



Centre for Health Services Studies

University of Surrey and University of Kent

Primary Care Strategic Workforce Planning Programme

Main report

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2. Main Recommendations

This section indicates what the authors consider to be their primary recommendations from the Evidence Scoping, Horizon Scanning, Work Force Modelling and Education components of the study. The report itself will contain supplementary advice in the relevant sections.

2.1 Evidence Scoping

Recommendation	Practical actions to address recommendation
Integrate lay health workers into the workforce, particularly in areas with significant deprivation. Section 4.1 (page 11), reference (18). Section 4.2 (pages 11-12), references (23, 27). Section 4.4 (page 14), reference (46).	<ul style="list-style-type: none"> ● Map across STP footprints the numbers and range of LHW: <ul style="list-style-type: none"> ○ What roles do they have (e.g. Self-management/peer support? Leading self-management programmes? Care navigation?) ○ Which groups are they working with (e.g. Older people? Disadvantaged groups? Young people? Specific disease/condition groups?) ○ What is the geographical spread – how does it fit with deprivation levels? ● Explore examples of best practice and local innovation (e.g. Encompass Vanguard Social Prescribing project) ● Needs analysis <ul style="list-style-type: none"> ○ Where do LHW numbers and roles need expanding? ○ Could generic training be provided more efficiently? ○ Could CEPNs provide supportive network to anchor LHWs and enhance retention? ● Explore the need for an associated programme to increase health professional acceptance and trust; e.g. integrate some LHW training into existing professional education programmes

<p>Integrate self-management support into routine care for people with LTCs, including support for psychological aspects of living with and managing LTCs. Section 4.2 (page 11-12), references (23, 26, 27, 29, 30, 31)</p>	<ul style="list-style-type: none"> • Train all health and community workers in awareness of psychological aspects of living with and managing LTCs. • Train all health and community workers in awareness of barriers to health behaviour change and how to address these. • Ensure all health and community workers have access to <i>ongoing</i> training and supervision in supporting people with LTCs. • Develop care pathways to meet the psychological support needs of people with LTCs across the disease trajectory (rather than limiting psychological care to treatment of mental health conditions). • Ensure that electronic data systems are designed to identify patients with psychological support needs in relation to chronic illness and to monitor treatment outcomes (including changes in self-management and health behaviour). • Expand the NHS skill mix to include health psychology and draw on this expertise to enhance the provision of theory-driven evidence-based interventions. • Introduce systems to ensure that patients are involved in decision making and care planning.
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2.2 Horizon Scan

Recommendation	Actions
<p>We recommend forming an independent regional resource or organisation to undertake whole-system (public, private, voluntary) care workforce modelling including testing of alternative working arrangements, the impact of rate-limiting influences in the workforce such as placements and enrolment quota, how technologies alter care work, and how knowledge and skills change over time.</p>	<ul style="list-style-type: none"> • Prepare “position paper” outlining the role, outcomes and benefits and to provide the evidence base underpinning its objectives, including costing the recommendation. • Invite all stakeholders to a round-table discussion to consider how to implement this recommendation.

2.3 Workforce Modelling

Recommendation	Actions
<p>A consortia of GPs should be encouraged and grown. The participators would share data in</p>	<ul style="list-style-type: none"> • Incentivise/encourage GPs to join a network.

order to facilitate real-world evidence research (e.g. risk modelling and collection of routine data). Section 6.2 (page 27) Section 6.3 (page 27)	<ul style="list-style-type: none"> • Advertise through CCGs and provide links to research on potential benefits
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2.4 Education

Recommendation	Actions
Cultural shift in how training is delivered by educational providers. This includes reform in methods, content of programmes and in the competencies they address. Sections 7.2, 7.3 (pages 34-35)	<ul style="list-style-type: none"> • Invite expressions of interest/ proposals to design curriculum fit for the future. Include generalist competencies amongst apprentices and other new types of workforce.
To move toward the type of practitioner likely to be needed in 2030, explore options for a shared foundation year across all regulated health and care professions Section 7.5.1 (page 36)	<ul style="list-style-type: none"> • Collective national or local action options appraisal with progressive universities.

3. Project design

The project comprised 4 work packages that were conducted over 12 months. The project was informed throughout by a service user reference group who met 3 times over the course of the project. The overall design is illustrated in figure 1. Over 46 stakeholders contributed to the project; the sample of contributors is shown in table 1. A summary of the methods used in each work package is presented in this section; a more detailed account of the methodology is presented within each technical report.

1.1 Evidence scoping and policy analysis

Published literature and policy documents were searched from 2002-2015. For self-management and community engagement a review of systematic reviews was conducted, supplemented by exemplars of practice. A systematic mapping of the literature and relevant policy was conducted for Access to Care. Grey literature was included within the evidence on Technology and was organised through a framework approach. The findings from each review were then mapped onto a framework for considering both positive and negative impacts of anticipated changes to the nature and organisation of healthcare work [1], [2], [3].

A policy review was also undertaken to identify enablers and potential barriers to changes in respective healthcare professionals' roles. The policy analysis was conducted using a modified PESTEL framework as an analytical tool [4], [5] informed by categorical content analysis [6]. As a systematic and detailed SWOT framework, PESTEL analyses the Political, Economic, Social, Technical, Environmental, and Legal aspects of a phenomenon. In this instance, we substituted the legal domain with Organisational Workforce Development and Environmental impacts resulting in a PESTOE framework.

A desk top review of the Prime Ministers General Practice Access Fund, formerly known as the Prime Minister's Challenge Fund was conducted in March 2016. Fifty seven wave 1 and 2 pilots were screened to identify those that were relevance to the project and had useful information and innovative ideas relating to workforce challenges. This was followed by a review of the First Evaluation Report for Wave One published in October 2015, focusing on key messages relating to technology and workforce.

3.1 Horizon scanning

The Horizon scanning work package was conducted in 4 phases:

- i. Modified Delphi technique (7) workshop with South Kent Coast CCG & provider organisations. 32 participants were asked to choose “yes” or “no” from 60 statements. These statements on future care provision were developed from the evidence scoping and policy analysis. The participants were then asked to rank the top 17 statements identified as likely to be true. This was used as a basis for a discussion to develop a future model of care.
- ii. Thanet CCG & provider organisations were asked to rank 29 statements using Survey Monkey, producing a short list of 16 statements deemed likely true. A workshop was held with 16 participants asked to rank the statements, producing a final list of 5 statements which were used as a basis for discussion to further develop a future model of care.
- iii. Workshop which included Sussex, Surrey & Kent CCGs, provider organisations & HEKSS involved 22 participants. The models of care were presented and further refined through consensus. A typology of the future patient was developed through interactive discussion.
- iv. Validation: the refined model of service provision and typology of the future patient was presented at a 4th workshop with South Kent Coast CCG. The workshop outcomes and findings from the evidence and policy analysis were discussed with 30 stakeholders from Surrey CCGs and provider organisations stakeholders in one to one interviews.

