Identifying Skills and Training Needs of the Connected Health Cities Programme

Report

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Summary

- Numerous NHS policies (*e.g.,* Five Year Way Forward, Wachter Review) have highlighted the importance of developing informatics and data skills in the workforce to facilitate the improvement and quality of care in health. Connected Health Cities (CHC) a pilot cross sector learning health systems programme that focuses on improvement of care was the first of its kind that embedded research into clinical workflows. As such, workforce Development and building skills capacity is a component of the Connected Health Cities programme, but has been addressed on an iterative basis as the programme has progressed and practice has been developed.
- This paper outlines the results of a qualitative study that was undertaken over a six month period to learn from the project journeys and identify learning and training needs that could be translated to others conducting projects in a similar manner. We have constructed a short training programme that highlights the key skills required to run a 'Learning Health System' in the future.
- This work was carried out in three stages: (1) review of digital adoption methods; (2) identification of key training needs through conducting 25 interviews across eight case-studies; and (3) design of a 10 step short workshop programme.
- Six key areas were identified as being the most important for a successful learning health system project to be implemented: (1) Information Governance and ethics; (2) the data landscape and how to access it; (3) curating a data set for subsequent analysis; (4) key data analysis steps and interpretation; (4) evaluation of technology/methodological introduction; (5) communication for diffusion and dissemination of digital innovations; (6) understanding how to implement change. These have been translated into a 10-day programme training programme to improve care pathways using a learning health systems approach.

Background

The Connected Health Cities (CHC) was set up to unite local health data and advanced technology to improve health services for patients across the North of England. Four regions in the North of England (Greater Manchester, North West Coast, Yorkshire and the North East) host multiple projects covering different innovation areas (*e.g.,* data Science, learning health systems, evaluation, technology and platforms). To respond to the well-documented need to increase informatics skills and numerous NHS policies, a main stream of work has been the development of the appropriate skills across the workforce in the NHS, academia and industry.

To support the success and spread of these initiatives, a qualitative study was undertaken over a six month period to learn from the project journeys and identify learning and training needs that could be translated to others conducting projects in a similar manner. The results presented in this report are based on these interviews.

Project Aims

The project aims were three fold:

(1) To identify key training needs and recommendations to improve the design and implementation of similar future projects within across the UK.
(2) Aid the further dissemination of successful CHC and future projects
(3) Provide an opportunity for teams to reflect on their work, share good practice and lessons learned across the programme and beyond CHC

Project Objectives

The project identified four key steps of implementation that would create a training evaluation and programme for the CHC programme:

- To understand the skill sets/stakeholders across the different projects of CHC (including investigators)
- To have an understanding of the main technical and methodological practices across the projects and map an understanding of requirements to these stakeholders
- To inform training materials for key themes that emerged using the projects as best practice
- To share good practice across regions through the design of a training program and workshops.

Method

A three stage qualitative study was conducted over a six month period from March 2018-July 2018 to identify training needs. Data was collected and analysed (over 60 days) by one qualitative researcher independent from the CHC (Pippa Bark-Williams) with a background in training design and validated by the CHC Education lead (Georgina Moulton). From this, a training programme has been devised.

Stage 1: Review of Digital Adoption Models

A review of evidence on models of success and non-success in health interventions was undertaken to develop a coding frame as a way to structure identified learning needs. The most comprehensive systematic review was identified as the Model of Diffusion that had been widely used since 2005 and highly relevant to the stages of innovation, adoption, assimilation and diffusion and dissemination used in the CHC projects[1]. See Appendix 1 for definitions. Additional concepts covering non-adoption, abandonment and challenges and reviewing issues specific

[1] Greenhalgh, T, Robert, G, Bate, P, Macfarlene, F, Kiriakidou, O (2005). Diffusion of Innovations in Health Service Organisations: a systematic literature review (Studies in Urban and Social Change), BMJ.

to health and care technologies were also included (Greenhalgh et al 2017)[2]. A coding frame was designed illustrating predictors of success at each stage to clarify learning needs in the interviews at each stage, and to group themes. Predictors of success include: incremental adoption; compatibility with organisational and professional norms; evaluation of system readiness. The full coding frame used in interviews and training needs analysis is included as Appendix 2.

Stage 2: Semi-structured interviews

Setting and Projects

Eight case studies were drawn from CHC research projects from each of the four regions across the North of England each with a different focus (e.g., data science, learning health systems, and technology and platforms) and covered a specialty range of acute care, community care, social care, pharmacy and paramedic services. Many had an element of Patient and Public Engagement and all included Information Governance, which we predicted would reveal attendant training needs.

Case study	Region	Project Type	Project Title
1	Connected Yorkshire	Data science	Safer prescribing for frailty
2	Connected Yorkshire	Actionable analytics	Supporting community care and reducing demand on A&E services
3	Greater Manchester	Data science	Using technology and data to improve the diagnosis and treatment of stroke
4	Greater Manchester	Actionable Analytics	BRIT Using data to tackle antibiotic resistance
5	Greater Manchester	Technology and platforms	Exploration of wound care data for use in research 3D photography
6	North East and North Cumbria	Data science	Smart Interventions for Local Vulnerable Families (SILVER)
7	North West Coast	Actoionable Analytics	Unplanned admissions
8	North West Coast	Data science	Alcohol

Table 1: The CHC projects participating in the Training Needs Study

Interview Participants and Design

Twenty-five volunteer clinicians, researchers, technologists and designers were interviewed on their experiences for approximately an hour each contributing to building up the case studies. Interviews were not intended to be a full representation of the project journey but were snap shots of individual perspectives on group experiences and skills. Areas covered can be seen in Appendix 2.

Stage 3: Mapping training needs

[2] Greenhalgh T, Wherton J, Papoutsi C, Lynch J, Hughes G, A'Court C, Hinder S, Fahy N, Procter R, Shaw S (2017). Beyond adoption: A framework for theorizing and evaluating non-adoption, abandonment and challenges to the scale-up, spread and sustainability of health and care technologies. J Med Internet Res 2017, 19

A thematic analysis was used to analyse the data using the standard six-phase methodological frame-work by Braun and Clarke 2006[3]. The majority of projects were found to be in the first two stages of progress (innovation and adoption).Themes identified covered a combination of professional and transferable skills, technical skills and project skills. It was notable that training themes emerged equally independent of the stage or prior training and experience of the programme teams.

Innovation Stage

Innovation manifested throughout the projects as "a novel set of behaviours, routines, and ways of working that are directed at improving health outcomes, administrative efficiency, cost effectiveness, or users' experience and that are implemented by planned and coordinated actions" (Greenhalgh et al 2005). The rich variety of methods to link or access data with the intended outcome of saving or improving lives was driven by individuals with a passion for health improvement. Clinical and financial benefits had been drivers from the beginning and there were some impressive examples across diagnosis, treatment and prescribing that led to improved outcomes for patient and staff. In one project, a clinician discussed how he derived his ambitious 10% death reduction target based on prior quality improvement training and guidance. The target was aimed at inspiring others the aspirational figure was required to gain the support and was exceeded.

In most cases, projects have been adapted and evolved significantly from the initial description proposed. Whilst to some extent that is the nature of healthcare research, people reflected on the opening ambitions of their original project, an idea tempered by an evolving sense of what and how long it would take to get the data they needed in creating and maintaining networks and access to data. Bridging the informatics- healthcare interface was far more demanding than they had originally envisioned. With hindsight, project designs had not taken this into consideration and therefore it was difficult to complete tasks within the timeframe and environment. Early training in honing them down was sought (and in cases found). Further training in breaking down such large scale cross-specialty projects into small pieces is necessary including elements of IT & general project management so that learning can be enhanced.

Whilst many were experienced and successful in creating networks within their own specialty, the nature of the CHC was bridging data sets outside their own specialty, for example across community and acute care or across social care, police and health care. The parts of projects that progressed best were those with an "inside lead" in each sub-part of the project and in each clinical and technological arena. Where the inside leads were strong for each branch of the project and where clinical and technological leads were involved side by side from the beginning, projects moved comparatively faster.

The challenge tended to come not in the initial networking, but in making sure that each lead had the capacity and time, and maintaining the networks when the key person left. In addition, there was an assumption that new people had the same network, influence and knowledge base, which is commonly found. This is often seen in projects, but in more complex projects, training in change processes,team dynamics and 're'-building would assist in maintaining the continuous progress of the project.

Multi-stakeholder working threw up a multitude of themes around defining what were the identified benefits and advantages of the projects and how compatible they were to individuals and within and between different organisations. Understanding differing agendas was a challenge successfully embraced in many projects, particularly when the outcome was very specific, say in increasing safety or reducing response time. The assumed agendas at the broad proposal stage could become more challenging as the project formally began, where those doing the front-line application and technologists who had not been central from the beginning became involved. When assumptions around differing agendas, project type, milestones and outcomes were not noticed or left unresolved,

[3] Braun V & Clarke V (2006) Using thematic analysis in psychology. Qualitative Research in Psychology, 3:2, 77-101, DOI: 10.1191/1478088706qp063oa

projects tended to diminish in scope. Many of these problems came back to a need for earlier training to scope a project and techniques in establishing mutual aims and benefits.

In terms of getting access to data, there was a common theme of the process of Information Governance slowing down the process to the point where project aims and deadlines were challenged. Work arounds were found, but sometimes altering the original vision. In some instances, barriers to access to data or volunteers led to issues, with the obtainable group or data (rather than the target population) undermining the aims of the project. Training on the process and timelines both of IG and data access generally was limited within wider organisations such as UoM and NHS The CHC programme did enlist these skills from an external consultant to assist regions with this to navigate the IG landscape. Useful templates and guides were collected by the end of the process but to overcome this IG training is required earlier on in the project delivery.

Almost all projects had an element of qualitative data collection and some had qualitative researchers employed. There could be tension between what technologists wanted from data collection versus clinicians resulting in a duplication of effort. CHC is the first project that embeds the research directly in the clinical pathway and thus one of the largest challenges was the health informatics –clinical understandingMost projects employed technologists with a wealth of experience in this area and had involved them from the very beginning. It took time for non-technologists (clinicians) to realise what that side of the project would involve, and training in an overview of technical concepts and processes would have accelerated this understanding not only of the subject area, but also the different technical roles and skills are available.

The amount of time and effort spent on the technological side of the project was difficult to estimate and often the amount of time was underestimated. Whilst it was not necessary for each person to be able to do another's role, an establishment of a common vocabulary between different groups would have helped. In particular, technologists found it difficult to communicate the different elements required to do their task. Training in understanding the different components of a project at concept level would help in the communication between roles. Finally the impact of understanding the organisational factors, from system readiness through to willingness would be to assess the milestones of a project.

Adoption Stage

In this stage, the dominant themes came around the human values. The innovation being seen as useful was a key driver to success and projects where health professionals could see the benefits from quicker access to information or better patient outcome were more effective. Closely related to this was mutual understanding of what type of project was being run. In one example community nurses regarded the project as a pilot to test the efficacy of an innovation, whilst the industry partner saw it as rolling out an already established tool. This early miscommunication revealed itself early on, when designers were frustrated that nurses did not prioritise time for training. In another, health care professionals intended to pilot the feasibility of data linkage initiative on a small set of dummy data, whilst others were anticipating real-life linkage on a large scale.

A mismatch in direction between top management and staff were highlighted. Whilst it was often a senior member who signed on the project, the workers at the front were responsible for success (or sometimes lack of success) in the day to day running and adoption of the project. Leaders who attempted to fast-track the process without full staff buy-in were frustrated in getting the project forward.

Again this raised issues of understanding who was involved and what the organisational and personal and organisational benefits were seen to be. With most projects relying on good-will and additional work for adoption, staff needed to be highly motivated. Overcoming this misalignment of expectations between different groups and establishing a shared goal is overcome through sharing of best practice and training on team building and dynamics.

From a technological perspective, designers who allowed flexibility and some user control and input were met with less resistance. For example in adopting an app, working around the users' feedback helped adoption considerably.

Assimilation

Of all the stages, this was one of the hardest stages for projects. There is a need for resilience in the face of large complex project working: acceptance of setbacks and surprises was seen as unexpected by those often not use to working in such environments. Overcoming these are essential for the ultimate success of projects, and are often not the elements that are published in results papers. This presents itself as a huge opportunity for sharing of experience and examples of what this involves.As CHC was a new-type of programme and the first of its kind it was the first opportunity to acquire training requirements and develop opportunities for training on an iterative basis. Continuation of work had started in the projects beyond the CHC funding was being considered, thus these key training areas will be useful for this endeavour.

Evaluation was most likely to be mentioned at this later stage. For some projects, evaluation was only considered when the project arrived at this stage, whereas for others there had been a planned or impulsive strategy to disseminate findings throughout. Training on evaluation is key: few people had received this prior to the projects starting.

Diffusion and Dissemination

One of the lessons learnt was about the time and effort needed to diffuse initiatives with few short-cuts. In one study the idea had been spread to three different NHS Trusts, but far from it being a copy and paste approach, each similar setting had a different culture/expectations, and thus had adopted the same innovations differently.

Projects such as those in polypharmacy and stroke had reached a point where they were cascading out their approach. The time, skills and commitment were demanding. For many, requirements revolved around: development of an extended communication strategy; strategies to extend and up-scale projects; how to embed innovations for the longer term and extend across a national basis.

Discussing communications, for those who had produced social media, visual and written material throughout, the skills had largely been gathered along the way or funding had had to be found. The planning process was inconsistent. At times, this impacted on initiates, for example in one study, videos of patient experience were not able to be shared as IG permissions had not been applied for. Even in those projects where they perceived they had had been highly active in producing materials, the profile was not as high as it could have been. Training in avenues of communication and best possible modes of communication would be beneficial for all stakeholders in projects.

At the stage of interviews, dissemination and diffusion had not been reached, reflecting some of the challenges faced for these projects. Those who had a consistent work force and QI training found it beneficial to work at this stage, thus training in effective communications to diffuse and disseminate innovations at the different stages of projects is required.

Training Programme Design

We have devised a 10-day programme building on the identified themes from the interviews. This programme will support subsequent work in developing learning health system programmes and will use the projects across CHC as exemplars. The programme aligns well with projects that have initiated their own reflections and training programmes to diffuse and disseminate their experience. Three workshops have already been delivered and two more are currently in development for delivery in 2019. Each of the workshops is aimed at all types of health professionals working across the health-service and academia.

Training needs	Aims	Objectives
What does it take to get the data for care pathway improvement?	The first planning stage of the process of data-driven improvement of a care pathway. This will cover the process from the early stages of understanding the data landscape, designing a study, getting people involved and gaining access to the data.	• Look at how to identify a measurable and achievable data-driven improvement strategy • Understand and map the processes involved in obtaining access to data sets across organisations • Identify who will be involved and how to build up • Identify barriers and facilitators that you can expect along the way
The highs and lows of Information Governance in gaining access to health data	How information governance relates to each part of the process of using data for improvement of a care pathway. This will cover the process from the early stages of understanding the data landscape, designing a study, getting people involved and gaining access to the data.	• Look at how to plan an information governance strategy from the beginning of the project • Understand and map the processes involved • To identify who will be involved and how to build up an IG relationship • To identify a realistic timeline • To identify barriers and facilitators that you can expect along the way • To apply the knowledge to worked cases
The human element in building networks and maintaining involvement	Understand the key predictors of achievement or failure in a health improvement initiative. This covers the skills and science of how to identify and work with the key players, from the planning stage of the process of data-driven improvement of a care pathway through to the running of the project. In a changing work force where staff are constantly leaving, the essential skills of resilience and team science will be discussed	• Look at how to identify the key individuals • How to draw in and create buy in from individuals across organisations from health and technological disciplines • Understand team science and how it applies to your multi professional team • Identify barriers and facilitators that you can expect along the way
A clinician's guide to establishing a data set	The processes needed to perform to be confident with a dataset. Aimed at health and social care professionals not usually involved in big data, a basic technological introduction to understand the process of what the technological and statistical experts will need to do with you to establish and produce the data in a palatable form.	• Look at how to understand what is in or needs to be in a data set • Map the processes involved in understanding the data sets across organisations • Identify who needs to be involved and what information they will need from you • Identify barriers and facilitators that you can expect along the way
A health professional's guide to using data sets	The processes needed to perform and to be confident with understanding and using a dataset to achieve your improved care pathway. Aimed at health professionals not usually involved in data, this day gives a basic technological introduction to understand what the technological and statistical experts can and can't do with data.	• Understand what you can understand from different data • Understand the potential and imitations of data sets • Explore different applications of how data can be used

From data to improvement: Deriving insights from your data	To move forward from data to action. Aimed at health professionals not usually involved in big data, this day gives methodologies and examples of how to apply the results of you data analysis to generate action.	• Understand how to interpret results from data analyses such that you generate action. • Compare a variety of different approaches to see the benefits and limitations • Discuss cases-studies to illustrate questions that arise when looking at health data • Identify patterns of data that will help define development of services
Evaluation Masterclass	To provide participants with a toolkit for embedding good evaluation practice through an entire project.	• Understand why evaluations take place • Understand the differences between outcome and process evaluations • Understand a range of approaches that can be used in an evaluation • Design and plan an evaluation for a project from start to end • Identify a dissemination strategy
Evaluation SOS	The knowledge to design and deliver a pragmatic evaluation of a project and will support you in designing and delivering an evaluation towards the end of a project. This event is designed for those who are already in the middle of a project, and realise it is time to take action.	• Understand the different types of evaluation, including their pros and cons • Identify suitable methods and approaches for evaluating a project; • Apply practical skills and tips in using evaluation methods and approaches. • Plan and implement monitoring and evaluation procedures in their own projects.
Communication for effective diffusion and dissemination of digital innovations	To provide knowledge and evidence for effective dissemination and dissemination	• Present evidence of what makes for effective diffusion and dissemination of digital innovations • Present case examples of improvement of a care pathway through digital innovation • Identify skills needed for dissemination • Identify process needed for a communications strategy

Appendix 1. Definitions of stages of innovation

- **Innovation:** A novel set of behaviours, routines, and ways of working that are directed at improving health outcomes, administrative efficiency, cost effectiveness, or users' experience and that are implemented by planned and coordinated actions.
- **Adoption**: Adoption is an individual process detailing the series of stages one undergoes from first hearing about a product to finally adopting it.
- **Diffusion:** Passive spread of an innovation (informal, unplanned). It's a group phenomenon.
- **Dissemination:** Active and planned efforts to persuade target groups to adopt an innovation.
- **Implementation:** Active and planned efforts to mainstream an innovation within an organization.
- **Sustainability:** Making an innovation routine until it reaches obsolescence.
- **Assimilation**: When the unit of adoption is not an individual, but a more complex system/team/department/organization, we usually refer to this as assimilation instead of adoption.

From: http://www.europeanpublichealth.com/health-systems/innovations-in-public-health/the-greenhalgh-model/

Appendix 2: Coding frame derived from the Model of Diffusion

Innovation Stage

What contributed to success/stalling? Training needs?

	Yes	No	Comments
Clear advantage of effectiveness			
Clear cost advantage			
Compatibility with values and needs of adopters			
Compatibility with organisational or professional norms			
Simple process or complex broken down into stages			
Adopted incrementally			
Few response barriers and/or interventions to reduce barriers			
Users can experiment for limited time			
Observability benefits visible			
Adopter can refine/adapt/modify			
Systems readiness – structures and systems in place			
Ways to minimise uncertainty of outcome or risks			
Task relevant to users work			
Transferable knowledge			
Technology supplied with customisation			
Training or helpdesk available			

Adoption Stage

What contributed to success/stalling? Training needs?

	yes	no	comments
Individuals motivated			
Individuals had intellectual ability			
Individuals tolerant of ambiguity			
Innovation meaningful to adopter			
Innovation matched user values			

Innovation matched user learning style			
Specific goals			
Specific skills needed			
Specific skills gained			
Meet identified need			
Congruent with individual's identity			
Congruence between top management, service users and stakeholders			
Process Pre-adoption			
Nature of adoption decision - led by? Authoritative?			
Users made aware pre-adoption			
Clarified concerns pre-adoption What, how, etc			
Clarified concerns on personal effect			
Process During adoption			
Addressed concerns during early use			
Continued access to support			
Ongoing training on task issues			
Process After			
Addressed concerns			
Gathered feedback			
Gave feedback			
Opportunity to refine			

Assimilation by organisations Stage

What contributed to success/stalling? Training needs?

	yes	no	comments
Very structured process?			

Messy flexible approach?			
Evaluation of system readiness			
Funding			
Simple product based suitable for imitation …. or			
Complex, process based innovation needing team, department or organisation			
Formal decision making process			
Evaluation of processes			
Planned and sustained efforts at implementation			
Flexibility in initiation, development and implementation			
Acceptance of shocks, set-backs and surprises			
Routinisation			

Diffusion and Dissemination Stage

What contributed to success/stalling? Training needs?

	yes	no	comments
Unplanned, informal, decentralised, peer-mediated			
Planned, formal, centralised, vertical hierarchy			
Increase awareness through mass media			
Through social networks – structure?			
Working through horizontal networks (eg drs)			
Using peer influence			
Supporting construction and reframing of meaning			
Working through Vertical networks (eg nurses)			
Cascading codified information			
Passing on authoritative decisions			
Users and future adopters from similar background			
Project appealing through clarity of goals, organisation and resources to attract support			

Identified and utilised Expert Opinion leaders - influenced through authority and status?			
Identified Peer opinion leaders - influenced through credibility and representativeness			
Increasing leader influence s eg by training to influence			
Ability to distinguish between monomorphic leaders (single) and polymorphic leaders (wide range of innovations)			
Identified champions			
Identified individual/s who have and are willing to use social ties within and without organisation for innovation			
Development of those individuals			
Formal dissemination programmes			
Dissemination programme took account of potential adopters needs, perspectives, esp costs			
Tailored strategies for different groups			
Identified communication channels			
Design rigorous evaluation			
Monitor against defined goals and milestones			