The implementation of a National Electronic Referral Programme: a qualitative study of Going to Full Scale

Abstract

**Background:** National electronic referral systems have proved challenging to implement due to problems of fit between the technical features of the solution and the social processes through which referrals are managed. In seeming contradiction to a socio-technical approach, the Irish Health Service Executive initiated an incremental implementation of a National Electronic Referral Programme (NERP), with step 1 including only the technical capability for General Practitioners to submit electronic referral requests to hospital outpatient departments.
Objective: The objective of this study is to theoretically frame the lessons learned from the NERP step 1 on the design and implementation of a national health information technology programme.

Methods: A case study design was employed, using qualitative interviews with key stakeholders of the NERP (N=41). A theory-driven analysis of interview data was conducted, using Barker et al.'s (2016) Framework for Going to Full Scale.

Results: The NERP step 1 was welcomed by key stakeholders as a first step in the implementation of electronic referrals; delivering improvements in the speed, completeness of demographic information, legibility and traceability of referral requests. National leadership and digitalized health records in general practice were critical enabling factors. The lack of specification of social features however, inhibited the development of data collection, reporting and learning systems through which the change package for the NERP step 1 could be tested and refined. Inhibiting factors for the specification of social features included policy uncertainty about the future organisational structures within which electronic referrals would be implemented; the need to establish a central referral office in line with these organisational structures; outstanding interoperability issues between the electronic referral solution and hospital patient administration systems; and an anticipated need to develop specialist referral templates for some specialties.

Conclusions: Key strengths of the NERP step 1 are the patient safety benefits delivered; a national electronic referral programme was progressed beyond pilot, despite limited resources and outstanding interoperability issues; and a new eHealth Ireland unit gained credibility that it can deliver national health information technology programmes. Limitations of the programme are that it was poorly integrated in the wider policy and quality improvement agenda of the Health Service Executive; the lack of specification of social features created challenges in communicating the scope of the programme to key stakeholders and restricted the ability of programme managers and implementers to test and refine the change package. In terms of design, this study concludes that while the social features of a national health information technology programme don’t need to be specified in tandem with technical features, they do need to be specified quite early in the implementation process so that the change package (both technical and social) can be tested and refined as a scalable unit.

Keywords
electronic referrals; scale-up; eHealth; implementation; health policy; integrated care

Introduction

Electronic referrals
Electronic referrals or “e-referrals” can be defined as ‘the electronic transmission of patient data and clinical requests between health service providers’ [1]. Shifting from paper-based referrals (i.e. postal letter or fax) to electronic referrals, offers the opportunity to transform the interface between primary
and specialty care [2]. Historically, the default clinical request from a General Practitioner (GP) referring to a specialist was to request a face-to-face consultation for a given service-user [3]. Electronic referral technology however, can support a two-way channel of communication between referrer and referee, creating the opportunity for more flexible and consultative forms of data exchange and clinical requests [4]. Electronic referrals provide health systems with the capability to optimise system capacity, whereby GPs can be supported by specialists to care for service users in the community until they genuinely require a specialist appointment [5].

The development of electronic referrals in the Irish Health Service Executive (HSE)
The initiation in January 2011 of an Irish electronic referral pilot programme was not solely motivated by the potential for electronic referrals to transform the interface between primary and specialty care. A crisis emerged in March 2010, when the media reported that one of Ireland’s largest hospitals had 30,000 unopened or unprocessed GP outpatient referrals. The Irish Health Service Executive (HSE) initiated an investigation [6] and the Health Information and Quality Authority (HIQA) partnered with the Irish College of General Practitioners (ICGP) to conduct a review of referral management between General Practitioners and hospital outpatient departments (GP-OPD). This HIQA-ICGP partnership produced a standardised general referral template, specifying the essential information that needs to be contained in a referral from a GP to a hospital OPD. A recommendation of the HIQA-ICGP partnership was that their standardised template could form the informational basis for an electronic referral solution between GPs and OPDs [7].

Also at this time, an advisory group had been established in the South of the country, made up of clinical, management, IT and patient representatives, to reconfigure hospital services in that region. This group partnered with Healthlink - an Irish structured healthcare messaging platform - to develop and pilot an electronic referral pathway between GPs and the OPDs of seven hospitals in their region. The pilot revealed a number of challenges for implementing a complete electronic referral solution, capable of offering a two-way interface between GPs and Hospital’s OPDs. Foremost of these challenges were the outstanding interoperability issues between the Healthlink platform and hospital Patient Administrative Systems (PAS) and secondly, the human resourcing of hospital Central Referrals Offices (CROs) to process electronic referrals alongside paper referrals.

Despite these obstacles to a complete implementation of electronic referrals, the pilot did successfully establish the technical capability, via the Healthlink platform, for GPs to electronically submit their referrals to Hospital OPDs. This first step in the electronic referrals process has been described as the electronic referral request [8]. The pilot project found that the use of electronic referral requests generating the following improvements:

- improved legibility because all information is typed in a standardised template;
- improved completeness of data due to the mandatory fields in the standardised template;
assurance for GPs and patients that their referral had been received because an automated email is returned to the referring GP once it is digitally opened in the hospital; and improved traceability and visibility for hospitals in referral management because Healthlink creates a digital record of when and how many electronic referrals have been received by each hospital, and when they were triaged [9].

These simple and yet important patient safety benefits informed a decision by a newly established unit of the HSE called eHealth Ireland, to establish a National Electronic Referral Programme (NERP) with step 1 involving the scale-up of the technical capability for GPs to submit electronic referral requests to hospital OPDs.