3.2 Workforce modelling

A systems dynamics methodology was used to model the healthcare economies in the nine participating CCGs both in the supply (workforce-specific) and the demand of services (population-specific) [8]. The GP Workforce Tool provided baseline data consisting of FTEs together with age-sex profiles. The Office of National Statistics population projections were utilised to capture the growth of the demand on services. Important system information not present in these data sources (for example, productivity) were found elsewhere in Royal College of GPs, Centre for Workforce Intelligence and the Health and Social Care Information Centre publications

A global model was designed and verified in this methodology. By iterating the model forward in time from baseline (present) into the future, the growth of demand and the burden it places on the supply of services is modelled.

The Systems Dynamics methodology allowed us to explore the effects of changes in system drivers (for example, changes in recruitment rates, or the roll-out of technological innovation across the population). In this way we were able to explore “what-if” scenarios and to come to understand the effect of potential policy changes or changes in working practices on the balance between supply and demand of services.

3.3 Education and training needs

A desk top review of the Prime Ministers General Practice Access Fund, formerly known as the Prime Minister's Challenge Fund was conducted in March 2016. Fifty seven wave 1 and 2 pilots were screened to identify those that were relevance to the project and had useful information and innovative ideas relating to workforce challenges. This was followed by a review of the First Evaluation Report for Wave One published in October 2015, focusing on key messages relating to technology and workforce. Findings from the desk top review and the horizon scan workshops outcomes were used as a basis for one to one interviews with 30 stakeholders from Surrey CCGs and provider organisations stakeholders.

A summative workshop was held with 38 attendees from a range of stakeholder organisations including HEKSS, Kent and Surrey CCG's, community providers, HEIs (Surrey, Kent, Canterbury Christchurch), general practice (including trainees and tutors), nursing, pharmacists, AHPs, the LMC, and primary care workforce tutors. The focus of the workshop was to identify what the primary care practitioner of the future should look like and what their educational needs would be.

Findings from the previous work packages were synthesised and presented to facilitate small group discussion. Through a plenary, consensus was sought on basic principles to underpin future education and training.

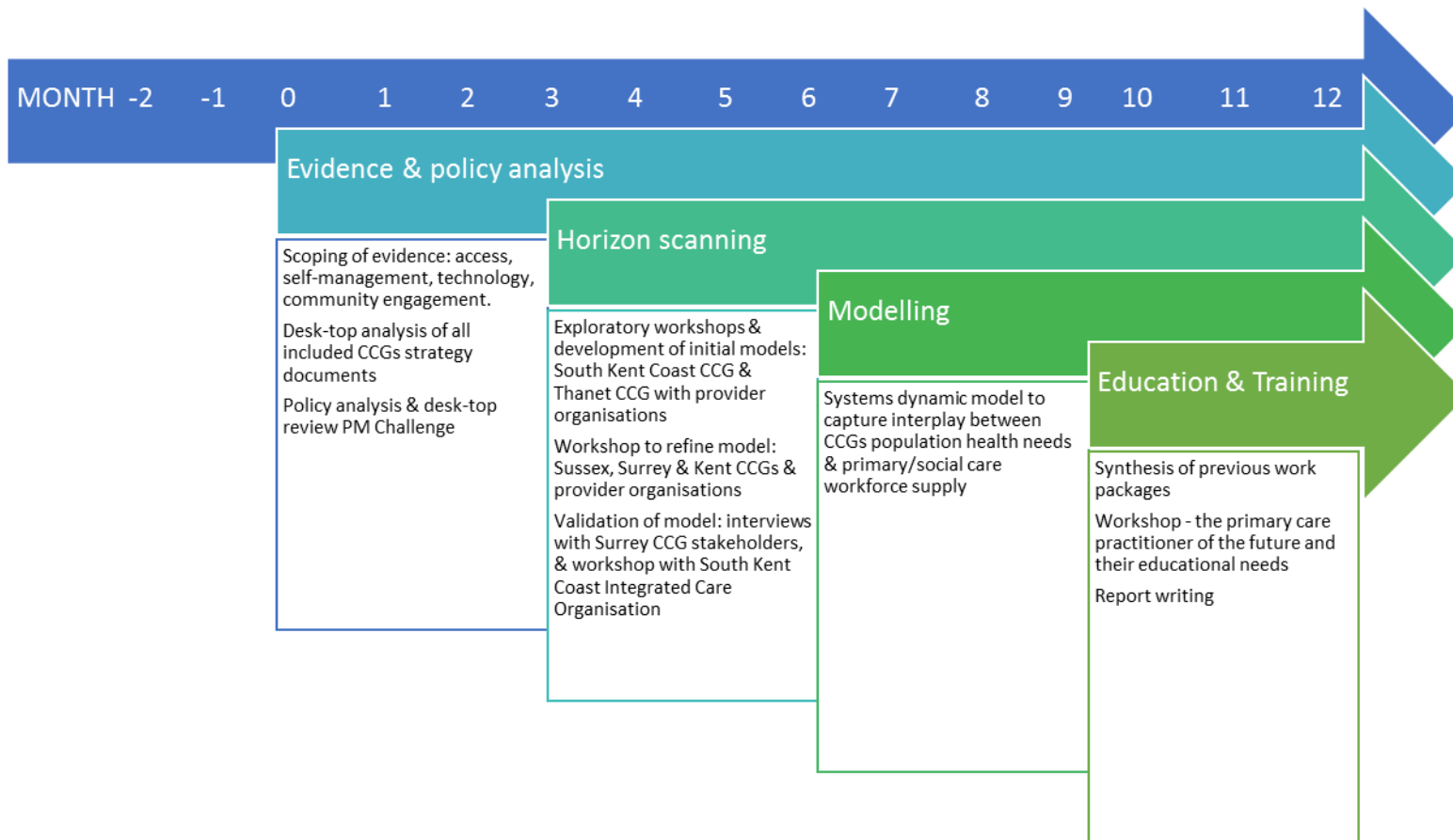


Figure 1. Project design & work packages

STAKEHOLDER ORGANISATIONS	EVIDENCE & POLICY ANALYSIS CCG STRATEGY DOCUMENTS	HORIZON SCANNING	MODELLING	EDUCATION & TRAINING
ASHFORD AND CANTERBURY CCG				✓
HASTINGS AND ROTHER CCG	✓	*	✓	✓
EAST SURREY CCG				✓
SURREY DOWNS CCG				✓
CRAWLEY & MID SUSSEX CCG				✓
HORSHAM AND MID SUSSEX CCG	✓	*	✓	
GUILDFORD AND WAVERLEY CCG	✓	✓	✓	✓
NORTH KENT CCG				✓
NORTH WEST SURREY CCG	✓	✓	✓	✓
SOUTH KENT COAST CCG	✓	✓	✓	✓
SURREY HEATH CCG	✓			✓
THANET CCG	✓	✓	✓	✓
WEST KENT CCG	✓	✓	✓	✓
AGE CONCERN		✓		
AGE UK		✓		
BOOTS PHARMACY		✓		
CANTERBURY UNIVERSITY				✓
CARERS SUPPORT		✓		
CENTRE FOR WORKFORCE INTELLIGENCE		✓		
COURTS PHARMACY GROUP		✓		
CROSSROADS		✓		
DOMICILIARY PROVIDERS		✓		
EAST KENT HOSPITALS UNIVERSITY NHS FOUNDATION TRUST		✓		✓

ENGLAND CENTRE FOR PRACTICE DEVELOPMENT		✓		
FAMILY MOSAIC		✓		
FIRST COMMUNITY HEALTHCARE TRUST				✓
FRIMLEY HEALTH FOUNDATION TRUST				✓
GENERAL PRACTITIONERS		✓	✓	✓
GRACE PHARMACY		✓		
HEALTH EDUCATION ENGLAND		✓		
HEALTH EDUCATION ENGLAND, KENT SURREY AND SUSSEX		✓	✓	✓
KENT AND MEDWAY NHS AND SOCIAL CARE PARTNERSHIP TRUST		✓		
KENT COMMUNITY HEALTH NHS FOUNDATION TRUST		✓	✓	✓
KENT COUNTY COUNCIL		✓	✓	✓
KENT LOCAL MEDICAL COMMITTEE				✓
KENT SURREY SUSSEX AHSN		✓		
NHS ENGLAND SOUTH				✓
PAYDENS PHARMACY		✓		
ROMNEY MARSH DAY CENTRE		✓		
ROYAL SURREY COUNTY HOSPITAL NHS TRUST				✓
SOCIAL ENTERPRISE KENT		✓		
SOUTH EAST COAST AMBULANCE SERVICE		✓		✓
SURREY COUNTY COUNCIL		✓		✓
TURNING POINT		✓		
UNIVERSITY OF KENT				✓
UNIVERSITY OF SURREY				✓
Table 1. Contact with Stakeholders.				

4. Evidence scoping

A scoping of the current evidence in four topic areas was undertaken. The topic areas were identified as being key influences on future service delivery models. These were:

1. **Access to primary and community care.** The demand for more rapid access to care is partly shaped by public expectation. However, demand is also significantly led by need; an aging population with associated multi-morbidities and complex needs.
2. **Self-management.** Long term conditions will continue to be a major feature of future morbidity patterns. Self-management of these conditions by service users and families will be an essential part of care and the shift towards patient autonomy.
3. **Technology.** Technology will support self-management, transform future service delivery models and change the way work is done.
4. **Community engagement.** The three preceding topics require an active dialogue between recipients, providers and commissioners of service delivery models, and an activated community who co-produce future service delivery models.

The full report of the evidence scoping can be found in Technical Report 5. In Box 1 we highlight clear areas of evidence, where there is insufficient evidence and where the evidence suggests ineffective approaches. It must be noted that as we did not undertake a systematic review we are unable to provide definitive answers to cost effectiveness. We then present a summary of the key findings and then conclude on the implications for the future workforce. As described in the methodology, we drew on a framework for considering both positive and negative impacts of anticipated changes highlighted by the evidence scoping.

The evidence supports:

- Delivering healthcare in community-based settings
- Adding-on services (such as counselling, immunisation) to existing services
- Improving access to GP appointments to reduce demand on urgent care
- Redistributing/substituting work between different professionals as an effective way of reducing cost, while at the same time maintaining quality and effectiveness of care.
- The use of lay health workers with lower income communities to improve access to care.
- Effectiveness of physician associates to increase access to primary care.
- Effectiveness of self-management programmes for improving patients' confidence in their ability to live with and manage their long-term condition
- Closer integration between primary care and mental health services to improve self-management.
- Tailored coaching using a patient activation approach to build skills, motivation and confidence.
- Technologies replacing some roles resulting in tasks being shared across different grades or more staff being free to complete other duties.
- Telehealth interventions in chronic heart failure, COPD, hypertension, diabetes and asthma.
- Telemonitoring in long term conditions.
- Electronic health records improving healthcare quality by boosting time efficiencies, adherence to guidance, and reducing errors in medicine management.
- Cost effectiveness of peer delivered community engagement interventions
- Community engagement interventions co-designed with the community
- Short and intensive community engagement interventions

At present there is insufficient evidence to support/indicate:

- Co-location of services
- Which models of integrated care work best
- Cost effectiveness of self-management programmes
- Which particular approach to psychological care and support of self-management is most cost effective.

- Which particular health technology skills the workforce need.
 - Which type of technology is most effective in self-management.
 - The effectiveness of mobile apps in improving health outcomes.
- It is unlikely that the following will be effective:**
- Shared decision making without organisational support such as longer consultations, staff training, embedding of shared decision making tools.
 - Telecare in reducing carer's quality of life or reducing burden.

Box 1. Summary of evidence.

4.1 Access to primary and community care

Changes in service provision have yet to show impact on access to primary care but show promise [9], [10]. An integrated organisation containing a wide range of services and above all, primary care services, is more likely to lead to coordination and continuity of care rather than coordination through a care network. However, successful integration requires clear definitions and robust data for non-GP community services [11]. There is mixed evidence on the impact of co-located services; while it enhances team working it can paradoxically lead to fragmentation of services [12]. There is evidence that capacity can be increased through developing existing services, particularly through a flexible care network structure [13]. Add-on services such as immunisation programmes being delivered in family planning services can improve utilisation and outcomes of healthcare delivery.

Clinical outcomes for patients receiving equivalent healthcare in community-based settings was as good as or better than those delivered in the acute hospital-based setting [14]. However, there is evidence that there are some increased associated risks. The demand for access to urgent care is often influenced by systems organisation. Service users face challenges in navigating local urgent care services and to access care in the way they would wish, and there is a correlation between the ease of obtaining convenient GP appointments and reduction in A&E visits [15].

Redistributing long term condition management between nurses and physicians can maintain quality of care with potential cost reduction [16]. There is also evidence supporting the development of new roles such as physicians' associates to increase access for same day care with positive outcomes [17]. However, service users and health care professionals have mixed responses to new emerging lay health worker roles. There is evidence that the use of lay health workers with lower income communities leads to positive health outcomes [18]

4.2 Self-management

Self-management education programmes delivered by trained facilitators have the potential to improve patients' confidence in their ability to live with and manage their condition. There is no evidence as yet to demonstrate that self-management programmes reduce costs to the health service [19]. Benefits for psychosocial functioning may not always be effectively captured; the outcome assessment needs to be carefully considered. Positive outcomes of self-management programmes are more evident for some conditions (such as asthma and diabetes) than for others (such as arthritis and back pain), although this may reflect differences in the focus of interventions across conditions [20].

Health professional / lay facilitators need to be trained to provide self-management support in accordance with a validated model and have the opportunity to develop skills through experience, self-evaluation and reflection [21]. The concept of self-efficacy is as relevant to training facilitators (to develop confidence in delivering self-management programmes) as it is to helping patients manage their long-term condition. It is likely that organisational-level changes will be necessary for improvements in patient self-efficacy to translate into appropriate resource utilisation [22]. Developing closer links between primary care and user organisations has the potential to facilitate access to advice and support and improve information sharing between clinicians and patients. Poor uptake of programmes is a common problem and overcoming the barriers of clashes with work schedules and family commitments, lack of transportation, and expensive dietary changes should be prioritised [22].

While both health professionals and lay facilitators can be trained to model 'technical' aspects of self-management (e.g. monitoring symptoms, taking medications), lay facilitators are uniquely placed to model psychosocial aspects of self-management (e.g. coping and everyday life functioning). Nevertheless, all staff providing care for people with long term conditions (LTCs) should be aware of the psychological implications of living with and managing chronic

illness and the role of psychological support in facilitating self-management [23]. Ongoing training and supervision of staff delivering psychological care will be critical for supporting competent practice [24].

It is important that systems (e.g. electronic patient databases) are designed to identify patients with psychological support needs in relation to chronic illness and monitor treatment outcomes (including changes in self-management and health behaviour [25]). It is also important that psychological care is not limited to assessment and treatment of mental health conditions and that patients are able to access support in relation to challenges faced across the disease trajectory (such as receiving a diagnosis, coping with symptoms and treatment regimens, adjusting to impacts of illness on lifestyles, relationships and mood) [26].

Health professionals need to be trained to facilitate shared decision making (SDM) and to support changes in health behaviour resulting from the SDM process. Health trainers can also play an important role in supporting health behaviour change [27]. Limited time in consultations, overspecialisation of doctors, poor continuity of care and lack of incentive for clinicians undertaking SDM have been reported as barriers to patient involvement [28]. Greater patient involvement could be achieved by distributing the SDM process between different clinicians (including doctors, nurses and health trainers), embedding patient decision aids within routine practice and making changes to clinical information systems to streamline recording and reviewing of SDM discussions and plans [29], [30].

Self-management support is commonly multi-component involving a range of interventions delivered to patients and/or health and social care professionals [22]. Self-management support is inseparable from high quality care for people with LTCs. Research indicates that effective self-management support is tailored to the individual's level of knowledge, skills, motivation and confidence. Health professionals need to be provided with time and resources to implement self-management support. It is also important that organisations evaluate self-management process and outcomes and provide positive reinforcement for those providing high quality self-management support [22].

Training in the use of Patient Activation Measures could help professionals tailor support to the patient's level of activation and evaluate the impact of self-management support provided within clinical practice [27]. Other staff (e.g. medical assistants and coaches) could be employed to provide more targeted support for patients with low activation levels. Adding health psychology to the NHS skill mix has the potential to increase psychological awareness in the healthcare workforce and enhance the provision of theory-driven evidence-based interventions [31].

4.3 Technology

Digital technology enables people to have access to information that previously was only available to professionals, and it enables expertise to be coded into machines that use that knowledge. The former impact alters how work is done and the latter impact embeds knowledge into things that people who may not have specific expertise can use, such as medical devices, algorithms, and into environments (e.g. Homes, schools) where these environments enable monitoring of health conditions. Importantly for workforce development and planning for health professions, technology alters clinical workflow, enables smarter technologies to be used within clinical workflow, shifts expertise toward patients, and shifts expertise to other health professionals and to less formal care providers [32].

Studies looking at how effective telehealth are mixed [33], [34], [35] however, there is some evidence of effectiveness in: reducing patient mortality and hospital admissions for chronic heart failure, reducing hospital admissions for COPD, reducing blood pressure in hypertension, improving glycaemic control in diabetes and reducing symptoms in asthma by encouraging self-management, helping those with diabetes to better manage their condition. There is also mixed evidence showing the cost effectiveness of telehealth. Some evidence has suggested that telecare can help relieve the effect of stress on carers of those with social care needs and improve caregiver outcomes, but there was little evidence to suggest that it increases the carer's quality of life or reduces burden. There are many benefits of mobile apps and many available, but more evidence of their effectiveness is required [36], [37], [38].

There is little evidence about what health technology skills the workforce needs; some recommended skills include, strong leadership, involvement of local champions, and excellent communication and co-ordination skills [39]. Key skills for future leaders include: managing and triaging large caseloads, making data-led decisions, developing and following assessment and treatment protocols, communicating and sharing relevant data across interdisciplinary teams, and how to choose and evaluate the most appropriate technologies [39]. There is no consensus on how to develop workforce skills relevant for telehealth; however, there are plans to use Code 4 Health to help support health

and care professionals and carers learn how to develop apps and digital services (30). The evidence indicates that training should be easily accessible, linked to development opportunities, and regularly updated. Skills in technology should be included in competency frameworks and regularly assessed [40], [41]. It is key to develop other staff members, or bring people into the workforce with skills in how to manage data, to enable integration and interoperability between devices and the organisation, tailor it to health and social care ways of working, and set up high confidentiality standards [42].

Some barriers to staff dealing with implementing telemonitoring include: selecting appropriate patients for remote monitoring, becoming comfortable with changing working practice without feeling threatened that technology might replace them or threaten their core identity, and working so they, and the patient understands how to use the monitoring devices [43].

Findings suggested that helping patients to gain confidence using technologies and by emphasising the benefits and addressing concerns about telehealth, interest could be increased [36]. Patient's technological literacy and/or age may impact adoption [37]. However, further work is required to better understand key users of digital technologies, and further research is required to find out what they want from information and services, or uptake patterns [43], [44], [45].

4.4 Community Engagement

There is good evidence that public health interventions using community engagement strategies for disadvantaged groups are effective in terms of health behaviours, health consequences, self-efficacy and perceived social support.

Community engagement has a positive impact on a range of health outcomes over a range of conditions. Key messages are that single component interventions tend to be more effective than multiple components, and universal interventions tend to have a higher effect size for health behaviour outcomes than targeted interventions [46], [47]. Short and intensive interventions appear to work best, with community engagement happening as early as possible [48]. Interventions conducted in non-community settings tended to be more effective than those in community settings for health behaviour outcomes [47]. The organisation may need to ensure that such settings are available and accessible for community-centred approaches [49], [50], [51], [52], [53].

Interventions involving peers, community members, or education professionals tend to be more effective than those involving health professionals [46]. The focus should therefore be in enabling members of the community to deliver interventions. Furthermore, peer interventions tend to have a larger effect than interventions based on empowerment or patient involvement. It is suggested that this is because peer delivered interventions tend to be short and intensive and that this is probably the confounding factor [46]. Community-designed or delivered interventions were also more acceptable because of their cultural relevance, and had a positive impact on the intervention outcomes. Specific, comprehensive and ongoing training of peers or lay deliverers of the intervention is also an important contribution to the intervention's success.

There appears sufficient evidence to conclude that peer/lay, collaborative and empowerment models are probably cost-effective. However, further cost-effectiveness studies are required [47].

Barriers to community engagement include having a poor history of relationships between communities and engaging organisations, a lack of organisational commitment, a lack of investment, time and clear goals for engagement, a dearth of appropriate skills for engagement in both the organisation and community, difficulties in reaching seldom-heard communities, and a lack of awareness and understanding of engagement processes [54].

Staff require skills in building relationships with communities and enhancing mutual trust; time and training are needed for this process. Staff's awareness of the purpose and goals of community engagement need to be enhanced, and assumptions about which groups and communities have capacity to be engaged need challenging [53], [54], [55], [56], [57].

Organisational priorities need to be balanced with those of the community [58], [59]. The organisation needs to provide infrastructure and resources for community engagement activities. Bureaucracy for community members should be reduced as much as possible, [58], [60]. Where representatives of a community are required, selection needs to be transparent and be undertaken in collaboration with the community [61].

4.5 What are the implications for future work?

A wider range of staff will be required for future work. They will need a broader set of generic competencies including enhanced decision-making skills. They will be working within a changed context where the gatekeeping role has been dispersed, and the relationship between professional, “non-professionals” and the public has changed. Future skills will be framed by patient and population needs rather than traditional professional boundaries.

Much of the future work will focus on facilitating self-management. The evidence review indicated that new emerging roles are safe and to some extent meet demands created by increasing long term condition morbidities. Developing a clearer focus on self-management and community engagement may increase work demand initially, but there will be longer term gains. Patient and public skills in self-management and decision-making will be developed alongside those of health and social care workers. Staff will move from traditional pedagogic input to become facilitators based on validated models of self-management support and psychological care skills.

Staff will need to be comfortable with agile working within a dynamic whole system. Professional identity will shift and may disappear; new anchors will need to be created to ensure staff and the public understand and have trust in changed and new roles within the whole system.

4.6 Conclusions

Evidence reviews to support future workforce planning have inevitable limitations; evaluating new roles, service provision and technologies takes time and results may be out-dated by the time they are published. However, some key messages can be drawn from the reviews. First, the new roles that have been evaluated such as physician associates do increase access to care and are safe. The whole system needs to be shaped in order for patients to easily navigate, utilise and have needs met from services where demand can be met (e.g. community pharmacy). Second, one-off interventions provided to the person with a LTC are unlikely to be sufficient to meet all current and future support needs – a whole systems approach needed in which self-management support is fully integrated into routine care. Third, technology will underpin work and staff will need core competencies which are regularly updated. Finally, work will happen within a context of changed relationships between workers and local communities. The emphasis will be on facilitating the community and individual patients to develop interventions or adjustments to care, and to share in decision-making.

5. Horizon scan

The patient of the future, their needs and the epidemiology in 2030 determine future health and social care needs. These needs, priorities and care objectives determine what work future care practitioners will likely be doing with a corresponding impact on what the priorities are of the health and social care system. Organisations are designed to bring together the necessary knowledge and skills to respond to these needs and how these organisations work together defines the care system itself.

Technologies that are speculative or just beginning to be used today will be in routine use or have been replaced by others in the future. Technologies have an impact on how work is done, influencing clinical workflow, enabling real-time monitoring of patients, or creating new diagnostic and treatment approaches.

Today's digital technologies are found on smartphones but what technologies will look like in 15 years requires some imagination. Much of what we use today did not exist 15 years ago.

The foresight process, which included a Delphi horizon scan, began with the patient's experience of care. It developed a future model of care through a structured process based on the experience of knowledgeable people with direct patient care responsibilities. This model of care led to new insights into the nature of future work, how that work would be done and who would do it.

Workshops were conducted with two CCGs to develop a future model of work for 2030. A third workshop was held with participants from Kent, Surrey and Sussex where a typology of the future service user in 2030 was developed and mapped onto the model of work. Results were validated in a further workshop and through face-to-face individual interviews, and are presented in full in Technical Report 7 and summarised in Box 2.

Future clinical work will be different because the future user of care services (patients, consumers) will not be the same as today. They will be more technologically literate, have a different mix of health conditions and social care needs, and have different expectations of the care they do receive. On that basis, it may be concluded that today, the workforce is broadly unsuited for the future work they will likely do. Indeed, it could be said that we are training professionals for a care system that no longer really exists, [62].

- Future care will be different from today, reflecting the continuing evolution of our understanding of the determinants of disease and invention of new treatments;
- Future services will not be provided in the same way as services are provided today, which suggests that clinical workflow will be different in many cases altering the organisations/institutions that provide care;
- The clinical priorities of future professionals will be different as the nature of work changes and their clinical expertise corresponding evolves;
- The epidemiology of future patients will be different arising from not just ageing but new arrangements of the burden of ill-health within populations;
- The needs of patients in the future will likely not be those of today's patients, with a likely greater need for independence, ability to assert control over choices of care, and understanding of the relationship between personal life choices and healthcare outcomes.

Box 2. Key findings of horizon scan workshops.

The findings entail that the future workforce should not be determined through population/professional staffing ratios (e.g. number of doctors per 10,000 of population), as done today, [32]. The reason is that the future patient experience determines what knowledge and skills are needed to deliver what types of care, and how that care is organised. This in turn determines how many of what types of practitioners are needed. Starting with ratios locks workforce numbers and planning into care models that will, in time, become obsolete.

The foresight work identified specific factors relevant to the future workforce:

- Access to knowledge will shift from professional / specialist use alone toward generalist end-users, including consumers and patients who will in particular benefit as user interfaces become more intuitive;
- Clinical work will involve more care coordination by the patient's first point of contact, and more generic skills along the care pathway, as care integrates in modified clinical roles with a corresponding impact on regulated boundaries of practice;
- Digital technology will increase in influence and continue to embody professional knowledge and expertise as non-routine physical and cognitive work is better understood with an impact on clinical work leading to wider use of robots and artificial intelligent systems and a corresponding impact on workforce substitution;
- Career choices today may be constrained by planning and may not be insightful enough to model future demand because future work will be unlike work today.

5.1 The changing shape of work in the future

The Foresight workshops produced judgements about the likely shape of a future model of care, of the future service users, and the future shape of the work and the workforce. Three broad conclusions flow from the findings (Table 2):

1. who does the work will be different
2. where the work is done will be different
3. how the work will be done will be different.

Table 2. Future work

	Patient Perspective	Practitioner Perspective
Who does the work	<p>The first person the patient has contact with will coordinate and organise care.</p> <p>Patients will have direct access to outpatient services and specialists.</p> <p>Person-centred “rules” will define patient engagement in care, rather than predetermined by organisational arrangements or professional preferences.</p> <p>Future mortality and morbidity will involve people living more often long-term conditions, requiring more integration of care within individual professional roles.</p> <p>Older age cohorts may be more healthy than younger age cohorts, altering today’s assumptions about what skill mix the future requires.</p>	<p>Care professions will share skills and knowledge widely, with less demarcation between clinical knowledge domains.</p> <p>It is likely there will care professions that do not exist today.</p> <p>The GP will be a care organiser, not a gatekeeper.</p> <p>Other health professions will do much of the work that doctors do today.</p> <p>Pharmacists will be a core profession in the community.</p> <p>Workforce shortages will persist and lead to the adoption of technology and novel labour substitution by device technologies such as robots.</p> <p>Future career paths will be more varied, with later career entry.</p>
Where work is done	<p>The home and community settings will replace the hospital and care homes for much of care delivery.</p> <p>Patients will expect “on-demand” care, rather than queuing for it, changing today’s assumptions about how care is physically organised.</p>	<p>Much clinical work will involve going to where the patient is, e.g. home, work, school, rather the patient coming to a care facility; this means that many care practitioners will not have a fixed work setting.</p> <p>Future team working will have a large ‘virtual’ element, challenging today’s assumptions about how knowledge and skills are deployed within teams.</p>
How work is done	<p>Patient preference will determine how care pathways are individualised and integrated as care become personalised and on-demand.</p> <p>Health technologies will be widely used and consumer friendly, putting more control into consumers’ hands to diagnose, and manage care.</p>	<p>Big data analytics, artificial intelligence, and predictive algorithms will anticipate care needs, treatment, staffing skill-mix and many other aspects of clinical pathways, in some cases replacing work done by humans and in others augmenting professional roles.</p> <p>Genotyping and precision diagnostics will have advanced and be in routine use, putting greater diagnostic knowledge earlier in the diagnostic process.</p>

Table 2. Future work

	Patient Perspective	Practitioner Perspective
	<p>Patients will have more control over their health and social care record and will share it with the care providers of their choosing.</p> <p>There will be a wider or more significant choice of care options and these options will involve greater personal self-care responsibilities.</p>	<p>Technology will support better and more precise health promotion and prevention, enabling all practitioners to be involved.</p> <p>Professions will need to have excellent communication capabilities with patients who are self-managing their care.</p> <p>The ability to use technology in care will be a core professional competency.</p>

5.2 Future service users require a different model of care

A focus on the age profile of the population has been a key driver influencing current workforce planning. For instance, much planning focuses on “retirement” ages for both the workforce and patients, but attitudes toward retirement are changing including working in later life. When people stop work today will not be when they will stop work in 2030 and their health status at retirement will differ. Older age cohorts appear to be getting healthier and younger cohorts appear to be getting unhealthier, [63].

Future users will be different; therefore, simply projecting today’s assumptions into the future will not produce sensible workforce requirements. The foresight process determined that future users should be segmented more around behaviours, rather than around more familiar segmentation based on clinical complexity and/or age. Today, segmentation mirrors legacy organisational structures which owing to system constraints have difficulty restructuring to meet changing service delivery requirements.

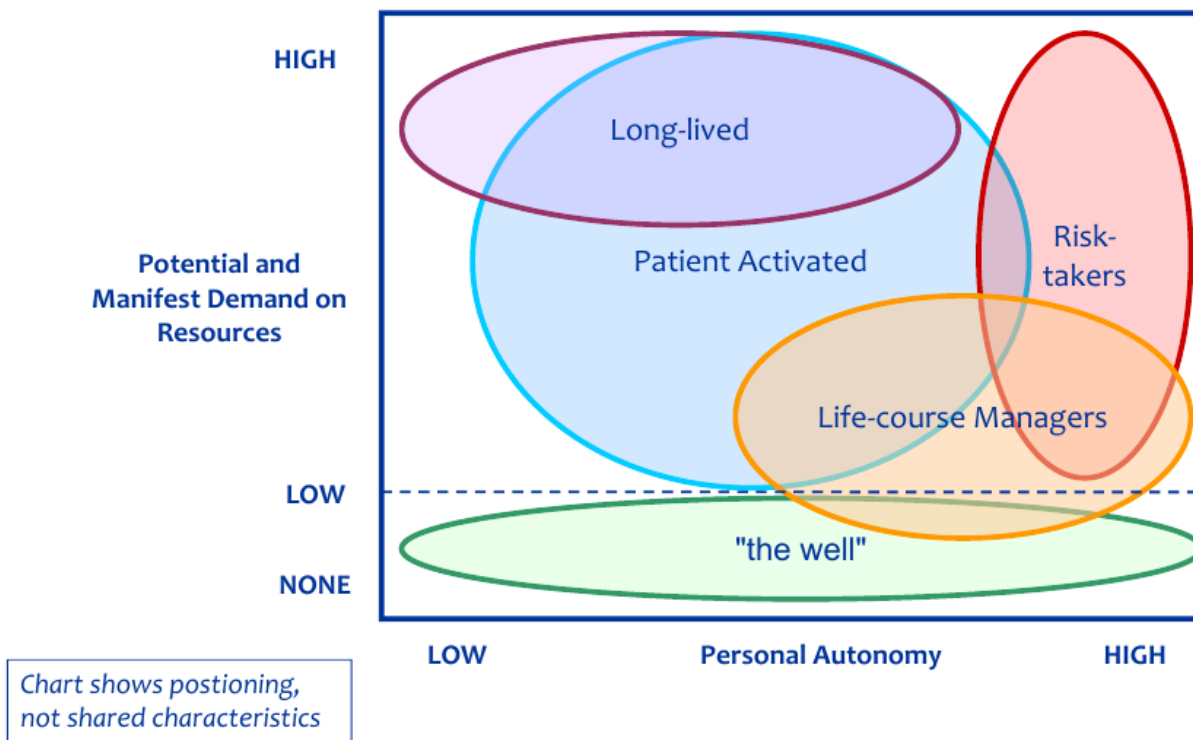
Technologies will continue to have a potentially profound impact on the organisation and nature of clinical work with a corresponding unappreciated impact on the workforce, [32]. In that respect, from 2030, technologies today will have further evolved and will be in general use, perhaps even be mundane, or become obsolete. Expectations are that precision medicine, digital healthcare and prediction will be integral to all users’ experience.

Person-centred models and their organisational arrangements that define care today may turn out to be incompatible with future personalisation of access and may be seen as intrusive or incompatible with personal autonomy, especially should care options enabled by technology may be more empowering to the patient.

A variety of service users were identified, but four were selected as representing important new ways to segment patient types based on personal behaviours:

1. Activated patients
2. Long-lived, over 100 years old
3. Risk-takers
4. Life-course managers

All the new user groups identified exist today in some form. As shown in figure 2, they can be understood as exhibiting different levels of personal autonomy in control of their care needs as well as pulling on care resources in different ways. A high demand pull on resource does not necessarily mean high cost as it entails different ways of providing service that may be more cost-effective. “The well” are included to show their low resource use, and varying autonomy, which if they become a member of a particular service user group would have associated impact as they migrate into a user group.



Note: Each user group is positioned against Personal Autonomy and Resource Demand which varies by user group; overlaps do not indicate shared properties.

Figure 2. Future users: a balance of autonomy and demand on resources

These user groups offer new challenges to practitioners as the work is less about the delivery of services and more on its coordination and designing care to meet user preferences (Table 3). Models of person-centred care are likely to be easier to realise in the future should delivery organisations have greater flexibility.

5.3 Future model of care is driven by characteristics of future service users

5.3.1 Future care is personalised and flexibly organised

Future care will be personalised and flexibly organised. While broadly familiar to today's aspirations, current aspirations will be the norm. Care would be organised by the patient's first point of contact, with more access points than today from public, private or voluntary care providers. This would lead to seamless 'one-stop' care anchored in the "patient's place" rather than institutions.

Table 3. Future Users		
Service User	Definition	Associated Service Features
ACTIVATED PATIENT	<p>Has a diagnosis, is in a treatment plan designed around personal well-being.</p> <p>This group is seen as a natural evolution toward greater personal autonomy in self-care management.</p>	<p>Support from families, politicians, communities, practitioners.</p> <p>Service information widely available.</p> <p>Has direct (not referred) coordinated access to health and care services.</p> <p>Services from an integrated community hub to support the individual: the who and how changes depending on how the patient interacts with the hub.</p>
LONG-LIVED, 100+	<p>Lives beyond 100 years of age.</p> <p>Characterised by abilities rather than functional decline.</p>	<p>Practitioners coordinate care.</p> <p>Services provided in home and managed settings to enable healthy living and well being: emphasis is enabling a healthy lifestyle.</p> <p>Funding aligns services around quality of life outcomes.</p>
RISK-TAKER	<p>Adopts risky life-styles and is not focused on improving their health as a goal and values personal autonomy.</p> <p>“It won’t happen to me” is a belief.</p> <p>Crisis driven and expects immediate access; unconcerned who the first point of contact is.</p>	<p>Unlikely to seek information to support personal health decision-making and may be resistant to efforts to engage in structured care plans to reduce risk.</p> <p>Public health and health promotion messaging and associated services of little interest. However, may be amendable to nudges, but this may conflict with their autonomy if viewed as paternalistic.</p> <p>Whether monitoring leads to riskier behaviour, though, raises issues for service design.</p>
LIFE-COURSE MANAGER	<p>Wants a long and healthy life and actively engages in behaviours and lifestyle choices to achieve that.</p> <p>Likely an adopter of health-enabling technologies.</p>	<p>Health and social care organised proactively and flexibly around individual requirements and preferences.</p> <p>Technology is designed with functionality these people will value and use.</p> <p>Quality of information to enable high-quality decision making is central.</p>

5.3.2 Future care anticipates and predicts care needs

By 2030, the goal of the care system will be to slow or stop functional decline, taking account of ageing processes and chronic ill-health. This is built on the ability to anticipate and predict care needs while integrating health promotion, prevention and clinical workflow. Today’s focus on precision medicine will have become the norm, with shared decision-making leading to a common perspective on care priorities, [64].

5.4 Future work will be determined by this model of care

The outline features of the anticipated model of care, lead to significant changes in the way that clinical work is actually done. By 2030, many things we do today will no longer be done while many innovations today will have become routine.

The foresight results concluded that future practitioners will be navigators within the new model of care, helping and directing service users to access care from a range of providers. For most health and social care workers navigation will comprise coordination, enabling care by entering information into the wider care system, and responding to and anticipating needs of service users and a local community. This is more a multi-tasking type of work, integrating care, prevention and promotion.

The impact of the changing nature of work would likely entail organisational arrangements different from today. The “first point of contact” model leads to multiple entry points to care, widespread public knowledge of them, and, potentially, self-referral and has the consequence of likely replacing referral patterns in use today.

The workshops identified technology as a significant influence in shaping the model of care and thereby the future workforce. There is good reason to respect this as recent developments in digital technology are having an impact on non-routine cognitive and physical work.

Digital technologies are making it easier for people to access, use and analyse information. Devices are invented to do things that people usually do. The intelligence of experts will continue to be embedded in devices such as a diagnostic tool, in processes used by people such as clinical decision support systems and predictive models that use real-time patient data, and in homes, clinics, factories, offices, making them “ambient” – sensitive and responsive to the presence of people, [65].

Technologies enable the migration of knowledge and skills toward non or lesser specialist people and toward generalist use. New professionals that span regulated knowledge domains are implicated to emerge and will require regulatory constraints which protect professional roles to be reformed.

Care professions have to date relied on their professional knowledge to define their role in the care system, but this dominance is progressively being unbundled by digital information technology. The horizon scan workshops identified specific pressure on the professions in terms of what they know and how they deploy their expertise in clinical work.

Three drivers are changing professional practice, supporting the insight of the horizon scan, [63].

- The first driver alters the role of human experts to provide what is in effect “bespoke” or “craft” services. Where today we have clinical specialties that demarcate who knows and can do what, the knowledge shift that technology drives is to systematise knowledge and make it accessible to people outside these specialist groups.
- The second driver standardises or routinises non-routine knowledge, standardises knowledge and creates reusable content, e.g. check-lists, clinical guidelines, formularies. Technologies already routinise repetitive physical work; what is new is the how digital technology routinises non-routine cognitive work and professional knowledge.
- The third driver systematises knowledge in algorithms. This is evident today in clinical decision support systems augmented with artificial intelligence (e.g. IBM Watson); the foresight work identified semi-autonomous devices such as robots as part of the future labour force.

5.5 Implications for the workforce

5.5.1 Future service users

Table 4. Future Service Users	
Service User	Implications for the future workforce
ACTIVATED PATIENT	<p>Practitioners routinely provide information, give skills and support, create a culture and behaviour for individuals to be active in their self-care.</p> <p>Practitioners need training, professional knowledge, skills and behaviours to work with this service user.</p> <p>Organisations will need epidemiological information to align workforce competencies with activated patient characteristics.</p>
LONG-LIVED, 100+	<p>As this user group is alive today, practitioners will likely need to revise assumptions about this groups care needs and priorities.</p> <p>Organisations will need to build considerable experience of the long-lived, so that workforce requirements can be better determined.</p>
RISK-TAKER	<p>The GP, ambulance paramedic, pharmacist, or A&E staff will be this service users first point of contact and will need to know how to deal with this challenging, disengaged user group.</p> <p>Organisational features, such as delays, queuing, and appointments systems are of little interest and users will avoid them, preferring on-demand services.</p>
LIFE-COURSE MANAGER	<p>Practitioners will be care coordinators, or navigators, to provide direction to structured programmes to manage and reduce risk.</p> <p>Organisations may need to use financial incentives to incentivise individuals, but ever mindful of impact on personal autonomy and access to care itself.</p>

5.5.2 Models of care and working

Table 5. Implications for the Workforce
New types of health and care professionals will exist and roles will 'blur' compared to today.
Work roles will need to be able to coordinate care and help patients navigate care options.

5.5.3 Future work

Table 6. Implications for the Workforce
The gatekeeping function may not last in its current form, while GPs indicated they want a role defined by care coordination not gatekeeping. Gatekeeping roles have disappeared in other sectors of the life; people now having direct access to many services without needing to go through brokers to buy insurance, agents to buy travel, or shops to buy goods.

Table 6. Implications for the Workforce

Algorithms and robots are likely to replace much physical and some cognitive work now done by practitioners, and redefine the meaning of labour substitution.

Boundaries between organisations are likely to be unsuitable to deliver flexible and personalised care coordination. The logic that integration of care is achieved through organisational integration looks problematic when information becomes the primary currency for integration.

Technologies that are usable by generalists, non-specialists and patients unbundle hospital services and move them into the home or community, altering our assumptions about the infrastructure needed to deliver care.

Professional training using today's domain logic will be unsuitable for future work. Roles will cross knowledge domains and skills will migrate toward greater specialisation and toward more generic practitioner roles.

The patient and consumer will shape care processes and outcomes. The professions will need to learn how to work in this environment.

5.5.4 Planning the future workforce

Table 7. Implications for the Workforce

As future work changes, reform of professional regulation should be actively modelled and revised to take account of workforce changes entailing new role boundaries and competencies.

Future clinical work will be different from today, in the same way as today's work differs from work 15 or more years ago, with factors to incorporate into workforce numbers arising from new technologies, changing epidemiology and social expectations of care.

Workforce projection models need to take account of the transition from "older ways of clinical working" to new types of clinical work in 2030, in particular to integrate supply and demand with system delivery requirements and evolving social and patient expectations.

6. Work Force Modelling

This section provides a summary of the main findings that have emerged from the modelling. The full details are presented in Technical Report 1, we provide a summary of the key findings in Box 3 below. We reserve our main recommendations for the primary care system for two reasons. Firstly, detailed projections around the demand of social care needs are often multiple and interrelated with other needs. Local authorities' spend on care depends crucially not only on local need but also on local policies and priorities, these are difficult to capture. Secondly, many important social care system indicators are largely uncertain, for example, the debt burden of private care home providers is difficult to measure.

The structure of the primary healthcare system, whilst dynamic and certain to change in the future (indeed this is one of the recommendations of this report) is more certain at baseline. Notwithstanding the fact that a primary measurement such as productivity is at least five years out of date¹, it's interaction with population demand is well documented. Therefore the weight of evidence lies with the primary healthcare system model, although we make some general observations around the social care system. The section concludes with modelling specific to each CCG.

- Key system parameters such as productivity are currently not measured.
- Risk of retirement is high in the workforce, this will have a deleterious effect on workforce numbers in coming years.
- Variations in recruitment has the biggest impact on the gap between the supply and demand of services, more so than any other single policy intervention.
- There are demonstrable efficiencies to be had by team working in the primary care setting.
- Technological interventions in healthcare management should not be restricted to people with long term conditions but rolled-out to capture a much wider part of the population.
- Smart phones offer a global healthcare management system that allow for predictive risk modelling which can further reduce demand.
- Hybrid intervention policies consisting of recruitment, efficiency, modernising working practices and technological innovation can be effective in bridging the gap between supply and demand of services.

Box 3. Summary of Findings.

6.1 The impact of retirement

Since recruitment is external to the healthcare system, being largely policy-driven and limited recently by scarcity in new recruits and trends in reduced working hours, workforce evolution is

¹ Productivity is actually not even measured. In accordance with previous attempts at workforce modelling in healthcare, it is actually *inferred* from UK-wide economic measures, which happen to be approximately 5 years out of date.

independent of population growth (for example, no policies exist that index-link recruitment to population size). A key finding of the modelling is that if we recruit at historical levels all nine CCGs will suffer a decrease in the primary healthcare workforce in the coming years - some CCGs are hit harder than others. These projections arise from the age profile of professionals currently in the system, with significant proportions close to retirement and therefore exiting from the system; historical levels of recruitment will not redress the balance.

6.2 Recruitment and retention

As important as the risk of retirement to the workforce, the dynamic modelling revealed that recruitment (and therefore retention) has the biggest impact on the gap between supply and demand of services of any policy initiative that has been envisioned in the horizon scanning or pilot schemes which were studied in this project. It is important to emphasise that on their own, independent of any other innovation or squeezed efficiencies in the healthcare system, recruitment and retention improvements have an order of magnitude larger impact on the shortage gap. This is because the burden of demand is driven by the growth of the underlying CCG population. Such growth is a continuous process and gathers pace directly with the size of the population², no re-shaping of the system can compete unless it is continuously compounded in this way. As a consequence improving retention rates of the workforce is of vital importance. Since the financial commitment to major increases in recruitment over and above the stated governmental aim of around 15% for the GP workforce itself [66] is unlikely to emerge, it is important to model a hybrid policy intervention. To this end, in tandem with boosted recruitment, we modelled scenarios consisting of multiple interventions, including reshaping work-place habits and technological innovation.

6.3 Scenarios

Inefficiencies in the workplace around permissions and administration represent major roadblocks to increasing productivity. Employing quantitative results from published research [67], we incorporated a generic team-working scenario innovation in surgery working. By employing team consisting of practice nurses together with a Healthcare Assistant as well as team working with GPs themselves we were able to demonstrate the effect such practice have on the gap between supply and demand. