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Patient-centred care for older people with complex needs

Evaluation of a new care model in outer east London

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About the report

Traditional models of care for older people focus on a single condition, even though the growing prevalence of comorbidities means that health care costs are increasing. Recognising this, and the fact that a significant proportion of care takes place outside of formal health delivery settings in the patients' own homes or their nursing homes, Barking and Dagenham, Havering and Redbridge clinical commissioning groups (BHR CCGs) set out to develop a new model of care.

In 2014, the Health 1000 pilot was established as a 'one-stop-practice' for patients with complex health needs, often delivering care within a person's own home. A dedicated multidisciplinary team of NHS health care and voluntary sector professionals were recruited into the practice including GPs, specialist doctors, nurses, physiotherapists, occupational therapists, pharmacists, key workers and social workers.

The Nuffield Trust was commissioned by the CCGs to evaluate this service, using a mixed methods approach to understand who was using the service and its impact on health outcomes and resources, and on staff and patient experiences.

This report looks at the implementation of the service, the impact it had on the use of health care resources, and its wider implications.

Acknowledgements

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This report uses information provided by Barking and Dagenham, Havering and Redbridge CCGs. We take the use of personal data seriously. Read more on our website: www.nuffieldtrust.org.uk/about/corporate-policies#information-security-and-data

Secondary Uses Services (SUS) data (2013–2017) are re-used with the permission of the 'data provider'.

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Executive summary

Background

Health 1000 was a new model of care dedicated to addressing the health and social care of patients with complex needs across the London boroughs of Barking and Dagenham, Havering and Redbridge (BHR). It aimed to improve quality of life through personalised care delivered by a clinically-led multidisciplinary team, focusing on prevention and early intervention and supported by contributions from the third sector.

Individuals who were considered eligible for the service were contacted via their registered general practice, and invited to transfer from their current primary care practice to Health 1000. For those who consented, the patient de-registered with their current practice and re-registered with Health 1000.

The Nuffield Trust was commissioned by the Redbridge Clinical Commissioning Groups (CCG) to evaluate this service. We used a mixed methods approach to understand who was using the service and its impact on the use of primary and secondary care services, and on staff and patient experiences.

Methods

We analysed the impact on the use of primary and secondary care services using a case-control design, whereby we matched each of 407 patients registered with Health 1000 to a control who would be registered with another GP in the local area. The specific services we investigated were hospital inpatient visits, attendance at A&E, outpatient appointments and primary care contacts. These were further evaluated at the end of life.

To assess the experiences of patients and staff, we conducted in-depth interviews over two phases. Over the first phase we interviewed 10 patients and seven staff and, over the second, a further 12 patients and seven staff.

All interviews were coded and thematically analysed. We also carried out a survey of a further nine staff employed by Health 1000, and 49 primary care staff working elsewhere within the three boroughs.

Patient registration

Patients were considered eligible for the service if they had complex health needs that were initially defined as five or more of a set of chronic conditions, although these criteria changed over time. The service aimed to recruit 1000 patients within six months, with a view to rolling out the service more broadly across the boroughs in the longer term. However, by the end of May 2017, fewer than half that number had been registered.

Many of the problems with recruitment stemmed from relationships between Health 1000 and other local GPs. Where patients had a long-standing relationship with their GP, it could be difficult to persuade them to move to a new practice. There could also be a reluctance on the part of the GP to lose a patient whose care needs they understood to a service whose value they were less certain about. GPs would also lose practice income.

Implementation of the service

Health 1000 has successfully established a distinct ethos to service provision that contrasts with existing general practice in the area, and is highly valued by patients. Both staff and patients believed that the model marked an important transformation in reshaping patients' relationship with general practice, something that was an explicit goal of Health 1000. Staff outlined how Health 1000 was providing a service that was "innovative", "different" and "efficient" for patients.

The majority of patients interviewed were extremely satisfied with the service they were receiving. Patients highlighted the friendly atmosphere, the attentiveness of clinical staff, the availability of GP appointments and the caring nature of the service. This was corroborated by the staff who felt that Health 1000 had improved the quality of care patients were able to access.

Health 1000 patients expressed some dissatisfaction with their previous GP services, again saying that appointments had been too short to cover off multiple conditions, that it was difficult to make an appointment promptly, and that once the need for a treatment was agreed, there could be long delays before it was provided. Other criticisms included rigid processes for obtaining repeat prescriptions, which made medications management difficult and difficulty in getting home visits.

There was a question of whether Health 1000's registration-based delivery model – also known as a "carve-out" approach – was best suited to the tasks it is trying to perform, or whether a service that allowed individuals to stay registered with their existing GPs would be preferable (the "wrap-around" approach). Opinion about this was very split, with several staff interviewees seeing pros and cons in both types of approach. Some praised the holistic, patient-centred approach to care, while others suggested that money could have been better spent supporting existing practices or community treatment teams.

Some of the challenges with delivering the new service included the lack of a function to issue electronic prescriptions remotely, the distances some staff had to travel to reach patients across three boroughs, and increased bureaucracy when accessing notes for seconded staff dealing with patients outside their "home" borough. Other challenges included integrating with other health and social care services and controlling costs.

Impact on the use of health care resources

After the date of registration with Health 1000, there were no significant differences in use of hospital services between the cases and the matched controls. There were also no differences observed during the last three months of a person's life. There were significantly more primary care contacts among the Health 1000 patients, although some of this is administrative activity and it is difficult to gauge how much extra work this is in comparison to other practices.

Given the relative infrequency of hospital attendance and the fact that the average follow-up period after registration was 18 months, it is possible that it has been too soon to see a notable impact on the use of hospital services.

Staff had reported reductions in unnecessary outpatient referrals and significant improvements to medicines management. They had also referred to the benefits of better care continuity on resource use, for example in facilitating quicker discharges from hospital and avoiding duplication across the system.

Implications

This study suggests that primary care hubs that are dedicated to the care of older people with complex health needs can have a positive impact on quality of care, and on the experiences of both patients and staff. We have not seen any evidence that these benefits translate into reduced use of hospital services, but, given the timescale of the study and the numbers of patients, it has perhaps been too soon to see any effect. It is also possible that the patient reviews and needs assessments undertaken when they were registered led to identifying new health conditions or needs that, in turn, influenced the use of secondary care services.

Eligibility criteria are intrinsically linked to both the delivery of the service and evaluation. A change in criteria that affects the needs of patients could alter the service being provided. Relaxing criteria may also reduce the marginal benefits of the service. In terms of evaluation, there could be a trade off between consistent, stringent criteria that generates small sample sizes and wider criteria where there is lower risk of an adverse outcome, meaning that individuals would need to be followed up for longer to see an effect.

Success or failure of similar schemes will depend on how well the wider local primary care community shares ownership. Services that do not require patients to be de-registered from their GPs may avoid a number of the recruitment problems, but have fewer of the care continuity benefits. However, this needs to be viewed in the context of a changing primary care landscape and moves towards delivery that is more integrated across sectors.

Key points

- Health 1000 provided a 'one-stop' primary care service to older people within three London boroughs who had complex health care needs.
- The service included a multidisciplinary team of health care professionals and specialists who provided proactive patient-centred care.
- The original plans were for a service that catered for 1000 patients, but fewer than half that number were registered over two-and-a-half years.
- Problems with recruitment were mainly due to difficulties engaging with local GPs and persuading them to de-register some of their patients, as well as persuading patients themselves to try out the new service.
- Patients were generally very satisfied with the service, as were the staff.
- Patients liked the friendly atmosphere, the attentiveness of clinical staff, the availability of GP appointments and the caring nature of the service.
- There have been challenges with electronic prescribing, the distance doctors have to travel to see some patients and integrating with other services in the area.
- Staff had reported reductions in unnecessary outpatient referrals and significant improvements to medicines management. They had also referred to the benefits of better care continuity, for example in enabling quicker discharges from hospital and avoiding duplication across the system.
- However, there is no evidence that the service reduced use of hospital services – whether for all patients, those who satisfied the original eligibility criteria, or those at end of life. However, with the numbers of patients and the period of follow up, it may be too soon to detect any such change.

Introduction

Health 1000 was a new model of care borne out of the Long Term Conditions Year of Care programme, for which BHR was an early implementer site (EIS), and supported by the Prime Minister's Challenge Fund (NHS England, 2015).

Traditional models of care for older people focus on a single condition, even though the growing prevalence of comorbidities means that health care costs are increasing. Recognising this, and the fact that a significant proportion of care takes place outside of formal health delivery settings in the patients' own homes or their nursing homes, Barking and Dagenham, Havering and Redbridge clinical commissioning groups (BHR CCGs) set out to develop a new model of care based on Wagner's chronic care model (Wagner et al, 2001).

In 2014, the Health 1000 pilot was established as a 'one-stop-practice' for patients with complex health needs, often delivering care within a person's own home. A dedicated multidisciplinary team of NHS health care and voluntary sector professionals were recruited into the practice including GPs, specialist doctors, nurses, physiotherapists, occupational therapists, pharmacists, key workers and social workers. It was planned that Health 1000 would run for an initial trial period starting in November 2014 until 2017.

The Nuffield Trust was commissioned by the CCGs to evaluate this service, using a mixed methods approach to understand who was using the service and its impact on health outcomes and resources, and on staff and patient experiences.

An interim report was presented to the Health 1000 project board in 2015, which described our initial findings, including the first phase of our staff and patient interviews. The main qualitative findings from the first phase of our analysis are presented in Appendix 1 (see page 62).

The evaluation was approved by the NRES committees (REC reference: 14/NS/1082), and local research and development approval was obtained from the Barking, Havering and Redbridge University Hospitals NHS Trust.

The service model

The service model was designed in collaboration with BHR CCGs and UCL Partners, and its proposed key features are listed in Box 1. In essence the service was medically led but highly responsive to social needs, and with greater focus on prevention and early intervention.

Individuals were deemed eligible for the service if they had five or more of a specific set of chronic conditions, although these criteria changed over time. They were contacted via their registered general practice, and invited to transfer from their current primary care practice to Health 1000. For those who consent, the patient de-registered with their current practice and re-registered with Health 1000.

At registration with Health 1000, each person received a refreshed care plan, a needs assessment and a review of their pharmaceutical regimes, and was assigned a dedicated key worker. The Health 1000 team proactively supported the patient – addressing their primary care needs and also providing access to additional services available within the team (including social care, physiotherapists, consultant specialists) as appropriate.

Box 1: The originally specified key features of Health 1000

- General practitioner-led proactive chronic disease management delivered holistically across multiple chronic diseases, supported by a rapid response team to support patient care out of hospital wherever appropriate.
- Proactive case management of both medical and social care will be the cornerstone of the intervention, enabling faster identification of need and arrangement of care packages.
- Patients entering the service will have existing diagnoses and management reviewed.
- Specialist geriatricians will be contracted to review all management plans on entry into the programme.
- Patients who continue to access unscheduled care outside of the new organisation will be reviewed in a multidisciplinary team meeting to revise the care strategy.