The impact of scale on a socio-technical approach
Reviews from some of the earliest deployments of national electronic referral systems, including Norway [10], the Netherlands and Denmark [11], recommend a socio-technical approach to implementing electronic referrals. A socio-technical approach considers how the technical features of health information systems interact with the social features of a health care work environment’ [12]. EHealth Ireland’s decision to initiate the NERP on an incremental basis, i.e. step 1 with only the technical capability for electronic referrals, appears to be at odds with this socio-technical approach. The only target specified was to establish within 12 months, the technical capability for GPs to submit electronic referral requests to at least one OPD specialty in all hospitals. In terms of the adoption of that technical capability, no targets were set for which outpatient department specialties would be included in the programme; what the target volume of electronic referrals versus paper referrals would be; or what proportion of GPs would be engaged. That is, the technology component to the programme was specified but how that technology would interact with the social system was not specified.

Eason (2007) applied a socio-technical lens to the implementation of the NHS’s National Programme for IT (NPfIT) and highlighted that in national health IT programmes, the technical and social features are not designed and implemented simultaneously [13], as many interpretations of a socio-technical theory approach suggests [14]. Rather, standard technical features are pre-defined at the national level and flexibility needs to be provided for local implementation sites ‘to adopt technical systems in ways that meet local needs and enable them to engage in sociotechnical systems design at a level where the local user community can play a full part’ [13]. This suggestion that the socio-technical approach needs to be modified for national health IT programmes is reflected in the design of the NERP step 1 [15], where standard technical features were pre-defined nationally with no specification of the programme’s social features. It is not clear however, from Eason’s critique of socio-technical systems theory; if or when the social features of national health IT programmes should be defined at the national level.
Goal of this Study
In order to contribute to this discussion on the design and implementation of national health IT programmes, this paper presents the findings from qualitative, in-depth interviews conducted with key stakeholders in the implementation of the NERP step 1. The data provided by these stakeholders are analysed using the Institute for Healthcare Improvement’s (IHI) Framework for Going to Full Scale [16] to explore two research questions:

1. What were the strengths and limitations of the scale-up of the NERP Step 1, as a technical-only intervention?
2. Do the social features of a national health IT programme need to be specified at the national level?

These research questions seek to explore the arguments for and against progressing with the scale-up of only the technical features of a national health IT programme, using Ireland’s National Electronic Referral Programme (NERP) step 1 as an empirical case study. The objective of this paper is to theoretically frame the lessons learned from Ireland’s NERP step 1, for policy makers and implementers seeking to design and implement national health IT programmes.

Methods

Methodological Approach
This study explored the implementation of a National Electronic Referral Programme (NERP) using qualitative, in-depth interviews with key programme stakeholders. This approach captures individual participants’ experiences, narratives, ideas and discourses [17], and informs an analysis of the scale-up strategy employed in the NERP step 1.

Recruitment

Ethics
Ethical approval was granted by the Office of Research Ethics in University College Dublin (UCD). No vulnerable populations took part in this study and no patient data was collected. All participants were interviewed in a professional capacity, as stakeholders in the scale-up of electronic referrals in Ireland. Participant anonymity and confidential data management are the dominant ethical considerations for this study and are maintained in line with UCD Research Ethics Guidelines.

Participants
A total of forty one participants were recruited (N=41) across 1 pilot site and five NERP sites. Twelve participants recruited were involved in the pilot, including: Pilot Management (N=3); Hospital Administration/Management (N=3); Information Communication Technology (ICT) (N=3) and General Practice (N=3). The pilot’s ICT (N=3) and General Practice (N=3) participants are also stakeholders of the NERP step 1. Stakeholders recruited from the NERP step 1 included: NERP
Management (N=2); Health Service Executive (HSE) Stakeholders (N=3); Hospital Administration/Management (N=17); and additional ICT (N=3) and General Practice (N=4).

Table 1: Participant involvement in the National Electronic Referral Programme (NERP)

<table>
<thead>
<tr>
<th>Key Stakeholder Types</th>
<th>Involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pilot</td>
</tr>
<tr>
<td>Pilot</td>
<td></td>
</tr>
<tr>
<td>Pilot Management</td>
<td>3</td>
</tr>
<tr>
<td>Hospital Administration/Management</td>
<td>3</td>
</tr>
<tr>
<td>NERP National Level</td>
<td></td>
</tr>
<tr>
<td>NERP Management</td>
<td>-</td>
</tr>
<tr>
<td>HSE Stakeholders</td>
<td>-</td>
</tr>
<tr>
<td>NERP Implementation Sites</td>
<td></td>
</tr>
<tr>
<td>Hospital Administration/Management</td>
<td>-</td>
</tr>
<tr>
<td>ICT</td>
<td>3</td>
</tr>
<tr>
<td>General Practice</td>
<td>3</td>
</tr>
<tr>
<td>Total (N=41)</td>
<td>12</td>
</tr>
</tbody>
</table>

A total of 28 interviews were scheduled. Of the forty one participants, nineteen participated in face-to-face group interviews while the remaining twenty two participants were interviewed individually. The group interviews involved a range of two to five participants and were predominantly undertaken with the hospital Administration/Management stakeholder group. Of the twenty two interviews conducted with individual participants, five were carried out via telephone and seventeen were conducted on a face-to-face basis.

Theoretical Framework

The Institute for Healthcare Improvement’s (IHI) Framework for Going to Full Scale [16] was adopted as the theoretical framework for coding and analysing the qualitative interview data collected. This framework proposes that in order to take a healthcare quality improvement to full scale, it is first necessary to account for the factors required to promote the adoption of changes and to support scale-up; and secondly, to design at the outset a phased plan to reach full-scale implementation.

The Phases of Scale-Up proposed by this framework for healthcare quality improvement include: (i) Set-up; (ii) Develop the Scalable Unit; (iii) Test Scale-up; and (iv) Go to Full Scale. Each of these phases are either enabled or hindered by the availability of certain Adoption Mechanisms and Support Systems (see Figure 1). Adoption Mechanisms to account for include: Better Ideas; Leadership; Communication; Policy; and Culture of Urgency & Persistence; while the Support Systems include: Human Capability for scale-up; Infrastructure for scale-up; Data collection and reporting systems; Learning System; and Design for sustainability.
An important reason for selecting this theoretical framework is that it can accommodate the NERP’s incremental design, whereby this study only examines step 1 in the implementation of electronic referrals and not a complete implementation of electronic referrals. The Phases of Scale-up in this Framework are informed by Plan-Do-Study-Act (PDSA) cycles of quality improvement. It is not assumed that what is being implemented is a complete programme. A PDSA cycle requires only that for any given programme or programme component, a theory of change can be specified and then tested across a range of contexts before being implemented at full-scale. The framework contains a feedback loop, demonstrated by the counter-clockwise arrows over the four Phases of Scale-up, whereby new learnings may involve returning to earlier Phases of Scale-up to make necessary adaptions.

Results
In this Results section, data collected via qualitative in-depth interviews with key stakeholders of the NERP step 1 are analysed using Barker et al’s (2016) Framework for Going to Full Scale. This theory-driven analysis involved specifying what is the New Scale-up Idea; describing how the NERP step 1 progressed across the four Phases of Scale-up; and focusing on how that progression was either enabled or inhibited by the five Adoption Mechanisms and the five Support Systems.

New Scale-up Idea
The Phases of Scale-up are triggered by the discovery of a New Scale-up Idea or a new best-practice. A national level participant commented that NERP step 1 was ‘an easy sell, [its] patient safety… a solution has been developed so it’s a matter of taking the solution and rolling it out to different acute hospitals’ (Participant 28). Similar to the pilot experience, NERP step 1 participants cited speed, complete demographic information, legibility and traceability as the four key patient safety improvements delivered in the NERP step 1. Participants commented that ‘speed of referral would be the biggest thing…The GP knows it’s got here’ (Participant 10) because an automated
notification is returned to the GP once the electronic referral has been opened within the hospital. ‘It’s instant, it sells itself. You send in the referral, the hospital has it, there’s no post, you’re not waiting a day for it to be delivered’ (Participant 29). ‘It’s good they have a minimum data set…Like we’ll never be missing a date of birth or [receive]…only one line of an address…They will always give you a phone number on it’ (Participant 40). Another hospital administrator pointed out that full contact details, including mobile phone numbers are very important so that they can ‘text remind people…to help reduce the DNA (Do Not Attend) rate’ (Participant 5). Finally, several participants commented on the legibility benefits of electronic referrals in that they save time trying to decipher difficult handwriting or calling GP surgeries to confirm details or seek missing information. ‘It’s legible you know. Many times you have to ring them up [GP surgeries]’ (Participant 40) but with electronic referrals, they ‘can find a patient much easier on the system now’ (Participant 24).

An important social feature of the Pilot Programme had been the requirement for hospitals to return a Triage Outcome message, via Healthlink, to referring GPs. Manpower planning issues identified in hospital Central Referral Offices (CROs) during the pilot resulted in the GP Triage Outcome message not being specified as a feature of the NERP step 1. One of the pilot GP’s commented that ‘it remains to be seen…how negative that will be…It reduces the communication back to the GP and it doesn’t tell the GP how the patient has been triaged’ (Participant 16). A national level participant commented that ‘we thought the GPs would be up in arms and they would go crazy about it but actually, when we did go back to the ICGP [Irish College of General Practitioners]…they said, “we’d be disappointed but at the same time…we would prefer that they [hospitals] went with it without responses than not go at all”’ (Participant 12). As such, GPs supported the NERP step 1 in proceeding with the scale-up of the technical capability for all hospitals to receive electronic referral requests, with the knowledge that hospitals did not have the “Human Capability for scale up” [Support System] to support an electronic processing of referrals (i.e. eTriage, eAppointments etc.). This acceptance amongst key stakeholders that NERP Step 1 is only about paving the way for a complete implementation of electronic referrals is also captured in a comment by a national level participant who described the NERP step 1 as getting ‘the footprint of eReferrals out to all hospitals around the country’ (Participant 18).

