciality areas.

DISCUSSION

This is the first process evaluation of HealthPathways implementation in NZ using qualitative methods and the first such evaluation to use the CFIR framework. The use of implementation science theory (CFIR) allowed us to “unpack” the reasons why the implementation of HealthPathways in the Southern Region of NZ was so challenging.

CFIR postulates that for an intervention to be implemented successfully account must be taken of both the intervention's core components and the adaptable periphery. We found that the core component of HealthPathways – the web portal and referral system which contains a large number of individual clinical care pathways – had been addressed well by the product developers. Little attention had, however, been paid to addressing the adaptable periphery (adaptable elements, structures and systems related to the intervention and the organization into which it is being implemented) – it was seen as sufficient just to deliver the web portal and referral system populated with a set of localized clinical care pathways as developed to effect successful implementation. In terms of CFIR's "inner setting" corporate and professional cultures, the implementation climate and readiness for implementation were not properly addressed during implementation. There was a culture of low trust between the DHB and other actors in the health system and an embedded division between primary and secondary care clinicians. There were no organizational rewards or incentives for end users to use HealthPathways (poor implementation climate). There was also a lack of readiness to implement, notably a lack of funding to allow for dedicated time for secondary and primary care clinicians to meet and interact meaningfully as part of HealthPathway development. There were also multiple failures of the implementation process across all its four components: planning, engaging, executing and reflecting/evaluating.

This qualitative interview study utilised purposive sampling to recruit a sample that varied by health care professional group (primary care and secondary care) and by

degree of involvement with the Southern HealthPathways programme. The choice of individual interviews was appropriate as it allowed participants to talk openly about the problems being encountered with the HealthPathways programme. It was appropriate that the study focused on a single NZ health region as it was designed in partnership with the local health system (Alliance South) to provide context specific findings that would be of benefit to the local health system.[20] Nonetheless, it is likely that our key finding – the need to consider the adaptable periphery when implementing interventions – is transferable to other NZ health regions and other health systems in which HealthPathways are being implemented. A strength of the chosen implementation science framework (CFIR) is that it is "meta-theoretical", including constructs from a synthesis of existing implementation theories, and it is designed to allow researchers to test out empirically mechanisms theorized to promote or hinder implementation of a given intervention.[14] It is also intended to be used flexibly, with the researchers selecting and identifying constructs which best explain their findings. We did not have an a priori view of which CFIR domains would explain the problems in the implementation process, we deductively coded into all of the five CFIR domains and through an iterative process of reviewing the domain categories we were able to identify those which were most relevant to HealthPathways implementation and thereby explain why the implementation had been problematic in this specific context.

We found the recruitment of participants challenging and, while we had not set a fixed number of planned interviews, were only able to recruit a small number of participants (three) who were categorised as end users of Health Pathways and not involved with the implementation process. We believe this difficulty reflects the findings, in that the

project was not well planned and implemented and so interest in speaking about HealthPathways was adversely affected. We had originally intended to combine this qualitative process evaluation with a quantitative component to determine if HealthPathways were effective in improving care of people with two exemplar clinical conditions through a before and after comparison of key process and outcome measures. We were unable to meet this second objective as we were informed, after award of the research grant, that the Health Pathways team would not be able to collect this data due to delays in implementing the project and project planning. It was a requirement of the study that Alliance South would set up the data collection process, not the research team.

There has to date been no formative evaluation of HealthPathways in NZ. The Canterbury HealthPathways programme, for example, has conducted a limited evaluation consisting of an online survey of primary and secondary care clinicians and audits of pathways use.[3 9 21] In contrast, two different Australian states have conducted a process evaluation of HealthPathways using a qualitative case study approach: New South Wales (Hunter and New England)[5] and Victoria (Barwon).[6 11] Neither Australian studies used an explicit implementation science framework; instead, they descriptively list the “barriers” and “facilitators” to implementation. These two evaluations considered that implementation had been successful and the Hunter and New England study’s list of “critical success factors” are the mirror image of a number of the key implementation issues identified in this study: senior management support, senior clinical leadership, involvement of clinicians in development, need for pathways to add value for clinicians

and engagement with hospital specialists.[5] Both evaluations' list of "barriers" highlighted lack of awareness by GPs of the HealthPathways programme.[5 6]

CFIR now has a good evidence base as it has been applied across a wide variety of implementation study designs and settings.[15] A recent CFIR-informed qualitative process evaluation study (exploring the barriers affecting implementation of an online frailty tool into primary care), using a similar methodology, also found that it was necessary to report empirical findings that related to the most important CFIR domains to best "make sense" of the data.[22]

Given we intended that this evaluation should help Alliance South in its implementation of HealthPathways in line with a university-health sector collaboration[20] we are able to report how these findings have been used. During the study interview phase (2016) we were able to feedback highlights of our emerging findings to the Alliance South HealthPathways workstream who then shared with us their own internal report (Bridget-Mary McGown, Alliance South, personal communication). The latter report independently highlighted several of our emerging findings. On completion of our preliminary analysis (2017) our findings were presented to the Alliance South HealthPathways Steering Group. At the same time the DHB had undergone a restructure with a new Chief Executive who wished to prioritise HealthPathways implementation. There was therefore senior management team support to initiate a re-launch of the programme which has taken account of the key findings of this study,

notably the need to ensure dedicated time for secondary and primary care clinicians to meet and interact as part of HealthPathways development.