- Disease specific specialists will be contracted to provide advice when necessary.
- Rapid access to diagnostics will be contracted from provider organisations.
- A full range of out of hospital emergency cover will be provided by the programme between 8am and 8pm, seven days a week. This includes external contracting where appropriate.
- Patient and carer education with enhanced self-management will be prioritised to promote and support independence and personal responsibility.
- Patients and carers will be encouraged to develop personalised care plans that include actions to be taken in the event of an acute deterioration in their condition.
- A new electronic care record will provide access for patients and all care team members to relevant medical and social care information, to enhance integrated working.
- Quality improvement will be embedded within the organisational culture from the outset. Value-based operating measurements will be linked to what matters most to patients. Operating measurements will help to embed and drive continuous improvement and capability development across the partnership, e.g. value scorecards for key pathways.
- Key workers will develop multi-skilled roles that will cross traditional professional boundaries through a continual personal and team development programme.

Source: UCL Partners/ Barking and Dagenham, Havering and Redbridge CCGs

Methods

The evaluation we agreed with BHR was a mixed methods approach. This combined a quantitative assessment of the impact of the new service on the use of other health care resources, with views and experiences of the service gathered from patients and staff. For resource use we agreed to focus on hospital activity and primary care contacts, and did not carry out a formal cost-effectiveness analysis.

Data on activity and outcomes

The evaluation team had access to pseudonymised primary and secondary care records for all individuals registered with GP practices within the areas under the responsibility of BHR CCGs. This included information on GP records, inpatient spells, outpatient appointments and A&E attendances since 1 October 2013. Individual patient records were linked across different data sources using a unique patient identifier. We had hospital attendance records up to 30 April 2017 and primary care data up to 31 May 2017.

Data also included primary data fields such as comorbidities, combined risk score (King's Fund, 2006), the date a patient was registered dead or moved away and, for relevant patients, registration with Health 1000 and the time they were registered.

The in-hours GP data can contain several different records for the same patient on the same day. Moreover, these do not only correspond to face-to-face consultations, but may be records of lab results or information from a discharge letter. This can make it difficult to quantify use of GP services. For our analysis we defined each GP "contact" as a unique date for which a record was made for an individual patient. Although such contacts do not all represent unique consultations, they provide some indication of the level of primary care activity in relation to each person.

In-hospital visits were analysed by date of discharge or death rather than date of admission. Since admissions are not reported in the data until a spell is complete, this avoided the problems of missing admissions where the spells were incomplete by the end of the follow-up period.

Costs associated with hospital visits were taken from the Payment by Results tariffs associated with the Healthcare Resource Groups (HRGs) assigned to the visit or spell. As such they equate to prices paid by commissioners rather than costs to providers.

Information from patients and staff

The qualitative component of the evaluation comprised two phases: the first taking place in 2015 and the second in 2016 (Box 2) and this report focuses on the second phase. During this phase, we conducted in-depth face-to-face and telephone interviews with 12 patients or carers of patients to learn about their experiences when using Health 1000 (Box 2). Each interview normally lasted between 30 minutes to an hour. Seven staff members were interviewed by telephone about their experiences of providing the service, the practicalities of implementing the service and their perceptions of the impact on patient care. Interviews were transcribed and analysed to identify recurring themes and areas where different viewpoints existed. We also surveyed a further nine staff employed by Health 1000, and 49 primary care staff working in the three boroughs who were not employed by Health 1000, using a self-completed online questionnaire.

Given the available resources, and taking into account the methodological literature, we judged that the number of patient or carer interviews were appropriate for the study. These were in-depth interviews, intended to provide rich qualitative data about the experiences of patients using the service. As such, they perform a different function from approaches requiring larger sample sizes, such as surveys. Because of the complexity of the questions we were asking patients, and also because of the likelihood of low response rates when asking patients to complete and return surveys, we felt that we could add best value by conducting data rich interviews. A significant number of common themes cropped up between interviewees, suggesting to us that the interviews did provide an accurate and sufficiently detailed picture of patients' experience of using the service.

As patients generally had multiple long-term conditions and accessed services either in their homes or via the Health 1000 site, selecting patients to participate in qualitative research was challenging. During this phase of the qualitative research, we used a patient list to select a set of Health 1000 patients from which we would invite a subset to participate in the research. However, we were still reliant on Health 1000 staff to provide contact details for these patients. When we exhausted this set of patients (some were not willing to participate), Health 1000 provided additional names to enable us to top up our sample. Therefore, although we took all possible steps to avoid selection bias in our interview subjects, we were reliant on Health 1000 to provide initial contact details in order for us to make contact with the patients. This could have introduced biases, as those patients more amenable to interview may be more healthy or have a better relationship with staff.

Patients using the service and staff working at Health 1000 were asked about their experiences of the service, including how satisfied they were, how Health 1000 differed from previous services and what impact the service has had on the care they receive or provide. Primary care staff based in Barking and Dagenham, Havering or Redbridge, but not working at Health 1000, were asked in the survey for their views about the service and its impact.

Box 2: Summary of qualitative research methodologies

Phase 1: September* – October 2015 (complete)

- Interviews with a sample of 10 patients who are registered with Health 1000 (patient details supplied by Health 1000).
- Interviews with a sample of seven staff members with a range of roles.

*one interview was conducted in July 2015

Phase 2: July - September 2016 (complete)

- Interviews with a sample of 12 patients who are registered with Health 1000 (seven patients selected randomly by Nuffield Trust; details of five patients supplied by Health 1000).
- Interviews with a sample of seven staff members with a range of roles (delivering the service).
- Survey of nine staff providing the Health 1000 service, and 49 primary care staff not providing the service but working in the three boroughs where Health 1000 operates.

Analysis of the quantitative impact on the use of health care services

For our analysis of impact, we matched each Health 1000 patient (case) with a control from the wider population who had similar characteristics at the time the case was registered with Health 1000. Details of the matching variables are shown in Box 3. These include the eight chronic conditions that were used as the original eligibility criteria.

Box 3: Matching variables used in the analysis

- Number of emergency inpatient visits in the three months before registration
- Number of emergency inpatient visits in the period between three and six months before registration
- Number of emergency inpatient visits in the period between six and 12 months before registration
- Combined risk score
- Age
- Number of outpatient visits in the six months before registration
- Gender
- Number of comorbidities
- Deprivation, measured by the Index of Multiple Deprivation (IMD) quintile associated with the area of residence
- Coronary heart disease (CHD)
- Stroke
- Diabetes
- Heart failure
- Dementia
- Chronic obstructive pulmonary disease (COPD)
- Hypertension
- Depression

In practice, because we did not have real-time data but information provided at regular intervals, it was not possible to obtain individual characteristics at the exact moment each case was registered. Therefore, we used the latest reported information for each person that was available before the Health 1000 registration date.

When selecting controls, we excluded GP practices that had higher proportions of patients who registered with Health 1000. This was to avoid any selection bias, due to the fact that patients from these practices who did not register with Health 1000 may have been deemed less suitable for the new service.

The matching procedure aimed to find controls that matched on as many of the variables we selected as possible, with a priority assigned to those further up the list in Box 3.

Outcomes were numbers of hospital visits over the period from three months after registration to the end of follow up for the case or matched control, whichever was sooner. We could thus ensure follow-up times for cases and controls were similar to avoid bias. We ignored the first three months after registration to allow for delayed impact of the new service.

Our analysis of numbers of A&E visits focused only on those that were not subsequently followed by an emergency admission to hospital (either on the same or following day). This was so we could focus on less serious visits and avoid information that would be included with the emergency admissions. However, for costing, all A&E admissions were included as the A&E costs would not be reflected in any subsequent admissions data.

We then compared the paired data on numbers of visits using negative binomial regression, treating the paired cases and controls as repeated measures. (Negative binomial models were used because counts were over-dispersed.) To allow for the fact that we were not able to obtain perfect matches for all cases, the model included some individual patient characteristics as covariates. To handle different follow-up times for different matched pairs, these were treated as an offset variable. We also investigated any influence of changes over time in the profile pf patient registering: preliminary analysis showed that 1 October 2015 was a suitable date for dividing patients into two groups.

For each type of hospital attendance we used log normal regression to compare the changes in costs per visit among the cases and controls before and after registration. A log normal model was used to accommodate the skewness in the cost data. Lengths of stay were analysed using cox proportional hazard models correcting for similar factors. All statistical analysis was conducted using SAS statistical software version 9.4.

Because of the relatively high proportion of registered individuals with fewer than five comorbidities, we carried out a separate analysis that only focused on those with five or more comorbidities: this being the group the service was originally designed for. This proceeded in a similar way, with different matched pairs to ensure all controls had similar numbers of comorbidities.

We carried out further analysis of emergency inpatient visits for a selection of specific conditions, including a set that were ambulatory care sensitive (ACS). The conditions we selected are shown in Appendix 2 (see page 64) that are based on a modified version of the Victoria State Health Department list, which is the most commonly used list within the NHS (Bardsley et al, 2013).

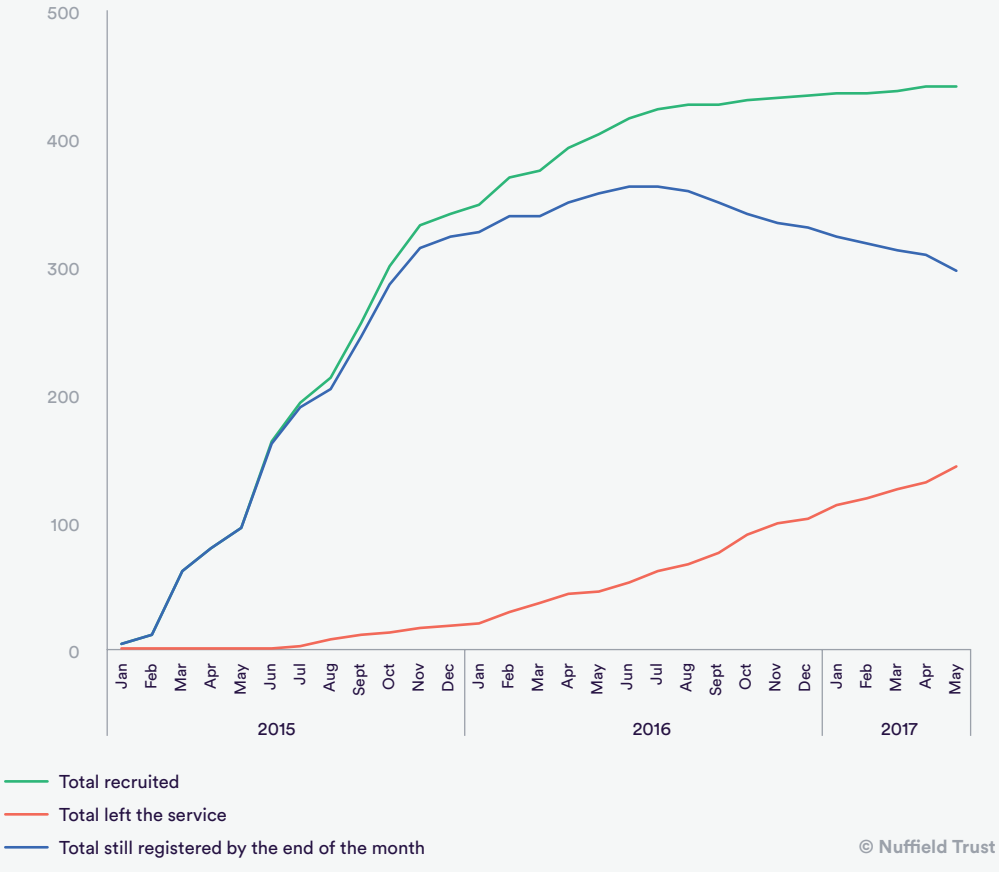
For any patients who died within either the case or control groups, we compared their use of health care services within the last three months of life. Because we were only analysing data for patients who died, the two cohorts would not be matched, and so we fitted an unpaired negative binomial regression model.

Patient registration

Patient registration and recruitment

The first patients were registered in January 2015, and the initial vision was to recruit 1000 patients within six months with a view to rolling out the service more broadly across the boroughs in the longer term. In practice, fewer than half that number (440) were recruited over a period of two years. With 144 patients either dying, entering a nursing home or leaving the service for other reasons (for example, by moving away from the area), by the end of May 2017 there were 296 patients registered (Figure 1).

Figure 1: Numbers of individuals recruited to, leaving and registered with Health 1000 each month up to May 2017



Patients were considered eligible for the service if they had complex health needs. These were initially defined as five or more of a set of long-term conditions:

- coronary heart disease
- high blood pressure
- heart failure
- stroke or mini stroke
- diabetes
- chronic obstructive pulmonary disease (COPD)
- depression
- dementia.

At the start of the service, 2,024 individuals across the three boroughs were identified by the CCGs as eligible. However, during the course of service implementation, the definition of complex needs was interpreted more flexibly. For example, complications such as frailty or requiring social care were added. Also, some carers and spouses of the eligible patients were registered with the service.

Characteristics of individuals recruited to Health 1000

The patients registered with the service before and after 1 October 2015 are compared in Table 1. The average age of all individuals at time of registration was 77. The most frequent comorbidities were hypertension (approximately 80% of patients), diabetes and coronary heart disease (each reported for more than half the patients).

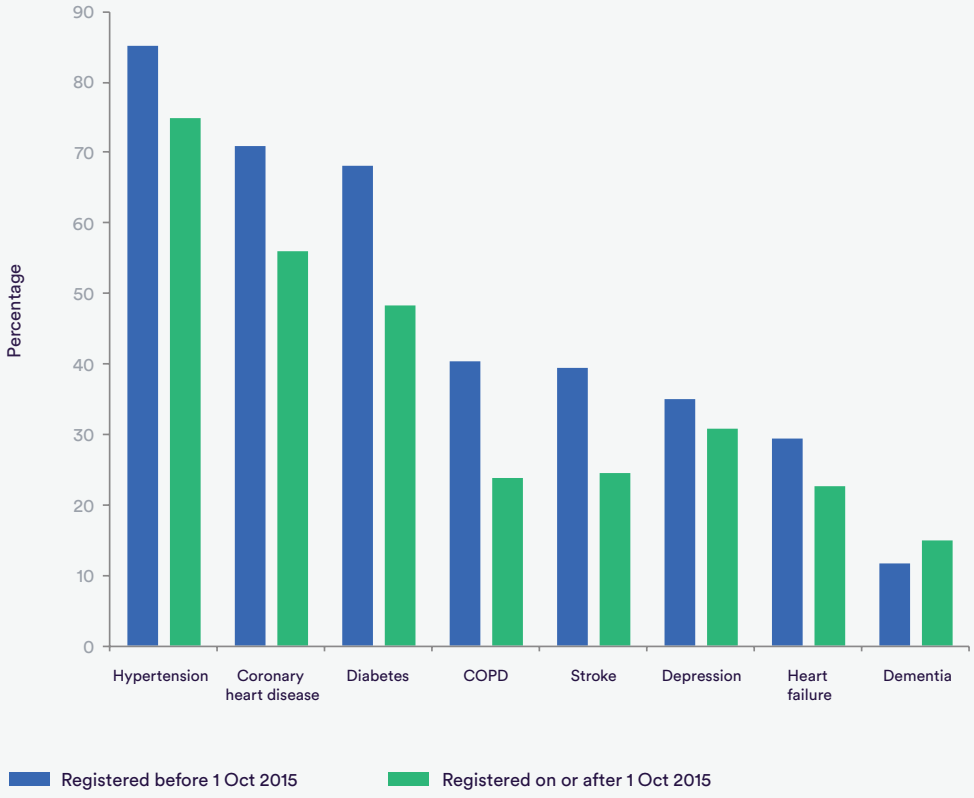
Those registered on or after 1 October 2015 were more likely to have fewer comorbidities ($p < 0.001$, Wilcoxon Test). For five of the eight comorbidities numbers were significantly lower (see also Figure 2). There was also a higher frequency of emergency admissions during the six months before registration ($p = 0.01$, Wilcoxon Test), but no significant differences in the other types of hospital visit. Also, the combined risk scores were not notably different.

Table 1: Characteristics of individuals at the time of recruitment to Health 1000

Variable	All individuals (n=407)	Registered before 1 October 2015 (n=248)		Registered on or after 1 October 2015 (n=159)		p-value for comparison (significant values in bold)
Mean age (standard error)	77.1	76.4	(0.6)	78.2	(0.8)	0.07
Proportion female (standard error)	50.9%	48.4%	(3.2%)	56.0%	(3.9%)	0.14
Mean combined risk score* (standard error)	40.0	39.2	(1.5)	41.3	(2.0)	0.40
Mean numbers of contacts with other services in previous six months (standard error)						
Emergency inpatient	0.59	0.46	(0.06)	0.79	(0.12)	**0.01**
Elective inpatient	0.27	0.28	(0.04)	0.26	(0.04)	0.96
Outpatient	4.35	4.33	(0.33)	4.38	(0.41)	0.74
A&E not followed by an admission	0.39	0.38	(0.05)	0.42	(0.07)	0.37
GP contacts	24.2	25.1	(0.8)	23.0	(0.9)	0.36
Numbers with different comorbidities reported (standard error)						
Stroke	33.7%	39.5%	(3.1%)	24.5%	(3.41%)	**0.002**
Diabetes	60.4%	68.2%	(3.0%)	48.4%	(3.96%)	**<0.001**
Coronary heart disease	66.1%	71.0%	(2.9%)	56.0%	(3.94%)	**0.002**
Hypertension	81.1%	85.1%	(2.3%)	74.8%	(3.44%)	**0.01**
Heart failure	26.8%	29.4%	(2.9%)	22.6%	(3.32%)	0.13
COPD	33.9%	40.3%	(3.1%)	23.9%	(3.38%)	**<0.001**
Dementia	13.0%	11.7%	(2.0%)	15.1%	(2.84%)	0.32
Depression	33.4%	35.1%	(3.0%)	30.8%	(3.66%)	0.37
Mean number of comorbidities (standard error)	3.47	3.80	(0.08)	2.96	(0.12)	**<0.001**

*See King's Fund (2006)

Figure 2: Prevalence of long-term conditions among patients registered with Health 1000 before and after 1 October 2015



Staff views on the recruitment of patients

When interviews were conducted for the interim report, several staff reflected on tensions between the new service and existing general practice. Reductions in practice income, and the potential loss of the relationship between the GP and the patient being transferred, were viewed as reasons why uptake of the Health 1000 scheme had been lower than expected.

During this second research phase, the same issues were still in evidence, but there was an additional implication that the Health 1000 initiative might generate increased scrutiny about how well conventional general practice was addressing the needs of this patient group. Two significant themes were the perceived failure of Health 1000 to engage GPs in the area during the implementation of the scheme, and also the challenges of convincing patients and their families of the scheme's value before they signed up.

Primary care staff working outside Health 1000 made some specific comments about the complexity of the process of recruiting patients to Health 1000 within the staff survey:

> "[The] biggest disadvantage as far as my patients concerned is that they have to de-register from this practice and none have wanted to, even though we explain they come back on later."

> "Not convinced that this service is being properly utilised. Complex patients should be picked up mainly following inpatient admissions or from day hospital. Patients and families need convincing about the value of this service."

The observed changes in eligibility criteria reflected views from Health 1000 staff members suggesting they should be refined. Reasons given included that the criteria were too inflexible and that if the objective of the scheme was admissions avoidance, eligibility criteria should have included those patients with a history of inappropriate admissions.

One interviewee suggested that relaxing the criteria could be crucial to improving the engagement of local GPs in the programme, through enabling them to feel more ownership of the service.

Implementation of the service

The ethos of the service

When conducting research for the interim report, we found Health 1000 had successfully established a distinct ethos to service provision that contrasted sharply with existing general practice in the area, and was highly valued by Health 1000 patients. Both staff and patients believed that the model marked an important transformation in reshaping patients' relationships with general practice, something that was an explicit goal of Health 1000. In the latest research phase, this was still the case and staff outlined how Health 1000 was providing a service that was "innovative", "different" and "efficient" for patients.

One staff member commented:

> "I really like the ethos of having the long-term conditions practice and looking after complex patients, and just trying to make their journey a lot easier through health care."

Another said:

> "Working in the NHS nine years, I don't think I've ever had as many 'thank yous' and 'I don't know what I would do without you' and 'please don't go anywhere'."

As was the case last year, patients heavily emphasised the difference in ethos between Health 1000 and conventional general practice. More than one interviewee described the service as being more akin to what they would expect in "private" health care. Specific benefits included:

- staff having more "patience" and time to listen
- a more "caring, respectful and thorough" experience than conventional general practice
- a very "personal" level of care.

> "I feel like I'm in a nice big fluffy blanket when I'm there. I feel cuddled and loved, as if I was their grandmother or mother. They're treating me how my children treat me – want the best for me and do the best they can."
> (Patient)

> "If I've got upset about something, they've been really nice to me. It's been very personal, probably because they have fewer patients to manage."
> (Carer)

Staff working in primary care across the boroughs but outside Health 1000 made some specific comments about the service within the staff survey:

> "I think the idea of Health 1000 is very good. I think these patients do need a service that combines their complex health issues and looks after them as a whole."

> "Health 1000 has been a wasteful exercise in my opinion and more investment should have been directed in developing community treatment teams that cater to a larger section of population."

> "It was a terrible idea, taking complex patients from the GPs who knew them best. That money, and there was lots of it, should have gone to each practice to support those who already do the work."

The service delivery model

Related to this theme was a question of whether Health 1000's registration-based delivery model – also known as a "carve-out" approach – was best suited to the tasks it is trying to perform, or whether a service that allowed individuals to stay registered with their existing GPs would be preferable (the "wrap-around" approach). Opinion about this was very split, with several staff interviewees seeing pros and cons in both types of approach (see Box 4).

Box 4: Benefits of different modes of implementing the service

Benefits of re-registration with the new service:

- Re-registration enables a review of all patient diagnoses, which can reveal those that are not accurate
- This provides clearer decision-making routes for medical management and intervention
- A single service provider offering the majority of primary and social care services

Benefits of maintaining existing registrations:

- Increased efficiency, because it would be more evident when staff were over- or under-worked

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One staff member in particular expressed frustration with the concepts of "carve-out" and "wrap-around", viewing this as a false distinction resulting from the dominance of market-based ideology in the operation of health services. This interviewee said:

> "If everyone had the same purpose, which is to have the best care possible, as close to home as possible, with the right people looking after you, and we do it with the greatest value for money; if all of us were truly working to that purpose, it isn't a wrap-around or a carve-out – it's one service. And what I haven't worked out yet is how you could possibly provide that, given the landscape we have."

One member of Health 1000 staff spoke of scepticism within the GP community that the Health 1000 programme would translate into a sustainable model of provision, not least because the service was relatively well resourced in comparison with mainstream general practice. Health 1000 was attempting to counter this scepticism by emphasising the potential value of learning from the piloting of the scheme:

> "There are some strong feelings out there – when the services are being under threat, when the money, when some of the GPs are struggling to survive, why should a relative luxury sit within the patch? And I think we've managed to get a message through that there's a rationale for that and the rationale's clear. It's about 'we need some further information that allows you and everyone to plan to go forward'."