Set-Up
Set-Up is the first phase in a scale-up, where the ambition for full scale is defined. Limiting the scope of the NERP step 1 to the technical capability was explained by national level participants as a pragmatic decision. A national level stakeholder explained that they didn’t ‘have the bandwidth within [their] resources to go to each site’ to support a socio-technical implementation. ‘When we are asked to rollout eReferrals within 12 months, what we can do is we can put the capability in place for each of the sites’ (Participant 18).
In terms of the “ask” to rollout electronic referrals in 12 months, the “Leadership” provided by the HSE’s new *eHealth Ireland* unit was widely cited as a critical *Adoption Mechanism* for the Set-up of the NERP. One pilot participant suggested that the ‘*timing was impeccable*’ (Participant 28) for the appointment of a Chief Information Officer (CIO) to lead the *eHealth Ireland* unit. ‘*If he hadn’t arrived I would say that at this stage, we’d have rolled it out in the South/Southwest Hospital Group [pilot] and possibly no further*’ (Participant 28). A national level participant commented that ‘*this is the first …of any of the projects we’ve done, where there’s been a national focus. Where from the top, it’s been said, “everyone has to accept electronic referrals by X date”* (Participant 12)’. Also, a GP who was involved in the pilot commented that the new CIO was ‘*providing a vision for where the service needs to go*’…but ‘*there’s a huge amount of work that needs to be done and huge investment that needs to take place and I suppose that remains to be seen, whether that will be available*’ (Participant 16). This last comment suggests that leadership requires not only vision but also the ability to secure funding. A comment by a national level stakeholder supports this suggestion in referring to the ‘*credibility piece*’, whereby ‘*if we can deliver a project of this type in a timeline that’s considered sensible…then it provides more confidence that the Office of the CIO and the Healthlink team can actually deliver significant change in a reasonable amount of time*’ (Participant 18). This comment provides context for the ambitious 12 month time-frame to scale-up the technical capability for electronic referrals, particularly since further resources need to be secured to proceed beyond step 1 of the NERP.

Secondly, defining the ambition of NERP step 1 as putting the technical “capability” in place for all hospitals to receive electronic referrals from GPs indicates a confidence that GPs will submit their referrals electronically, should this facility be available to them. The level of digitalisation of General Practice health records represents an important “Infrastructure for Scale up” *Support System*. The *Healthlink* solution is fully integrated into General Practice software packages and GP participants emphasised the importance of this integration in their interviews. GPs ‘*have all the information in the system and being able to extract it and package it up and send it off electronically is kind of a side effect of the investment that they’ve [GPs] made over the years*’ (GP 1). No formal incentives are offered to GPs to use electronic referral requests and therefore, their adoption of the solution relies upon their technical capability to submit electronic referrals and the perception that this solution is a “Better Idea” (as described above).

**Develop the Scalable Unit**
The second phase of scale-up is developing the scalable unit. The scalable unit is the smallest unit of the system targeted for full-scale implementation. This analysis proposes that the Scalable Unit of the NERP step 1 should contain some specification on (i) the proportion of hospitals targeted; (ii) the proportion of OPD specialities targeted; (iii) the proportion of electronic vs paper referral requests targeted; (iv) and the proportion of GPs targeted to use electronic referral requests. In practice, the
scalable unit specified by eHealth Ireland only included the first of these elements, with a full scale target of all public hospitals.

Implementing this first element was the focus of the NERP step 1 throughout the period of this study (October 2015 – May 2016) and was achieved in May 2016, i.e. after 17 months implementation, when (i) all 47 public hospitals had (ii) at least one speciality accepting (iii) outpatient electronic referrals from (iv) referring GPs. With all hospitals targeted, a minimal specification of at least one OPD speciality in each hospital can be assumed. No specification was provided however, for the target proportion of electronic vs paper referral requests or the proportion of GPs targeted to use electronic referrals. The remainder of the description of the NERP step 1’s progression through the Phases of Scale-up will therefore, be dealing with what remains to be scaled rather than what has been scaled.

Interview data collected suggests that the incomplete development of the scalable unit reflects uncertainty in national “Policy” [Adoption Mechanism]. The Irish health system is going through a process of de-centralisation, from a highly centralised Health Service Executive (HSE) to the creation of Hospital Groups and Community Healthcare Organisations [18,19]. These structures have yet to be finalised [20] and this creates a challenge for the NERP step 1 because it is envisioned that Central Referral Offices (CROs) will ultimately be created at the Hospital Group level, rather than within individual hospitals [21]. Arguably, it would be a duplication of effort to implement the “social” process changes associated with electronic referrals at the hospital level only for those processes to be changed again once there is certainty about the Hospital Groups. A national level stakeholder highlighted that it is not a decision for eHealth Ireland whether outpatient electronic referrals will be managed in each hospital or at a Hospital Group level. It is ‘not something that IT can make a call on… we’ll certainly drive it once we’re clear this is a direction that is best of the patient and for the service’ (Participant 18). This quote illustrates a governance challenge faced by national health IT programmes like the NERP, in that the authority to make key decisions about the design of such programmes may lie outside of the programme team.

Shortcomings also emerged at this Phase in the “Communication” Adoption Mechanism. Barker et al. (2016) suggest that it is necessary to communicate the value of a scale-up to both leadership and implementers, ideally by providing real-time data from one scale-up phase to garner support for the next phase [15]. Amongst implementers, hospital administrative staff in particular reported a lack of engagement or opportunity to contribute to developing the scalable unit, which negatively impacted upon their ‘sense of ownership of it’ (Participant 37). CRO staff commented that ‘there are meetings and different groups but…the administrative end is not heard all the time’ and then ‘they come looking for secretarial support but then no budget or nothing available’ (Participant 23). Perhaps stemming from this lack of consultation, there was an unmet expectation from CRO staff that
electronic referrals were going to save them time. ‘Everything that’s been done electronically, it’s supposed to save time and resources but actually it doesn’t. It does exactly the opposite mostly’ (Participant 22). While electronic referrals will reduce the administrative burden for CRO staff once the interoperability issues between Healthlink and PAS are resolved, in the short term, it increases the workload because they have to manage an additional mode of referral request, in addition to traditional post and fax.

Participants also reported that the strategy for communicating the value of electronic referrals to GPs requires clarification in order to increase the proportion of GPs submitting electronic referral requests. This element of the scalable unit was not specified for the NERP step 1 and therefore, nobody was officially tasked with responsibility to increase the proportion of GPs using electronic referrals. A hospital based implementer suggested that ‘I felt like why was I having to try to promote Healthlink? …Nobody could give me any communication tools to use for the GPs – so we had to try and figure out the best way to do it’ (Participant 29). National level participants suggested that ultimately, GPs are ‘independent sole traders’ (Participant 27). The key authority capable of shaping the referral behaviours of GPs are the hospitals receiving those referrals. ‘That is really, a HSE hospital led kind of initiative… [The] ultimate step would be for management to say, “this is how we want you to refer”…unless there is an exception’ (Participant 27). Participant GPs broadly agreed with this perspective, suggesting that local hospitals are in the best position to change GPs’ referral behaviours together with local peer promotion through the ICGP’ Continuing Medical Education meetings. GPs commented that ‘I think it would be great to see the hospitals running with the ball on this one alright’ (Participant 13), and also, ‘people listen to their peers (Participant 39). These comments illustrate the importance of acknowledging GP’s professional independence when designing a communication strategy to engage GPs in the scale-up of a national IT programme.

Test Scale-Up
Test Scale-up, is where the underlying theory of change and the change package are tested in a broader range of settings to refine programme hypotheses and to build the belief and will of leaders and frontline staff to support the changes [15]. In order to progress implementation beyond NERP Step1, appropriate “Data Collection and Reporting Systems” [Support System] is going to require a more complete development of the scalable unit. Participants reported that electronic referrals present an opportunity to standardise what data is collected (Participant 7), especially through automatically populating demographic information (Participant 40), clinical history (Participant 22), and medication & allergy information (Participant 29) from the GP’s medical records. Participants reported that electronic referrals is ‘giving greater visibility on referral volume, referral tracking, all those sorts of things by specialty within hospitals’ (Participant 27), ‘whereas before we were relying on staff members putting them in an Excel…So now every referral to be processed must be on PAS’ (Participant 5). The dis-advantage of structured messaging is that it may limit GPs ability to
communicate details about a referral. One GP commented that ‘You can write a very good clinical note using free text, probably the best quality clinical notes because it captures what the patient and yourself are saying. You can’t do that with something that’s completely structured. When you’re picking from drop-down menus or whatever’ (Participant 30). Participants highlighted the importance of buy-in from stakeholders on the type of data collected. One participant commented that ‘I maintain that no clinician wants to work to a political target…They don’t mean anything clinically’ (Participant 35). A pilot participant also cautioned that ‘when you use data in a punitive way…people are resistant to it’ (Participant 19). These quotes highlight the potential for electronic referrals to greatly improve the volume and quality of data collected in relation to referral management but also the importance of engaging with stakeholders to determine what data would offer the most constructive and meaningful insights for quality improvement.

In terms of Reporting Systems, participants reported receiving a monthly Healthlink escalation report, showing electronic referral requests that were received by the hospital but for which, no triage outcome had been logged on Healthlink. Although logging the triage outcome to Healthlink was beyond the scope of the NERP step 1, participants reported that this report supports CRO staff in tracking and tracing electronic referrals. ‘It has actually highlighted that we weren’t doing it [managing referrals] as well as we thought we were doing it’ (Participant 22). Participants described two other national programmes to which they submit data and receive reports relevant to electronic referrals; namely, the HSE’s Outpatient Services Performance Improvement Programme (OSPIP) and an independent statutory body called the National Treatment Purchase Fund (NTPF). Crucially however, neither OSPIP nor the NTPF targets are formally aligned with any specific targets for the NERP step 1. A CRO participant commented that ‘in the Health Service, there’s no picture of what’s happening’ (Participant 22), suggesting that there is a lack of data feedback to implementers, either on the NERP step 1 on its own, or a more strategic data reporting system which utilises the data collected across HSE and statutory programmes.

This lack of development in Data Collection and Reporting Systems has knock-on effects for the “Learning System” [Support System] for the NERP step 1. ‘Large-scale change requires a mechanism for collecting, vetting, and rapidly sharing change ideas or interventions’…in order to assemble a ‘change package’ for scale-up [15]. Participant interviewed indicated that informal learning from the pilot sites was encouraged by the national implementation team but no evidence emerged of any formal learning system. A national level stakeholder commented that as part of the ‘go-live’ training, it is ‘normally suggest(ed) that they [implementers] speak to other counterparts in other hospitals that have already gone live’ (Participant 18). One implementation site participant commented that he had ‘two conference calls’ (Participant 21) with a member of the pilot implementation team to learn from their experience but otherwise, the data did not suggest that a learning system was in place for the NERP step 1.
Alongside these Support Systems, an important Adoption Mechanism at this phase is a “Culture of Urgency and Persistence” [Adoption Mechanism], motivating stakeholders to take action and sustain their efforts to take a programme to full scale. A troubling theme emerged around how legacy IT failures have created a culture of caution rather than urgency for national health IT programmes. One pilot participant explained that ‘there’s the legacy belief around HSE ICT projects fail’ (Participant 38) and a national level participant made reference to how ‘some of them are not open to new stuff because they’ve been burnt in the past… Most sites need reassurance as to the impact it’s [NERP step 1 is] likely to have operationally for them’ (Participant 18). Conversely however, CRO participants reported that while they were cautious about electronic referrals, now that they are using Healthlink they find it very straightforward to use and there is a strong appetite for the implementation of an end-to-end electronic referral solution. One participant commented that ‘Now that we know how easy it is to go electronic, it would be amazing to cut out all the filling’ (Participant 4). Similarly another CRO participant commented that ‘rather than sitting on this for a year and everyone would just get too complacent with it and then it’s more change…If you’re in the middle of a project and there’s more coming on board, you just take it’ (Participant 25). These comments again illustrate the importance of developing a complete scalable unit, whereby participants are clear on what the vision for full-scale is and they can then maintain momentum in going to full scale.

Go to Full-Scale

Go to Full-Scale is the fourth and final phase of the Framework for Going to Full Scale. This is the ‘the rapid deployment phase in which a well-tested set of interventions, supported by a reliable data feedback system, is adopted by frontline staff on a larger scale’ [15]. “Design for Sustainability” is a critical Adoption Mechanism for reaching this fourth Phase of Scale-up, whereby throughout the three activity phases (Develop the Scalable Unit, Test Scale-up and Go to Full Scale), the learnings about sustainability are built into the expanding change package.

Policy uncertainty is a key sustainability issue for the NERP step 1, which has already been described above as the uncertainty about whether to proceed with the “social” process changes for electronic referrals at the hospital level [22] or to postpone process changes until the Hospital Group CROs can be established [21]. An associated sustainability issue is the reconfiguration of administrative staff to work within newly established CROs. Historically, each hospital consultant would have their own secretary who manages referrals sent to that consultant. A national level participant suggested that consultant level referral management creates ‘a lot of duplication’ because secretaries ‘wouldn’t be at full capacity all the time’ (Participant 28). Such a reconfiguration of staff is perceived as a challenge at the implementation level, where participants explained that ‘resources are still an issue with the Central Booking and the Central Office. So to do it from within your current compliment [of staff] initially is difficult’ (Participant 5). Similarly, another CRO participant commented that ‘We do [have a CRO] only we have no one to sit in it. That’s why it comes to me. I’m the central office’ (Participant...
40). The variation in terminology used by participants to refer to the CRO in the above quotes reflects the variation in set-up and functions of these offices across sites. This variation helps to explain why some hospitals experience greater difficulty than others in implementing electronic referrals, if their administrative staffs have not been reconfigured into a CRO.

A third key sustainability issue for the NERP is the persisting interoperability issues between Healthlink and the hospital Patient Administrative Systems (PAS). One national level participant explained that hospitals which have been upgraded from the old PAS to an Integrated Patient Management System (iPMS) can be integrated with Healthlink. The HSE IPMS Team are working to ‘incorporate that functionality…but again, it’s just purely staff dependent’, (Participant 32) since this team does not have the human capacity to keep all hospitals technologically and procedurally up-to-date with the latest version. A CRO participant claimed that ‘it is a great system (new iPMS)…if the correct processes were in place, it would be perfect’ (Participant 2). The process changes involved in implementing iPMS requires CRO staff training. CRO staff reported that while the HSE IPMS Team did train on-site trainers, these ‘trainers only had a short period of time to get trained themselves’ (Participant 22) and as a consequence, the training ‘wasn’t specific to your job, it was a general training group everyone went to’ (Participant 2). Upgrading hospital PAS to iPMS and providing the necessary training to CRO staff on how to use this upgrade are objectives beyond the scope of the NERP step 1. It is important to highlight however, that in order to progress the NERP past step 1 (i.e. eTriage, eConsult, eAppointments, ePrescribing, eDischarge), this interoperability issue must be addressed.

Consultant engagement was also beyond the scope of the NERP step 1 because electronic referrals were printed once they reached the hospital. Implementing a more complete electronic referral solution will require hospital consultants triaging electronic referral requests online. An implementation site participant explained that they have had consultants from certain specialties requesting that ‘their own referral form’ be accommodated within Healthlink, to enable the collection of specialty specific information to inform triage decisions. The ‘way we got around’ that was by saying, “well Healthlink said they would take on certain forms but if we could just run with this…and see how we get on with it” (Participant 21). Similarly, a national level participant commented that ‘we get a consistent message from the hospitals that they’d like to do more in the way of specialist referral’ (Participant 18). The challenge is that consultants throughout the country ‘have to agree with those extra parameters that are unique for that speciality’ and then ‘avoid a scenario that says well actually ideally we’d like 20 extra parameters from a GP’ (Participant 18). An implementation level participant commented that ‘I know that Healthlink did have some issues with [specialist referral forms]. They just want to consolidate as much as possible’ (Participant 21). Healthlink’s reluctance to integrate multiple specialist forms may be driven by technical and financial obstacles to working with GP software vendors rather than a concern about whether or not GPs would have the time to complete
specialist referral templates. Some national level participants suggested that ‘Engaging with the vendors is a challenge… because we’re very reliant on them doing the initial work to get their products modified’ (Participant 12). Healthlink worked with the Irish College of General Practitioner’s (ICGP) national General Practice Information Technology (GPIT) Group ‘to do a specification for the vendors… and coming up with agreements on cost and implementation time-frames’ (Participant 12). In order for Healthlink to integrate specialist referral templates, they would again need the support and cooperation of the ICGP GPIT Group to engage with GP vendors to make the necessary upgrades. If specialist referral templates are perceived by GPs as a burden, the ICGP GPIT group may not be willing or able in future to support this integration work.

Discussion

Principal Results

The objective of this study was to theoretically frame the lessons learned from the NERP step 1 on the design and implementation of a national health IT programme. NERP step 1 presented an interesting case study of implementing a national health IT programme because it explicitly committed to a technical-first implementation rather than a socio-technical approach. A key strength of the programme was that it was welcomed by key stakeholders as a first step in the implementation of electronic referrals; delivering important patient safety benefits. A national implementation of electronic referrals was progressed, despite limited resources and outstanding interoperability issues. It also gained credibility for a new eHealth Ireland unit, that it can deliver national health IT programmes. NERP step 1 limitations were that it was poorly integrated in the wider policy and quality improvement agenda of the Health Service Executive. Also, the lack of specification of social features created challenges in communicating the scope of the programme to key stakeholders and restricted the ability of programme managers and implementers to test and refine the change package. In terms of design, the theory-driven analysis of the NERP step 1 highlighted that it is necessary to specify the social feature of a national health IT programme at the national level. Social features do not need to be specified in tandem with technical features but they do need to be specified quite early in the implementation process so that the change package (both technical and social) can be tested and refined as a scalable unit. These principal results are discussed in more detail and in comparison with prior work in the next section.

Comparison with Prior Work

Strengths & Limitations of the Scale-up of the NERP Step 1

A key strength of the NERP Step 1 is that it scaled-up of the technical capability for GPs to submit electronic referral requests to at least one OPD speciality in all public hospitals. The four patient safety improvements reported by the NERP step 1 participants included: speed of transfer, more complete demographic information, legibility and traceability, have been recognised internationally,
as key benefits of implementing an electronic referral solution [3, 23]. Secondly, the NERP step 1 has maintained progress in implementing a national electronic referral solution between GPs and hospital OPDs, beyond the piloting stage. This commitment to enacting learnings from a pilot must be commended since eHealth initiatives have been described as ‘plagued by “pilotitis”, with many small initiatives sprouting up without any real coordination or ability to scale’ [24]. Specifically in reference to electronic referral systems, Bouamrane & Mair (2014) reported that deployment is often ‘slow and characterised by limited and localised uptake, or regional rather than nation-wide implementations’ [1]. Driven by executive leadership [5] within eHealth Ireland, as well as GP’s appetite and technological capacity for electronic referrals, the NERP step 1 has gained a foothold at a national scale. A third key strength of the NERP step 1 is that it was perceived by national level participants as building “credibility” within the health system, for a newly established eHealth Ireland unit. This finding is important because it supports Eason’s (2007) suggestion that the scale of national health IT programmes, there are ‘many agencies involved in shaping the system that reaches the users. Each agency can be considered a locus for part of the decision making’ [13]. That is, agencies like eHealth Ireland set the strategic priorities for programme implementation but crucially, they then need to have the credibility to successfully engage implementation sites (GPs and Hospital OPDs) to adopt the technology. Huang et al (2017) has flagged that the implementation of national health IT programmes can just as easily fail at this institutional level as it can if the technology is not accepted by the end-users [25]. This credibility is particularly important in the context of participant references to a “legacy belief that HSE ICT projects fail”.

Associated with this institutional complexity, a key limitation of the NERP step 1 was that it was poorly integrated within the wider policy and quality improvement agenda of the health service. The programme was designed and implemented by eHealth Ireland to achieve a technical objective. National level participants described the programme as a separate piece of work to the HSE’s Outpatient Services Performance Improvement Programme (OSPIP), which is responsible for service improvement more generally within hospital OPDs. Greenhalgh et al. (2014) cautions that postponing the collaborative, cross-institutional work needed to deliver a sociotechnical implementation only increases the chances that a technical system will be met with resistance from other stakeholders [23]. Huang et al. (2017) suggests that major health sector innovations typically ‘emerge from negotiations between diverse stakeholders who compete to impose or at least prioritise their preferred version of that innovation’ [25]. Instead of a top-down approach to technology deployment, Coiera (2009) advocates for a “Middle-Out” approach to developing national health IT systems, whereby technical goals are set to help achieve clinical/service standards [26]. These standards are not static and therefore, a partnership approach is required between health care providers (clinicians and managers), government and the IT industry to constantly develop national health IT systems in line with health service priorities and the evolving potential of technology. Under this approach, ‘implementation
never stops’ [26] and implementing technical capability as an objective separate from a specific clinical or service target would not be pursued.

A second, related limitation of the NERP step1 was the lack of programme specification. Once all hospitals had at least one OPD speciality accepting electronic referral requests from GPs, the single objective of the programme was achieved. Participants reported increased implementer burden as a result of this lack of specification. Hospital participants reported having to try and figure out for themselves how to engage local GPs, although they did not consider this their responsibility. Some hospital administrators expressed dissatisfaction with the level of consultation, whereby they could communicate the “double-jobbing” challenges associated with sending the GP Triage Outcome message. Sending this message was a feature of the pilot but not the NERP step 1, but interviews with hospital administrators suggested that the scope of the NERP step 1 was not clearly specified or communicated to them. This limited programme specification also restricted the potential to develop data collection & reporting systems, through which individual implementation sites could monitor their progress [27]. If the programme had been better integrated within the wider quality improvement agenda in the HSE, a broader range of mandatory clinical/service targets could have been set, as was the case in the rollout of electronic referrals in Scotland [1]. As raised by participants however, clinicians do not wish to work to “political targets”. Any additional targets set, must be patient-centred to ensure that the learnings gained from the data are meaningful for the various stakeholders [23, 28].

**Going to Full Scale with a National Health IT Programme**

The second research question asked do the social features of a large-scale national health IT programme need to be specified at the national policy level? Analyzing the NERP step 1 using the Framework for Going to Full Scale [16], provided an implementation timeline within which the absence of social features in the NERP step 1 could be assessed. The resounding answer to this second research question is yes. Without a more complete development of the scalable unit, specifying the technical and social features of the NERP step 1, data collection and reporting systems cannot be established to test and refine the change package. Consequently, the data is not available to build a learning system, whereby what is learned in one implementation site can be shared with comparable implementation sites or sites encountering similar challenges. In short, the change package of the NERP step 1 cannot evolve because its interaction with the social system is not formally or systematically being captured as part of the implementation process. Coirea (2009) provides a strong technology argument for implementing a national health IT programme that interacts and responds to its social context. It is argued that centrally defined, top-down implementations of national health IT programmes ‘become increasingly out of step with service needs, and clinical providers will have to build work-arounds to make the aging system meet emerging needs’ [26]. If emerging needs are left unaddressed, the work-arounds will ‘inevitably add
unmanageable local variations to what was intended to be a singular national design’ [26]. In addition, from an economic perspective, a dynamic cost-benefit analysis study found that the potential gains of implementing electronic message exchange could be reduced by 40-50%, if old working procedures to fit old technology are maintained after new technology is implemented [29]. This type of economic argument warrants careful consideration for the NERP step 1, in light of the outstanding interoperability issues between \textit{Healthlink} and Hospital Patient Administrative Systems, which until resolved will require the “double-jobbing” of old and new working procedures. These arguments illustrate that the success of the technical features of a national health IT programme is dependent upon its interaction and fit with the social system.

As such, the academic literature’s advocacy of a sociotechnical approach to implementing national health IT programmes is not contradicted by this study. This paper started with an observation that the NERP step 1 was initiated with a technical-only intervention and an uncertainty about whether this type of implementation strategy [13] put the NERP step 1 at odds with a best-practice, sociotechnical approach. The key learning from this study is that all complete implementations of a technology will require an interaction and ultimately a fit between the technical and social systems. This complete implementation evolves however; it is not designed at the outset. As such, a programme may be initiated with a technical-only intervention, like the NERP step 1. The priority for such an intervention must then be to fit the technical features of the programme to the social system within which it is being implemented. It is recommended that policy makers and implementers use a quality improvement framework such Barker et al’s (2016) \textit{Framework for Going to Full Scale} [16] to help guide them in the design and implementation of national health IT programmes.

\textbf{Study Limitations}

A key limitation of this study is that hospital specialists were not interviewed. The only change encountered by this stakeholder group was that some referral requests from GPs would be presented to them for triage on a standardised template. The triage phase was not included in the NERP Step 1 and therefore, clinical dis/satisfaction with the standardised GP-OPD referral template was beyond the remit of this study. Issues were raised within the study however, for which it would have been valuable to have obtained a specialist medical perspective. For example, the centralisation of referral management to a Central Referral Office (CRO) at a Hospital or Hospital Group level; or the suitability of using the standardised GP-OPD referral template for all OPD specialities.

A second limitation is that participants were not recruited from randomly selected implementation sites. Access to one pilot site and five NERP step 1 implementation sites was arranged by \textit{eHealth Ireland}. Although not randomly selected, the five NERP step 1 sites did include public and voluntary hospitals, as well as regional and urban hospitals and so a broad representation of implementation sites was included.
**Conclusion**

This qualitative study of the early stage implementation of a National Electronic Referral Programme (NERP) provides empirical insights into the complexity of implementing a national health IT programme. The incremental design of this programme - with step 1 only seeking to scale-up the technical capability for the e-request phase of an electronic referral solution - made NERP step 1 an interesting case study from a sociotechnical perspective.

The strengths of this implementation were that it did successfully scale-up the technical capability for GPs to submit electronic referral requests to at least one speciality in all hospitals in the Irish public health system. It maintained progress in the implementation of an electronic referral solution beyond piloting, despite extremely limited resources and outstanding interoperability issues. Finally, it built credibility and confidence in the new eHealth Ireland unit's ability to successfully implement a national health IT programme. Conversely, limitations of this programme were that it was poorly integrated within the wider quality improvement agenda of the HSE; and its’ incomplete specification of the vision for full-scale created uncertainty for stakeholders on their roles and responsibilities within the programme, as well as a lack of clarity on the change package that needs to be tested and refined.

These limitations were a consequence of not specifying the social features of the programme. It was concluded that although social features of a programme do not have to be specified in tandem with technical features, they will need to be specified quite early in the implementation process so that the change package (both technical and social) can be tested and refined into a programme that can be implemented to full scale.

**Acknowledgements**

The authors wish to sincerely thank the 41 key stakeholders who kindly gave their time to participate in this study. We also thank eHealth Ireland for their assistance in recruitment. This study was conducted by Applied Research for Connected Health (ARCH), a technology centre led by University College Dublin and funded by Enterprise Ireland and IDA Ireland.

**Conflicts of Interest**

None

**Abbreviations**

CIO: Chief Information Officer
CRO: central referral office
GP: General Practitioner
GPIIT: General Practice Information Technology group [Ireland]
HIQA: Health Information and Quality Authority [Ireland]
HSE: Health Service Executive [Ireland]
ICGP: Irish College of General Practitioners [Ireland]
IHI: Institute for Healthcare Improvement [US]
ICT: information communication technology
iPMS: Integrated Patient Management System
IPMS: Integrated Patient Management System programme [Ireland]
IT: information technology
NTPF: National Treatment Purchase Fund [Ireland]
NPfIT: National Programme for IT [UK]
NERP: National Electronic Referral Programme [Ireland]
OPD: outpatient department
OSPIP: Outpatient Services Performance Improvement Programme [Ireland]
PAS: Patient Administrative System
PDSA: Plan-Do-Study-Act cycle of quality improvement
UCD: University College Dublin

References
   https://hse.ie/eng/services/publications/hospitals/Tallaght%20Hospital%20Review%202010.pdf Archived at: http://www.webcitation.org/6y6t03jid