It is not always the case that quality improvement initiatives, such as HealthPathways, are successfully implemented and thereby lead to positive outcomes for patients and health practitioners. Publication bias may also mean that there are less published studies reporting negative quality improvement research findings.[23] We argue there is great benefit in understanding why, and under what circumstances and in which contexts, some quality improvement interventions fail. Although we currently have limited evidence as to whether HealthPathways improve health outcomes for patients (as opposed to being viewed by health practitioners as improving referral quality and promoting integration of care) it is clear that there is rapid adoption of HealthPathways both within other regions of NZ, Australia and also in the UK.[6] A consequence of this is that they are being implemented in very different contexts than those present in Canterbury NZ in 2007-2008 when the programme was first developed and implemented. What we have shown, using the CFIR framework, is that a focus on the core component of HealthPathways (web-portal and referral system) without adequate consideration of the adaptable periphery (which is context dependent) when implementing HealthPathways into a health system means implementation will likely fail. Others have similarly shown the importance of the local context in determining whether or not local implementation works or fails when rolling out a national quality improvement programme in secondary care.[24] We therefore consider that the

implication of our work for future implementers of HealthPathways and similar complex interventions is always to consider the local context within which they are to be implemented and to tailor the implementation approach to address these.

Word count: 4668

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Contributors

TS conceived and designed the study with input from RG and FDN. ET conducted the interviews and led on the data analysis with input from TS. TS drafted the manuscript. All authors read, provided critical review and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Authors' information

RG was independent chair of Alliance South at the time the study was conducted. ET was an Assistant Research Fellow in the Department of General Practice and Rural Health, Dunedin School of Medicine at the time of conducting the research.

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Ethics approval and consent to participate

Ethical approval was obtained from the Otago University Human Ethics Committee (16/024). Written informed consent was obtained from all participants.

Data sharing statement

Full de-identified interview transcripts will not be shared. Informed consent, in line with the approving ethics committee, only allows for the use of de-identified extracts within research reporting and writing, in order to maintain the privacy of participants based in a defined regional area and population, thus making their identification with full transcripts more likely.

Table 1 CFIR Domains and associated constructs. Domains and constructs used in the study are in bold.

1. Intervention Characteristics *Interventions have core components (essential elements) and an adaptable periphery (adaptable elements, structures and systems related to the intervention and the organization into which it is being implemented)*	**3. Inner Setting** *The structural and cultural contexts through which the implementation process occurs*
• *Intervention source*	• *Structural characteristics*
• *Evidence strength and quality*	• *Networks and communication*
• *Relative advantage*	• ***Culture***
• ***Adaptability***	• ***Implementation climate***
• *Trialability*	• ***Readiness for implementation***
• *Complexity*	4. Characteristics of Individuals *The individuals involved with the intervention and/or implementation process*
• *Design quality and packaging*	• Knowledge and beliefs about the intervention
• *Cost*	• Self-efficacy
2. Outer Setting *The economic, political and social context within which an organisation resides*	• Individual stage of change
• *Patient needs and resources*	• Other personal attributes
• *Cosmopolitanism*	**5. Implementation Process** *An active change process is usually required to deliver individual and organizational use of the intervention as designed*
• *Peer pressure*	• ***Planning***
• *External policy and incentives*	• ***Engaging***
	• ***Executing***
	• ***Reflecting and Evaluating***

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Supplementary file 1: INTERVIEW TOPIC GUIDE

So following on from the information sheet, just to reiterate, we're hoping to explore your views and experiences of the HealthPathways initiative in the Southern Region, including what has been challenging or beneficial in relation to their implementation."

"CONSENT PROCESS"

Before we begin, do you have any further questions?

The following questions are examples rather than a set of specific questions.

Question
When did you first hear about HealthPathways in the Southern Region? What do you understand them to be? What were your initial thoughts? Did you feel they met a need?
What do you know about how HealthPathways in the Southern Region came about and how they created? Who was involved? What did you think of the process?
How useful do you think the HealthPathways initiative in the Southern Region is? How were you introduced to them? What were your initial thoughts? Did you feel they met a need? What gap does it fill? What problem does it solve? If not, why not? What is not being addressed? Is this a fix to a problem you don't perceive? Is there a problem about communication/process, etc. rather than concept/content?
What has been your experience of using a pathway? Did they fit well with normal practice? Have you used a healthpathway; if yes which one? How was that for you? What was better than before/what wasn't so good?
What has worked well in Southern Region initiative to implement HealthPathways in your opinion? Why? Communication; resourcing; support; clinical leadership; IT; patient information; effective governance of the work etc.
What has not worked so well in Southern Region initiative to implement HealthPathways in your opinion? Why? Communication; resourcing; support; clinical leadership; IT; patient information; effective governance of the work etc.
If you were asked to make a recommendation about the continuation of HealthPathways, what recommendation would you make? Why?
If you were asked to suggest further conditions for HealthPathways what would you suggest? Why? Are these conditions, particular prevalent or is the care (care coordination) for these conditions particularly fractured/complicated?
Is there anything else you would like to make comment on in regard to HealthPathways in general or the HealthPathways initiative in the Southern Region?

Supplementary File 2

COREQ (COnsolidated criteria for REporting Qualitative research) 32 item Checklist

Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. International Journal for Quality in Health Care. 2007. Volume 19, Number 6: pp. 349 – 357

Domain	Item Number	Comment	Reported on page number or not applicable (N/A)
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	The Assistant Research Fellow (Dr Emma Tumilty) conducted the interviews	8
Credentials	2	All four research team members have extensive experience of conducting qualitative health research	N/A
Occupation	3	ET was an Assistant Research Fellow at the University of Otago at the time of conducting the research	1
Gender	4	Two male-identifying and two female identifying researchers (interviewer, female-identifying)	
Experience and training	5	All four research team members have extensive experience of conducting qualitative health research	N/A
Relationship with participants			
Relationship established	6	The assistant research fellow had no relationships with participants prior to the study, while the broader research team had varying relationships with the health community at large. It was felt the interviewer should be seen as an unbiased enquirer rather than a person with a particular stance or opinion about the topic.	8, 24
Participant knowledge of the interviewer	7	The interviewer introduced herself to participants stating she was not a medical professional, etc. as well as describing the research team, its funding, the purpose of the project and answering any questions participants may have had about the project and those involved in it.	N/A

Interviewer characteristics	8	The interviewer was not a medical professional, but aware of the medical system in New Zealand and had read the literature on care pathways prior to beginning the project.	N/A
Domain 2: Study design			
Theoretical framework			
Methodological orientation and theory	9	Deductive thematic analysis using the Consolidated Framework for Implementation Research	9
Participant selection			
Sampling	10	Purposive sampling was used	8
Method of approach	11	Various methods of approach were used, group emails were sent via a third party, invitations were added to newsletters, emails were sent to practices, and then those taking part or responding were also asked to pass on information to others (snowball sampling).	N/A
Sample size	12	Ten	10
Non-participation	13	A number of key informants did not respond to the invitation to participate, however no person responded directly to decline taking part, nor did anybody drop out once agreeing to take part.	N/A
Setting			
Setting of data collection	14	Participants could determine whether the interview took place in their place of work or in a private meeting room arranged by the interviewer on the university campus.	N/A
Presence of nonparticipants	15	None	N/A
Description of sample	16	Fully presented in results section	10
Data collection			
Interview guide	17	The interview guide was open, but listed a number of key questions and potential prompts. Interviews generally followed a similar approach although questions themselves varied depending on the participant.	Supplemental file
Repeat interviews	18	No	N/A
Audio/visual recording	19	All interviews were audio-recorded and later transcribed.	9
Field notes	20	Yes, the interviewer wrote brief field notes after each interview regarding the nature of the interview and her perceptions of the participants responses, etc.	N/A

Duration	21	Interview times varied but were generally around 60mins	N/A
Data saturation	22	Not applicable as a deductive thematic analysis	N/A
Transcripts returned	23	No	N/A
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	The interviewer coded the data and described codes and these were discussed with all members of the interview team on a regular basis	9
Description of the coding tree	25	Codes had tags and description within the software except for where they were self-explanatory	9
Derivation of themes	26	The themes were those used in the Consolidated Framework for Implementation Research	9
Software	27	nVivo 11 was used	9
Participant checking	28	No	N/A
Reporting			
Quotations presented	29	Yes quotations are presented and identified in a manner protecting participants confidentiality	10-18
Data and findings consistent	30	Consistency between the data and the findings exists	10-18
Clarity of major themes	31	Yes, major themes are clearly identified	
Clarity of minor themes	32	Yes, minor themes (CIFR constructs) are clearly identified and related to major themes.	10-18