Dissatisfaction with existing health and care services

Patient interviewees expressed some dissatisfaction with their previous GP services, saying that appointments had been too short to cover off multiple conditions, that it was difficult to make an appointment promptly, and that once the need for a treatment was agreed, there could be long delays before it was provided. Other criticisms included rigid processes for obtaining repeat prescriptions, which made medications management difficult and difficulty in getting home visits:

> "I'd go there to the doctor's surgery and because I've got more than one illness, they didn't participate in the second illness and it was 'take these tablets, that should improve it'. To me they just didn't dig down – it is just a case of 'take your paracetamol, on your merry way' and these people [Health 1000] are entirely different."
> (Patient)

> "Straight away there was a difference. We'd been with that surgery a long time and they'd done a lot for us, but Health 1000, from the word go they had time for us."
> (Patient)

However, several interviewees spoke of hesitation about leaving familiar GP practices, and in some cases it was clear that there were strong existing bonds between the previous GP and the patient:

> "I can't say the [previous] GP didn't care. I don't think that they could provide the level of care that Health 1000 can – they couldn't visit Mum every two weeks to see how she was."
> (Carer)

> "I didn't feel very good about it – the only thing that made me do it in the end was that I could go back to [previous GP] if I wanted to and I didn't have to stick with what I'd signed up to do."
> (Patient)

In the second year, a new theme of dissatisfaction with social care services also emerged. One interviewee in particular, who was a carer, spoke of dissatisfaction with their relative's social care spanning a period of multiple hospital admissions prior to registering with Health 1000.

Patients' and carers' comments suggested they felt that "conventional" services were in some cases unable adequately to address their needs, although interviewees were often at pains to acknowledge the pressure they knew services in the three boroughs were under.

Challenges of service implementation and potential improvements

In the earlier interviews, staff were asked to identify challenges facing the Health 1000 service. They mentioned difficulties with IT systems and hardware, problems with the process of "de-registering" and "re-registering" patients, administrative workload, integration with other services, working across borough boundaries and difficulties with recruiting and retaining staff.

During the second year, some of the same themes cropped up, such as the lack of a function to issue electronic prescriptions remotely, the distances some staff had to travel to reach patients across three boroughs, and increased bureaucracy when accessing notes for seconded staff dealing with patients

outside their "home" borough. However, there were also some new issues that challenged some of the main principles of the model, as discussions had moved on from how the existing approach should be working to how the model might be adapted for the future.

Integration with services outside Health 1000

Compared with findings from our first year of interviews (Appendix 1), there was a sense from some staff interviewees that awareness of the Health 1000 service had increased among those working in the NHS and social care in the three boroughs. Several of the staff interviewees felt that more colleagues knew of the scheme, though one of these said:

> "There's more of them know about us and we're able to engage with them better, but in general I think they see us as a project happening in parallel to their existence rather than a project that they're integrating with."

However, staff still experienced a difference between the way Health 1000 services integrated well with each other and the less strong links with those "outside" the scheme. One described a continuing lack of awareness in secondary care in particular, and said some staff in other services were unwilling to accept that some of the same expertise existed within Health 1000. For example, occupational therapy could be provided in-house. Another member of staff outlined problems dealing with multiple community pharmacies, especially where controlled drugs were concerned.

Services were thought to be well integrated within Health 1000, and multiple interviewees said this was driven by the successful multidisciplinary team meetings that are a feature of the scheme. Although staffing levels seemed more stable than at the outset of the scheme when recruitment was still underway for some roles, one interviewee suggested that the fact that many staff are part time or working locum shifts meant there could be a lack of awareness of the different roles and functions staff members performed – a problem that could be resolved via a more detailed induction process.

Cost and efficiency of the service

The monthly staffing cost was approximately £85,000, which corresponded to the minimum staffing levels. However, this cost would not scale with the

number of patients, as the service could handle more without extra cost. One Health 1000 GP said the level of expenditure was justified as a measure to get patients stable over a period of 18 months – the implication being that this might not be sustainable in perpetuity. Another staff member described Health 1000 as a "Rolls Royce service" and questioned whether this would actually be sustainable in future. A third said it should be possible to reduce costs but as a pilot, Health 1000 had "no choice" but to set up a service that had turned out to be expensive because managers had needed "time to think".

During the latest round of interviews, there was an increased emphasis from staff on the efficiency of the Health 1000 model and ways that this could be improved. This was particularly the case where staff were involved in discussions about setting up "locality based" models to make a wider number of services available to patients in the community. Issues raised included:

- an element of double paying for services at present because not enough patients had been recruited to enable the decommissioning of existing hospital/community services
- opportunities to make the staffing of the model more efficient by reducing the amount of GP time and/or decreasing the number of consultant geriatrician hours.

One interviewee suggested the model as it stood was unaffordable because, based on the low number of patients recruited, a 20% improvement in outcomes would be necessary to justify the expenditure. However, this interviewee pointed out that with a full quota of patients, the affordability of the model would improve. The same interviewee said:

> "I do believe fervently that we had to do something different with this patient group if you want to deliver a different outcome that is a better outcome for them and a better outcome in terms of the system - i.e. less ED attendance and everything else. Whether we're doing the right thing I don't know, but we need to look at that and what scale you have to have to make it cost effective, I'm not entirely sure. So the reason why I've indicated this is that it might be a luxury model at the moment, but we need that information to inform the future, rather than just float with the latest dogma of 'this must be brilliant because so and so is doing it'."

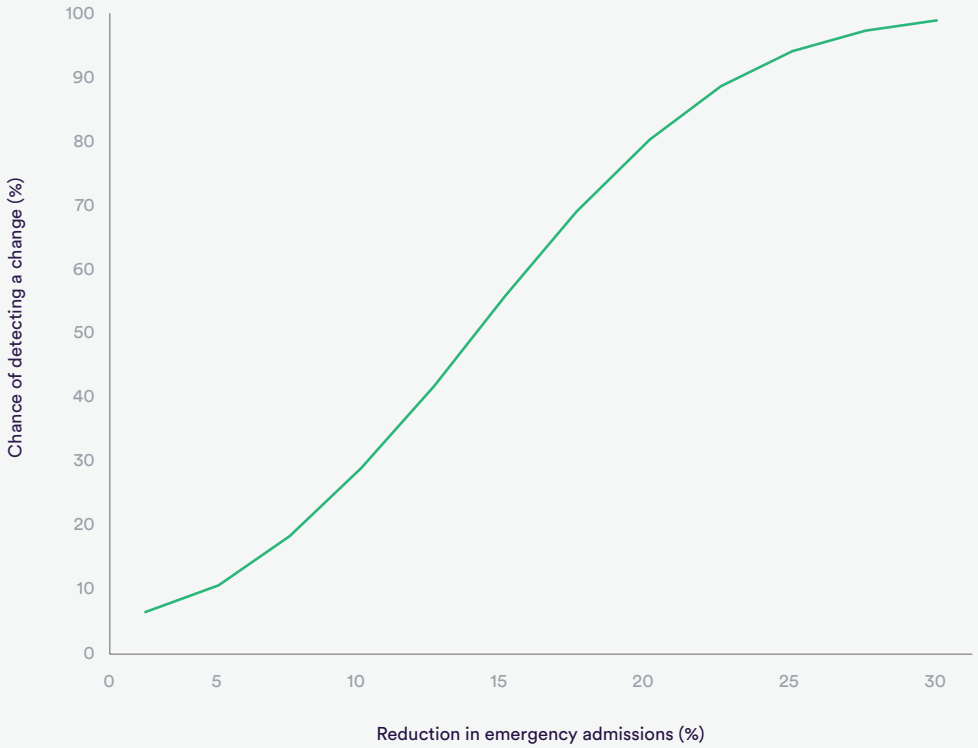
The impact of Health 1000 on the use of health care services

The ability to detect change

Up to the end of May 2017, the maximum follow-up time for individuals after registration with Health 1000 was 28 months and the average was 18 months. Before registration to Health 1000, the rate of emergency admissions was approximately one per person per year. If Health 1000 had an impact on reducing hospital admissions, then the chances of detecting reductions of different sizes over 18 months, using standard statistical rules, are illustrated in Figure 3.

So, for example, if rates were actually 10% lower after registration, then the chances of this appearing as a significant result using a 95% confidence level would be approximately 30%. If rates were 20% lower then the statistical power would be 80%. This means that the combination of patient numbers and follow-up time would provide sufficient chances of detecting reductions of 20% or more, but there would be a high chance of not picking up reductions of around 10%.

Figure 3: Chances of detecting a change in emergency admissions (power) by following up 450 individuals over 18 months (using two-tailed 95% confidence intervals)



Matching cases and controls

Because we were not analysing outcomes within the first three months after registration to Health 1000, we excluded any individuals who had fewer than three months' worth of follow-up. These would be people who either died or left in that period, or were recruited in the later months of the service. Of the 440 individuals who were recruited, 33 were excluded for this reason, leaving a total of 407 who were matched to controls.

A comparison of the characteristics of cases and controls at the time the cases were registered is shown in Table 2. Despite the matching process, differences in some variables reflect the ability to find controls for all cases that match on all criteria. The cases had a significantly higher number of comorbidities and GP contacts. Among the comorbidities themselves, the cases had significantly higher proportions of reported stroke, diabetes, CHD, heart failure and COPD, reflecting the eligibility criteria.

Table 2: Comparison between 407 cases and controls

Variable	Cases		Controls		p-value for comparison (significant values in bold)
Mean age (standard error)	77.1	(0.5)	77.1	(0.5)	0.97
Proportion female (standard error)	50.9%	(2.5%)	51.4%	(2.5%)	0.89
Mean combined risk score (standard error)[1]	40.0	(1.2)	39.1	(1.2)	0.59
Mean number of comorbidities (standard error)	3.47	(0.07)	2.93	(0.07)	**<0.001**
Number died (%)	71	(17%)	71	(17%)	1.0
Mean numbers of contacts with other services in previous six months (standard error)					
Emergency inpatient	0.59	(0.06)	0.58	(0.06)	0.99
Elective inpatient	0.27	(0.03)	0.28	(0.03)	0.83
Outpatient	4.35	(0.26)	3.74	(0.22)	0.07
A&E not followed by an admission	0.39	(0.04)	0.37	(0.05)	0.2
GP contacts	24.2	(0.6)	18.8	(0,6)	**<0.001**
Numbers with different comorbidities reported (%)					
Stroke	137	(34%)	104	(26%)	**0.01**
Diabetes	246	(60%)	211	(52%)	**0.02**
CHD	265	(66%)	230	(57%)	**0.01**
Hypertension	330	(81%)	329	(81%)	0.99
Heart failure	109	(27%)	65	(16%)	**<0.001**
COPD	138	(34%)	104	(26%)	**0.01**
Dementia	53	(13%)	41	(10%)	0.23
Depression	136	(33%)	110	(27%)	0.06

[1] Combined risk score only available for 406 cases

Comparing outcomes for cases and controls

Differences in rates of health care resource use between the cases and controls, after registration with Health 1000, are compared in Table 3. Quarterly differences are illustrated in Figure 4.

Table 3: Use of health care resources per person per year after registration with Health 1000: comparing cases and controls (first three months after registration are excluded)

	Registration date	Cases	Controls	p-value for difference adjusted for case mix* (significant values in bold)
Emergency inpatient visits	Before 1 Oct 2015	0.91	0.80	
	On or after 1 Oct 2015	0.99	0.95	
	All	0.93	0.84	0.12
Elective inpatient visits	Before 1 Oct 2015	0.64	0.50	
	On or after 1 Oct 2015	0.34	0.38	
	All	0.57	0.45	0.97
A&E visits not followed by an admission	Before 1 Oct 2015	0.73	0.73	
	On or after 1 Oct 2015	0.86	1.02	
	All	0.77	0.81	0.06
Outpatient appointments	Before 1 Oct 2015	8.19	7.16	
	On or after 1 Oct 2015	8.09	6.68	
	All	8.16	7.02	0.40
GP contacts	Before 1 Oct 2015	70.1	36.5	
	On or after 1 Oct 2015	65.1	39.2	
	All	68.7	37.3	**<0.001**

*Derived from regression models

Figure 4: Quarterly primary and secondary care contacts before and after registration with Health 1000 (quarter 1 is excluded from the analysis)

Once we account for differences in patient characteristics, our analysis shows no significant difference between cases and controls after the first three months following registration for each mode of hospital visit. However, Health 1000 have significantly greater GP contacts than the controls.

For emergency inpatient visits, the overall profile of cases and controls is a combination of two very different profiles. For patients registered on or after 1 October 2015, the visit rate just before recruitment rose to 4.8 per 1000 patient days, which compares with a lower rate of 2.7 per 1000 patient days among the earlier registrations. Also, among the later registrations there is a clear fall in the number of visits after registration, which is mirrored in the controls, but no such effect is apparent among the patients registered earlier. After registration, rates of admission fall to similar values for both sets of cases. This could be a regression to the mean effect caused by ensuring that they matched on the number of visits before registration. Whether regression to the mean is present among the cases depends on the way patients were selected for the new service, and the extent to which decisions to recruit individuals were based on recent inpatient activity.

Unlike with emergency admissions, there is no evidence of any association with the date of registration for the other modes of secondary care. There has been an overall drop of about 8% in the number of outpatient appointments following registration to Health 1000, from nine per year down to 8.3 per year. Along with the other matching variables, it has not been possible to obtain a perfect match for numbers of outpatient visits before registration, with the cases having rates that are approximately 20% higher. We adjusted for these differences in our regression analysis.

The number of A&E visits that are not followed by an admission is almost significantly lower among the cases ($p = 0.06$), although the profile in Figure 4 suggests that the greater differences are soon after the date of registration.

Compared to the controls, Health 1000 patients had approximately 16% more GP contacts before registration, until the last quarter when there has been a further increase (Figure 4). After registration, numbers increased markedly followed by a decline to a rate that is about 50% higher than before. A closer look at the data reveals many of these to be administrative activity that has not involved the patient and telephone consultations. It is difficult to gauge how much extra work this is in relation to other practices. Other activity would

relate to the reviews and needs assessments that patients underwent soon after registration. Where this led to identifying new health conditions or needs, it could have an influence the use of secondary care services.

Case and control comparisons for some of the more common diagnostic groups are shown in Table 4 and Figure 5, and comparisons for the most common conditions and ambulatory care sensitive (ACS) conditions are shown in Table 5 and Figure 6.

Across cases and controls, respiratory conditions have been the most common reasons for emergency admission, accounting for 24% of all spells. The most common individual conditions across cases and controls have been chronic obstructive pulmonary disease (COPD), pneumonia and urinary tract infections (UTIs). None of the differences in the degree of change between cases and controls are statistically significant, which may be partly due to small numbers. However, rates of pneumonia admissions hardly changed for the Health 1000 cases after registration, yet doubled among the controls over the same period of time.

ACS conditions accounted for 33% of all admissions over the period of analysis. Among Health 1000 patients, there was a 29% reduction in the rate of ACS admissions, which compares to a 20% reduction among the controls. However, after adjusting for individual patient characteristics, there is no significant association of these changes with Health 1000 ($p=0.25$).

Table 4: Changes in admission rates by disease group among cases and controls, comparing 12 months before registration to after registration (excluding first three months after registration)

Selected diagnostic groups		Cases		Controls	
		Visits	Rate per 1000 person days	Visits	Rate per 1000 person days
Infections and parasitic diseases	Before	6	0.04	11	0.07
	After	13	0.09	17	0.09
Diseases of circulatory system	Before	63	0.43	44	0.30
	After	64	0.35	56	0.31
Diseases of respiratory system	Before	103	0.70	85	0.57
	After	103	0.56	102	0.56
Diseases of digestive system	Before	26	0.18	35	0.24
	After	28	0.15	38	0.21
Diseases of genito-urinary system	Before	66	0.45	44	0.30
	After	53	0.29	41	0.22

Figure 5: Changes in admission rates by disease group among cases and controls, comparing 12 months before registration to after registration (excluding first three months after registration)

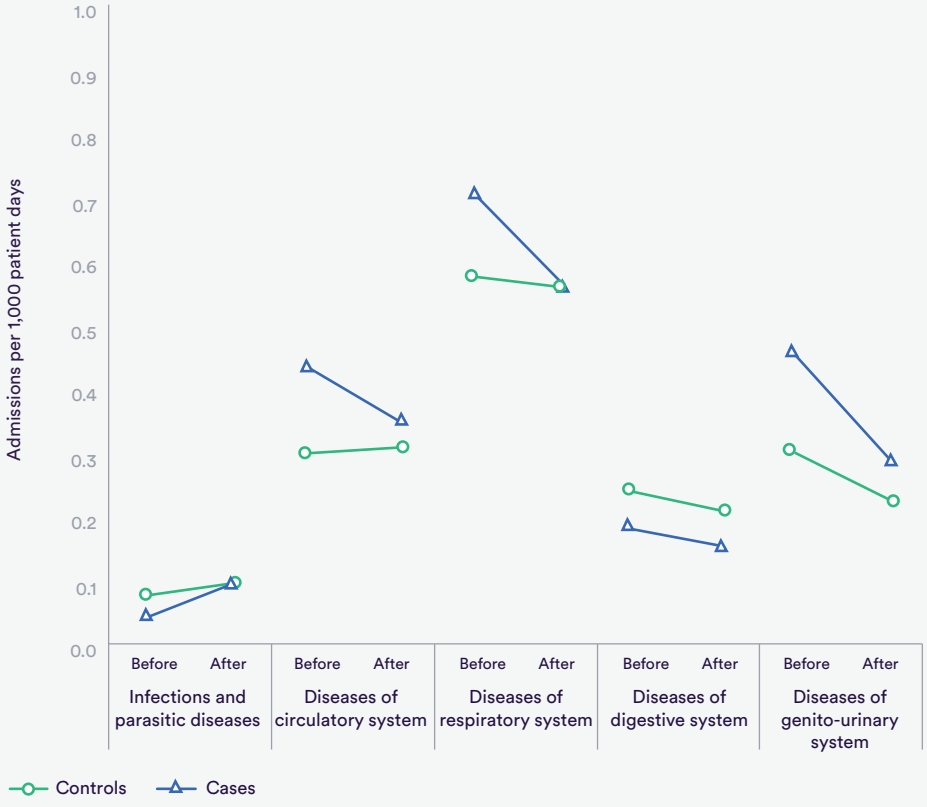
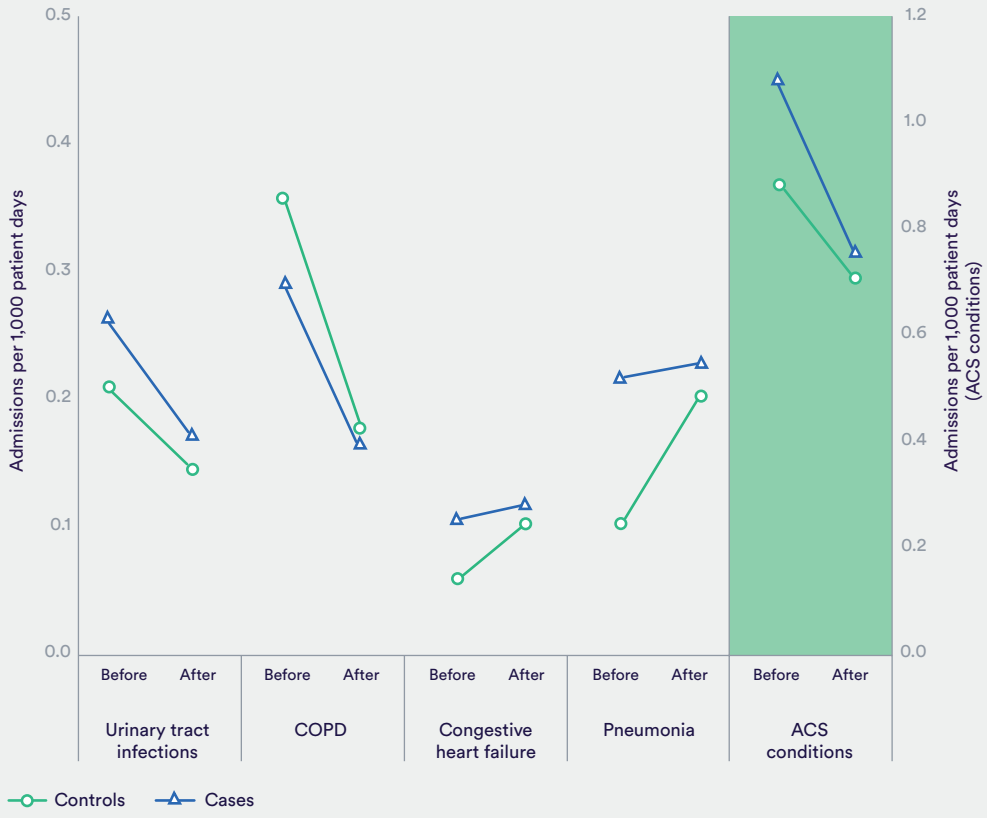


Table 5: Changes in emergency admission rates for ambulatory care sensitive (ACS) conditions and selected individual conditions among cases and controls, comparing 12 months before registration to after registration (first three months after registration excluded)

		Cases		Controls	
		Visits	Rate per 1000 person days	Visits	Rate per 1000 person days
ACS conditions	Before	157	1.07	131	0.88
	After	141	0.76	129	0.70
COPD	Before	44	0.30	53	0.36
	After	30	0.16	32	0.17
Congestive heart failure	Before	17	0.12	10	0.07
	After	23	0.12	18	0.10
Pneumonia	Before	33	0.22	15	0.10
	After	42	0.23	38	0.21
Urinary tract infections	Before	38	0.26	32	0.22
	After	32	0.17	26	0.14

Figure 6: Changes in emergency admission rates for ambulatory care sensitive (ACS) conditions (right-hand axis) and selected individual conditions (left-hand axis) among cases and controls – comparing 12 months before registration to after registration (first three months after registration excluded)



Analysis restricted to people with five or more conditions

We separately analysed outcomes for people with five or more conditions, as this would be the group who satisfied the original eligibility criteria. There were 96 matched pairs of cases and controls with five or more comorbidities at the time of registration, and their use of health care services is illustrated in Figure 7. Numbers registered on or after 1 October 2015, being only 25 individuals, are relatively small. There appears to be some deviation in emergency inpatient visits between cases and controls in later quarters, but numbers are too small and follow up too short to determine whether this represents the start of a persistent trend.

Figure 7: Quarterly primary and secondary care contacts before and after registration with Health 1000 (individuals with five or more comorbidities on registration to Health 1000)

Emergency inpatient lengths of stay and costs

To complement the analysis on numbers of visits to hospital, we also analysed changes in costs per visit and lengths of stay. Although we have observed no significant differences in numbers of emergency inpatient visits, we wanted to know whether there was any evidence that for Health 1000 patients they were intrinsically shorter or cheaper. The differences between cases and controls in terms of lengths of stay and costs per spell are shown in Table 6. The two periods of comparison are the 12 months before registration and the 12-month period between 3 and 15 months after registration.

After accounting for patient characteristics and comorbidities, the cases have longer lengths of emergency spells than the controls, both before and after registration, and lengths of stay increase within both groups. However, the increase among the cases is lower than among the controls.

Average costs for both cases and controls increase between the two periods, and there tend to be larger increases among the Health 1000 patients. However, after accounting for patient characteristics and comorbidities, there is no significant marginal change in cost per visit between the two groups.

Table 6: Length of stay and HRG tariff cost per emergency inpatient visit. Cases and controls in the 12 months before and three to 15 months after registration

	Period	Cases		Controls		p-value for marginal change
		Mean days (SE)		Mean days (SE)		
Length of stay	12 months before	7.4	(0.5)	6.3	(0.5)	0.49
	3 to 15 months after	8.8	(0.8)	6.8	(0.7)	
Cost	12 months before	£2,504	(£92)	£2,418	(£119)	0.10
	3 to 15 months after	£2,955	(£149)	£2,509	(£129)	

Use of services at end of life

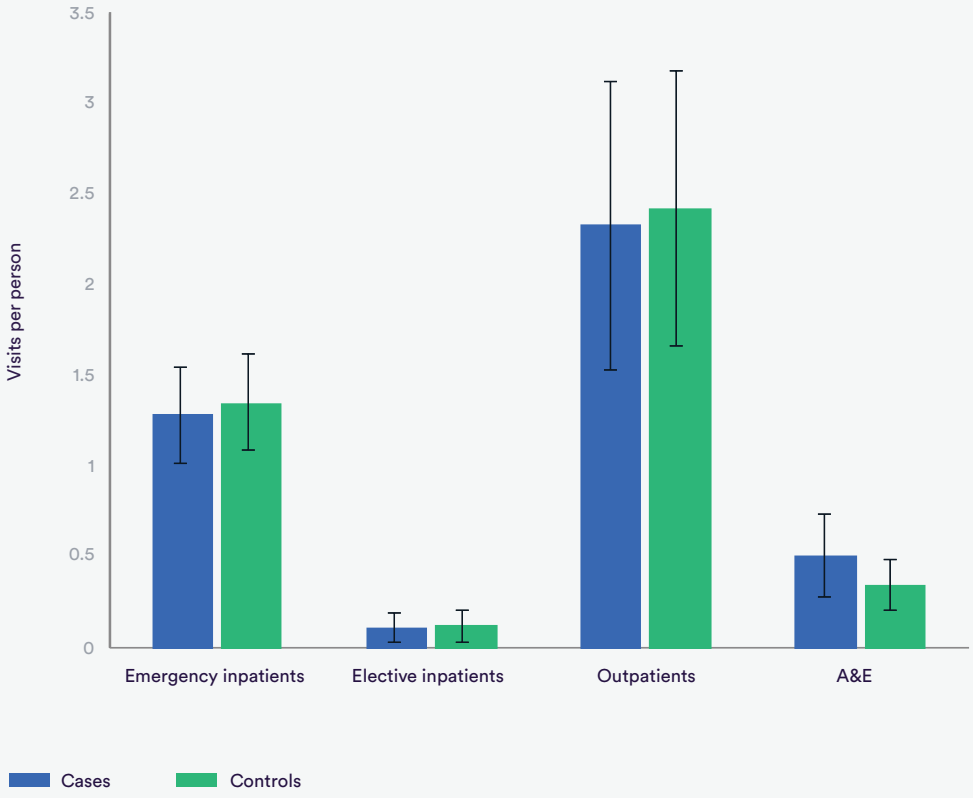
Excluding the first three months after registration, 71 (17.4%) people registered with Health 1000 have died. Exactly the same number of deaths were observed among the matched controls.

Differences between the cases and controls in the number of visits in the last three months of life are shown in Table 7 and Figure 8. None of these differences are statistically significant.

Table 7: Mean numbers of hospital visits in the last three months of life: differences between cases and controls

	Cases	Controls	p-value for difference
Emergency inpatient visits	1.28	1.35	0.70
Elective inpatient visits	0.11	0.13	0.83
A&E visits not followed by an admission	0.51	0.35	0.26
Outpatient appointments	2.33	2.42	0.57

Figure 8: Differences between case and control groups of numbers of visits in the last three months of life (error bars are 95% confidence intervals)



Impact on other services/wider economy

When we asked about the likely impact of Health 1000 on other services and the wider local health economy, two staff interviewees felt the number of patients enrolled in the Health 1000 service was too small to generate any perceptible effect on demand for GP services. A third interviewee said:

> "Primary care seems so stressed, it just feels other people fit into those slots so they're always overburdened."

However, a GP working at Health 1000 suggested there could be "mileage" in reducing pressure on general practice if the number of patients registered with Health 1000 was increased.

Although no staff members volunteered concrete evidence of this, one suggested that the programme was leading to the avoidance of some hospital admissions, another thought fewer outpatient appointments were being used for Health 1000 patients, and a third said there was less usage of out-of-hours services because of the out-of-hours phone line that Health 1000 operates.

When asked for their views about the impact of Health 1000 on the wider health system, the views of surveyed Health 1000 staff were again very different from staff working in primary care in the area but not employed by Health 1000, as can be seen in Table 8.

Table 8: Proportions of current Health 1000 staff and those working in primary care outside Health 1000 agreeing or strongly agreeing with the statements about the impact of the service

Statement	Current H1000 staff	Not working at H1000
Rates of attendance at A&E for complex patients have reduced since the new Health 1000 services opened	77% (7/9)	16% (8/49)
Complex patients' reliance on acute care services has reduced since the new Health 1000 services opened	77% (7/9)	14% (7/49)
Waiting times for services for complex patients have reduced since the new Health 1000 services opened	77% (7/9)	10% (5/49)
Patients now have to travel less far to access services since the new Health 1000 services opened	66% (6/9)	25% (12/48)
Patients using the new Health 1000 services get followed up more quickly since the new Health 1000 services opened	88% (8/9)	24% (12/49)
Patient experience has greatly improved since the new Health 1000 services opened	100% (9/9)	16% (8/49)
It is easier for all staff to access patient information since the new Health 1000 services opened	55% (5/9)	13% (6/48)
Inequalities in access to health care have reduced since the new Health 1000 services opened	55% (5/9)	10% (5/48)
Variance in access to care for complex patients has reduced since the new Health 1000 services opened	55% (5/9)	10% (5/49)
Variance in quality of care for complex patients has reduced since the new Health 1000 services opened	77% (7/9)	13% (6/48)

Although the numbers are small, perhaps unsurprisingly, staff employed at Health 1000 have more positive views of its impact. The reductions in hospital attendance reported by Health 1000 staff could well be the effects of regression to the mean discussed above.

For staff not employed by Health 1000, the number of respondents selecting the "don't know/not applicable" option for each statement ranged from 29% to 37% – again suggesting that a fair number of staff working in primary care outside Health 1000 may have little sense of the impact of the service.

Similarly, while 28% of primary care staff working in the area, but not employed by Health 1000, thought the creation of the service had addressed pressures facing the local health system very or quite well, 36% thought it had done so very or quite poorly, and 21% had no opinion.

The impact of Health 1000 on patient experiences of care

Patient satisfaction

The majority of patients interviewed were extremely satisfied with the service they were receiving. Patients highlighted the ethos (as described earlier), the friendly atmosphere, the attentiveness of clinical staff, the availability of GP appointments and the caring nature of the service.

Comments included:

> "Mum absolutely loves the new service – she feels listened to; she feels given time."
> (Carer)

> "Before, you weren't able to put a prescription in or there were so many ups and downs but now, you just phone and it will be done with Health 1000. With Health 1000, you feel you're a person not a number."
> (Patient)

> "Well I just get better treatment, and the doctors are much more attentive, they'll sit and listen to you, whatever you've got to say, and they do tend to help you. I find it really nice, I've got no complaint about it whatsoever."
> (Patient)

Of the patients expressing dissatisfaction, one felt that the level of service had deteriorated over the time they had been registered, as they had initially had a greater number of home visits from Health 1000 staff, and another felt that the quality of hospital care was poor and Health 1000 was unable to help when they were in hospital.

One suggested that increased access to physiotherapists would be helpful.

Three of the people we interviewed were both patients of Health 1000 and carers for their spouses, who were also registered with the service, and two interviewees were carers who were not registered with the service. Of those with a caring role, comments about the service included that Health 1000 GPs acted as advocates for them as carers as well as for the patients, that they were better supported and that the Health 1000 service had enabled them to "lead their own life more".

One carer, who herself had a disability meaning that she struggled to take her relative to the practice, said despite not being registered with the service herself, a Health 1000 GP had helped her by setting up home visits for the relative who was registered with the service, without even needing to be asked to do so.

Staff views of patient satisfaction

Staff reported that patients appeared on the whole to still be very satisfied with the service, despite the increase in the numbers of registered patients.

One staff member reported that only "two or three" patients out of the entire cohort had asked to be transferred back to their original GP practice. Another said scores in the Friends and Family Test had remained consistently high over the period since the interim report.

Staff felt Health 1000 had improved the quality of care patients were able to access. One staff member said of standard services: "Some of them, I suspect generally they were unable to serve them, they'd be unable to do some of the stuff we've done with them, that's without doubt because some of the stuff has been quite intensive with some of our patients. They would have been unable to respond so frequently and particularly out of hours, and they'd have been

unable to provide the continuity, particularly at weekends that some of them get. I think the hope was that because we're able to be responsive, we're able to nip things in the bud, give people confidence in staying at home with our service and also get better outcomes."

The main area where staff felt there could be potential for patients to be disappointed was around the impact of the higher numbers on the expectations of patients. One staff member spoke of expectations possibly being raised at the beginning of the scheme:

> "Maybe everybody spent quite a long time with patients and maybe they can't now because we have a lot more patients on the books, and the other thing is that I was under the expectation that people would be getting a lot more phone calls to see how they are. There are some patients who do expect more calls from us than we can offer them. I hope they will recognise that when they are really needing us that we do respond as soon as we can."

Another staff member in a clinical role noted a potential risk related to the way the model was operating in terms of staff calls to patients:

> "If patients don't contact us all the time then sometimes I think you get a bit lazy and say, 'well they haven't contacted us, so everything must be OK' – not a great approach but I guess that could happen."

Referrals into other services

Once again, interviewees reported using multiple services provided by Health 1000. In addition to the core GP service, six reported contact with Age UK, five said they or the person they cared for had received occupational therapy services, and four reported using physiotherapy and social care services.

Patients reported that Health 1000 staff were ensuring they received quicker access to services, including "chasing up" consultants and facilitating quicker access to adaptions and social care services:

> "We have had times when she has been on the waiting list for six or nine months for something simple, whereas with Health 1000 everything happens really pretty quickly."

Contacts with Age UK ranged from befriending services and invitations to lunch clubs and other social activities, to advice services and offers to sign up for cleaning services. There were mixed views about Age UK, with some patients praising them for their befriending services and dinner clubs, and for supporting them in obtaining support that they were entitled to:

> "I had a man come to see me and he put me in touch with a young girl, well I say young, she's in her 50s, I see her every Thursday, we go shopping and have coffee and all that sort of thing. She's really nice and we get on well together."

However, one carer found their services to be "very well meaning" but with long waiting lists, while a patient said she "couldn't see the point" when Age UK offered to take her shopping.

Home visits

It had initially been intended that greater access to home visits for patients would be a prominent feature of the scheme. However, early in the scheme Health 1000 managers had changed the approach so that patients who were able travelled to a central practice location, with taxi transport provided if required. One factor behind this switch was the logistical challenge of home visiting, which if provided universally would have seen staff spending large amounts of time travelling between patients. This shift was felt to have been accepted by the vast majority of patients. One clinician described the efficiency benefits in operating this approach, while acknowledging the benefit of home visits in relationship building:

> "Getting people into the surgery is actually sometimes very helpful because you can examine them better and you can get the bloods done, you could actually have a sort of one-stop shop if you can get them into the surgery. [Home visits] are very useful in maintaining the rapport with the patient."

Patients who were able to travel to the Health 1000 practice told us they were mostly unconcerned by being asked to do so, particularly as transport was provided for them. However, one patient expressed disappointment because they had not been visited at home recently.

Of those who were provided with home visits, this was highly valued:

> "They come home to you, that was the main thing, and that's lovely. I've been very ill and they've come home and they've really looked after us. It is a wonderful service, it feels private."

Impact on patient outcomes

Patients highlighted a range of improvements to their quality of care and quality of life, including:

- a perception that they now had better access to expertise about their conditions
- improved social care – especially quicker access to adaptions and better carer support
- better continuity of care
- more confidence in the advice they were given by health care staff
- appointments long enough to enable them to address multiple conditions
- more suitable medicine regimes as a result of the medicines reviews.

When asked about improvements to patients' quality of life, one staff member spoke of a patient who had been unable to get to his daughter's wedding and for whom staff had arranged the loan of a wheelchair at very short notice. The staff member said:

> "That can make a big difference to people and their wellbeing as well as their health, and that didn't really cost us anything, so there is something about being more proactive, but being able to react quickly."

In a similar vein, staff spoke of being able to arrange adaptations more quickly for patients under the Health 1000 approach.

Another perceived quality of life improvement was the reduction in outpatient referrals that were unnecessary and not helping patients, such as ensuring speech and language therapy referrals were not made for patients with Alzheimer's and for whom clinicians felt these would not be effective. Some staff also highlighted the benefit of enabling patients to live at home for longer, which could be particularly important for patients with forms of dementia, for whom the familiarity of their home setting was comforting.

Medicines management was viewed as an area where staff had been able to make significant improvements to clinical care. Several patients spoke of changes that the Health 1000 team had made to the care they were receiving after they were registered. Two-thirds of the patient/carer interviewees described that changes had been made to medication regimes, and four of these indicated that one or more drugs had been removed from their regime:

> "The Health 1000 GP was pretty concerned about this because apparently it was quite dangerous, this combination of drugs so she found an absolutely acceptable alternative"
> (Carer)

> "It was [Health 1000 GP] that has finally got my medication correct."
> (Patient)

> "I'm up and about a lot more – put it that way. Where I was getting confused with all the tablets that were in me and now I seem to be levelled out a little bit more."
> (Patient)

In addition, some staff reported that Health 1000 clinicians had been able to get some patients' clinical indicators for some conditions under better control than previously. For instance, one staff member said:

> "The GPs often talk about Mr Bloggs – his HbA1c has gone from 99 to 50 or whatever, and they are really pleased with themselves that they've done that. There have been a few stories like that, especially around diabetes, people taking more control of their health and changing their diets."

Another staff member described how Health 1000 was able to provide a follow-on occupational therapy service for patients post-admission to hospital that would not normally be available after discharge for patients using conventional services.

Care continuity

As demonstrated by the findings above, continuity of care was viewed as an important element of the scheme by both patients and staff. The vast majority of patients reported having a named GP and/or keyworker who knew them and provided a single point of contact. Patients and carers spoke of care at Health 1000 being more "joined up", of not having to repeat themselves and of staff knowing about their conditions.

Staff members referred to the importance of continuity within the Health 1000 ethos. One said ownership of the "whole journey" had been particularly beneficial in enabling Health 1000 staff to facilitate quicker discharges following hospital admissions. The same individual said:

> "Until somebody has actually taken complete responsibility for the care of these people, as long as we are continuing to pass off care as providers in the way that we do now, then I think we're doomed. What we need to be able to do is to dictate, and I really choose that word, somebody needs to dictate to the other providers what and how they are providing the service that supports the primary care service."

In terms of continuity with services outside Health 1000, one staff member mentioned that there could still be issues when attempting to access the GP records of new patients – an issue that had arisen during the research for the interim report.

The survey of staff both working and not working at Health 1000 asked whether they believed Health 1000 patients were experiencing better care in a series of categories. The results are shown in Table 9.

Table 9: Proportions of current Health 1000 staff and those working in primary care outside Health 1000 agreeing or strongly agreeing with the following statements:

Statement	Current H1000 staff	Not working at H1000
Complex patients are now better supported to manage their conditions	100% (9/9)	24% (12/49)
Complex patients are now better supported to stay out of hospital	88% (8/9)	27% (13/49)
Care provided to complex patients is now more joined up	100% (9/9)	24% (12/49)
The opening of Health 1000 has resulted in greater capacity being available within mainstream general practice for those without complex needs	55% (5/9)	20% (10/49)
The opening of Health 1000 has led to registered complex patients having to attend fewer outpatient appointments in secondary settings	77% (7/9)	16% (8/49)

For this set of questions, a relatively large proportion of the 49 respondents not working at Health 1000 said they neither agreed nor disagreed (ranging from 20-33% across the different questions), and "don't know/not applicable" responses ranged from 16-27%. This may reflect the extent to which any impact of the service is apparent to primary care staff working outside Health 1000.

The impact of Health 1000 on the experiences of staff

Similar to our findings during the first of phase of interviews, staff described working at Health 1000 as professionally rewarding, although occasionally challenging. One said:

> "I've enjoyed doing it. It is hard and can be quite emotionally draining at times, because you are dealing with often quite sick patients with lots of problems and frustrations of trying to get things – interventions for them has been difficult for me."

Further staff comments included that the Health 1000 team were "like a little family" and worked well together to support each other, and that the creation of a full-time practice manager role had led to better organisation.

Some staff members spoke of the more open approach to their work, which allowed them to adapt their skills to the role, but had in some cases taken some getting used to initially:

> "One of the things about working in a place where there's no rules almost is it's very difficult to come in and say 'what is my role here?', because we're working differently."

Several staff members praised the multidisciplinary team meetings as being particularly effective, and one attributed Health 1000's ability to operate more quickly on behalf of patients to this in particular:

> "You can get things done really quickly if you have got face-to-face discussion opportunities with colleagues."

Some staff who had broader skills and experience than might be expected in their roles reported being able to draw upon that experience in a way that might not have been possible in a more conventional service.

Discussion

Health 1000 was a new model of care dedicated to addressing the health and social care of patients with complex needs across. It aimed to improve quality of life through personalised care delivered by a clinically-led multidisciplinary team, focusing on prevention and early intervention.

We found no evidence that Health 1000 reduced the use of hospital services, including bed days and cost, but it is possible that there were not enough patients followed up for sufficient time to detect a significant change. However, the experiences and satisfaction of patient and staff were positive. A strong focus on staff engagement within the new service has achieved an ethos of delivering high-quality care within a supportive environment. The service was well liked by patients, and the holistic approach to management of complex patients addressed apparent unmet health and care needs. It is unclear what influence this apparent unmet need had on increased secondary care use and cost, and whether it counterbalanced any possible reductions due to patient management.

Patient-reported benefits included greater access and more tailored care. Staff valued the multidisciplinary working that enabled them to focus their efforts and share information. However, low engagement of local GPs not working within the scheme led to patient recruitment challenges, with only half the number originally planned being registered.

Strengths and weaknesses of the study

This is one few mixed methods evaluations of a patient-centred GP hub service targeted towards complex older people.

The quantitative outcomes from our study concentrated on the use of health care services. Other outcome measures such as wellbeing, mental and functional ability were not recorded for this study.

Our data matching produced a set of controls that match the Health 1000 patients well in many respects, although there are still signs that the cases may have had greater clinical needs before registration. This is borne out by higher numbers of previous outpatient visits and more comorbidities. Therefore, in our analysis we have been careful to additionally correct for these factors, although once numbers of previous emergency inpatient visits, combined risk scores and age have been taken into account, their influence is not strong.

Given the number of recruits and the length of follow up, the statistical power for detecting an impact on hospital visits is low, particularly for relatively uncommon events like emergency admission to hospital where the average attendance among these cohorts has been around one per person per year, and where many such attendances would be unaffected by the new service. This suggests that it could have been valuable to also analyse other measures where changes would have been more likely to be seen in the shorter term, such as wellbeing scores or HbA1c measures for diabetic patients. Some work had been done looking at changes in prescribing patterns, but the available primary care data made this difficult to interpret.

Because of the complexity of the information sought and the characteristics of the patient population, in-depth interviews were used. A significant number of common themes cropped up between interviewees, suggesting the interviews did provide an accurate and sufficiently detailed picture of patients' experience of using the service. However, not all patients were randomly selected. Because of low initial patient numbers and because of the severity of some patients' conditions, some interviewees during the first phase were selected by Health 1000. This could have introduced biases as those patients more amenable to interview could be more healthy or have a better relationship with staff.

Other studies

Because of the differences in health service environments and the many different ways of organising patient-centred services for older people, when reviewing other studies it is unclear we are comparing like with like. One systematic review focused specifically on services for older people (Low et al, 2011). Of the reviewed interventions, patient-centred case management generally had better outcomes than system-wide integrated care services, although most clearly in outcomes such as wellbeing, mental and functional ability.

Evidence of reduced risks of emergency hospital admission was variable. The one case-management study from the UK that was reviewed showed no impact on hospital service use (Gravelle et al, 2007). Another systematic review focused on studies relating the organisation of primary care and avoidable visits to hospital (Van Loenen at al, 2014). They found links between reduced hospital admissions and the availability of adequate primary care services, as well as long-term relationships between doctors and patients.

Implications

Finding ways to enable the wider local primary care community to share ownership of similar schemes in future is likely to be a significant factor in their success or failure. That said, we do not underestimate the difficulty of achieving high levels of engagement, particularly where the existing primary care workforce is dispersed and under significant pressure itself.

It was suggested that the incentives on GPs not to lose income have weakened the ability of models like Health 1000 to drive change. A similar argument may be made about the ability of these schemes to integrate with other elements of NHS provision where service delivery is split across multiple organisational structures.

It is possible that "wrap-around" services, which do not require a patient to de-register from their GP, might be able to avoid these perverse incentives. However, since Health 1000 was designed, the NHS landscape has begun to change in ways that could ultimately resolve some of these issues even with "carve-out" approaches. For instance, it will be interesting to see whether similar approaches can achieve more traction when they are deployed under accountable care system approaches, where some market-driven barriers to change may be absent.

This study identifies how a patient-centred primary and social care service can provide benefits for individuals with complex care needs. The benefits we find are generally in improved patient experience and access. It may have been too soon to detect an impact on use of hospital services.

Eligibility criteria for such services may have a large influence on recruitment and observed impact. If criteria are stringent then it could affect the number of individuals registered to such an extent that is not viable, and evaluation becomes difficult because of small sample sizes. Alternatively, relaxing criteria to bring in more patients for whom the marginal benefits of the service could be small. Also, for evaluation, where there is lower risk of an adverse outcome, individuals would need to be followed up for longer to see an effect.

Our findings raise questions about the relative value of services where patients are removed from existing GP lists and re-registered, and "wrap-around" services that are more within the control of patients' existing GPs. "Wrap-around" services could be a pragmatic solution to some of the recruitment problems, but may have fewer of the care continuity benefits. However, this needs to be viewed in the context of a changing primary care landscape, with an increasing focus on segmenting cohorts of patients with different needs (Rosen, 2018), and moves towards delivery that is more integrated across sectors.

References

Bardsley M, Blunt I, Davies S and Dixon J (2013) 'Is secondary preventive care improving? Observational study of 10-year trends in emergency admissions for conditions amenable to ambulatory care', *BMJ Open*, e002007.

Gravelle H, Dusheiko M, Sheaff R, Sargent P, Boaden R, Pickard S, Parker S and Roland M (2007) 'Impact of case management (Evercare) on frail elderly patients: controlled before and after analysis of quantitative outcome data', *BMJ*, 334: 31-4

Low L, Yap M and Brodaty H (2011) 'A systematic review of different models of home and community care services for older persons', *BMC Health Services Research*, 11:93.

King's Fund and others (2006) Combined predictive model.

NHS England (2015) Prime Minister's Challenge Fund: improving access to general practice.

Rosen R (2018) Divided we fall: getting the best out of general practice. Nuffield Trust.

Van Loenen T, van den Berg MJ, Westert GP and Faber MJ (2014) 'Organizational aspects of primary care related to avoidable hospitalisation: a systematic review', *Family practice*, 31: 502–516

Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J and Bonomi A (2001) 'Improving chronic illness care: translating evidence into action', *Health affairs,* 20: 64–78

Appendix 1: Key findings from the first phase of staff and patient interviews

The first phase of staff and patient interviews took place in 2015. This Appendix presents the key findings that were reported in an interim report that was presented to the commissioners in the same year.

Setting up the service and patient registration

- Within 12 months, Health 1000 has been successfully designed and implemented, with a high degree of attention being invested into designing a service from the patient perspective.
- Patient registration was slower than expected. Staff reflected that the only route to contacting eligible patients via the existing general practice has been challenging due to: low levels of engagement with GPs; GPs concerns over loss of income, and their ongoing relationship with the patients transferred to the new service. The service and BHR CCG are trying to address these issues.

Staff and patient experience

- The service has achieved a distinctive ethos to providing care. Patients felt this compared favourably with existing primary care, describing Health 1000 as personalised, friendly, positive and enthusiastic in their approach to care.

- Patients highlighted the value of the medication reviews, focus on quality of life, and care continuity in the service. Staff were positive about Health 1000's ability to lead to improvements in patients' outcomes.
- Staff felt that the multidisciplinary team was delivering a more co-ordinated and integrated service and higher quality care. However, Health 1000 staff felt that the relationships with other external providers could be improved to ensure patients are linked into other potential services available.

Points for future consideration

- The advantages and disadvantages of extending the patient groups eligible for Health 1000 need careful consideration. Accepting patients with only three long-term conditions may reduce the ability to deliver a service dedicated to complex patients, and reduce the ability of this evaluation to demonstrate an impact on hospital activity.

Appendix 2: List of ambulatory care sensitive conditions used in the study

Condition	ICD-10 codes
Acute ACS conditions	
Cellulitis	L03, L04, L08, L88, L980, L983
Dehydration	E86
Dental conditions	A690, K02-K06, K08, K098, K099, K12, K13
Ear, nose and throat infections	H66, H67, J02, J03, J06, J312
Gangrene	R02
Gastroentereritis	K522, K528, K529
Nutritional deficiencies	E40-E43, E55, E643
Pelvic inflammatory disease	N70, N73, N74
Perforated/bleeding ulcer	K250-K252, K254-K256, K260-K262, K264-K266, K270-K272, K274-K276, K280-K282, K284-K286
Urinary tract infection / Pyelonephritis	N10, N11, N12, N136, N390

Condition	ICD-10 codes
Chronic ACS conditions	
Angina	I20, I240, I248, I249
Asthma	J45, J46
Chronic obstructive pulmonary disease	J20, J41-J44, J47
Congestive heart failure	I110, I50, J81
Convulsions and epilepsy	G40, G41, O15, R56
Diabetes complications	E100-E108, E110-E118, E120-E128, E130-E138, E140-E148
Hypertension	I10, I119
Iron deficiency anaemia	D501,D508,D509
Vaccine preventable ACS conditions	
Influenza	J10, J11
Pneumonia	J13, J14, J153, J154, J157, J159, J168, J181, J188
Tuberculosis	A15, A16, A19
Other vaccine preventable	A35-A37, A80, B05, B06, B161, B169, B180, B181, B26, G000, M014

Appendix 3: Model results

Table A3.1: Emergency admissions

Parameter	Estimate	Standard Error	95% Confidence Limits		p-value
Intercept	-7.2012	0.1570	-7.5088	-6.8935	<.0001
Group (control = 0, case = 1)	-0.1865	0.1206	-0.4228	0.0498	0.1220
Presence of comorbidities					
Stroke	-0.2865	0.1407	-0.5623	-0.0108	0.0417
Heart failure	0.1760	0.1497	-0.1175	0.4695	0.2399
Diabetes	-0.0357	0.1286	-0.2877	0.2162	0.7811
Coronary heart disease	0.1325	0.1427	-0.1472	0.4123	0.3530
COPD	0.4141	0.1270	0.1651	0.6631	0.0011
Depression	0.0295	0.1329	-0.2309	0.2900	0.8241
Number of outpatient visits during 6 months before registration date	0.0607	0.0153	0.0306	0.0907	<.0001
Number of GP contacts during 6 months before registration date	0.0392	0.0045	0.0303	0.0481	<.0001

Table A3.2: Elective admissions

Parameter	Estimate	Standard Error	95% Confidence Limits		p-value
Intercept	-7.4782	0.1887	-7.8482	-7.1083	<.0001
Group (control = 0, case = 1)	0.0059	0.1632	-0.3141	0.3258	0.9714
Presence of comorbidities					
Stroke	0.2104	0.1616	-0.1062	0.5271	0.1928
Heart failure	-0.2077	0.1875	-0.5752	0.1598	0.2680
Diabetes	-0.1014	0.1497	-0.3948	0.1919	0.4979
Coronary heart disease	0.2882	0.1645	-0.0343	0.6107	0.0799
COPD	0.5086	0.1448	0.2247	0.7924	0.0004
Depression	0.1988	0.1513	-0.0978	0.4954	0.1890
Number of outpatient visits during 6 months before registration date	0.1012	0.0186	0.0647	0.1377	<.0001
Number of GP contacts during 6 months before registration date	-0.0043	0.0073	-0.0186	0.0099	0.5503

Table A3.3: A&E attendance not followed by an admission

Parameter	Estimate	Standard Error	95% Confidence Limits		p-value
Intercept	-6.9462	0.1858	-7.3103	-6.5822	<.0001
Group (control = 0, case = 1)	-0.2436	0.1313	-0.5009	0.0137	0.0635
Presence of comorbidities					
Stroke	-0.0048	0.1701	-0.3381	0.3285	0.9775
Heart failure	-0.2984	0.1465	-0.5856	-0.0112	0.0417
Diabetes	-0.2033	0.1834	-0.5627	0.1561	0.2676
Coronary heart disease	0.0659	0.1879	-0.3024	0.4343	0.7257
COPD	0.2064	0.1743	-0.1351	0.5480	0.2362
Depression	0.1795	0.1537	-0.1217	0.4808	0.2427
Number of outpatient visits during 6 months before registration date	0.0198	0.0188	-0.0170	0.0566	0.2908
Number of GP contacts during 6 months before registration date	0.0363	0.0079	0.0209	0.0518	<.0001

Table A3.4: Outpatient attendance

Parameter	Estimate	Standard Error	95% Confidence Limits		p-value
Intercept	-4.8018	0.1143	-5.0259	-4.5777	<.0001
Group (control = 0, case = 1)	-0.0605	0.0725	-0.2026	0.0815	0.4037
Presence of comorbidities					
Stroke	0.0290	0.0857	-0.1390	0.1970	0.7349
Heart failure	0.1530	0.0798	-0.0033	0.3094	0.0551
Diabetes	0.0310	0.0757	-0.1173	0.1793	0.6821
Coronary heart disease	0.2088	0.0806	0.0508	0.3668	0.0096
COPD	0.1187	0.0787	-0.0356	0.2730	0.1315
Depression	0.1311	0.0732	-0.0124	0.2747	0.0733
Number of outpatient visits during 6 months before registration date	0.1004	0.0064	0.0878	0.1131	<.0001
Number of GP contacts during 6 months before registration date	0.0074	0.0031	0.0014	0.0135	0.0165

Table A3.5: GP contacts

Parameter	Estimate	Standard Error	95% Confidence Limits		p-value
Intercept	-2.9413	0.0451	-3.0297	-2.8528	<.0001
Group (control = 0, case = 1)	0.5142	0.0330	0.4495	0.5789	<.0001
Presence of comorbidities					
Stroke	-0.0328	0.0328	-0.0971	0.0315	0.3173
Heart failure	0.0857	0.0368	0.0136	0.1578	0.0199
Diabetes	0.0732	0.0340	0.0066	0.1397	0.0313
Coronary heart disease	0.0245	0.0371	-0.0483	0.0972	0.5102
COPD	0.0154	0.0339	-0.0511	0.0818	0.6506
Depression	-0.0085	0.0335	-0.0742	0.0571	0.7991
Number of outpatient visits during 6 months before registration date	0.0058	0.0030	-0.0001	0.0117	0.0543
Number of GP contacts during 6 months before registration date	0.0277	0.0013	0.0251	0.0304	<.0001

Table A3.6: Emergency admissions for ambulatory care sensitive (ACS) conditions

Parameter	Estimate	Standard Error	95% Confidence Limits		p-value
Intercept	-8.8687	0.2293	-9.3180	-8.4193	<.0001
Group (control = 0, case = 1)	-0.2027	0.1763	-0.5482	0.1429	0.2503
Presence of comorbidities					
Stroke	-0.0565	0.1845	-0.4181	0.3050	0.7593
Heart failure	0.4528	0.2000	0.0607	0.8449	0.0236
Diabetes	0.0349	0.1694	-0.2972	0.3670	0.8367
Coronary heart disease	-0.2188	0.1972	-0.6053	0.1676	0.2671
COPD	0.6233	0.1742	0.2819	0.9646	0.0003
Depression	0.1684	0.1754	-0.1754	0.5121	0.3371
Number of ACS admissions during 6 months before registration date	0.4755	0.0657	0.3467	0.6044	<.0001
Number of outpatient visits during 6 months before registration date	0.0460	0.0143	0.0180	0.0740	0.0013
Number of GP contacts during 6 months before registration date	0.0473	0.0061	0.0355	0.0592	<.0001

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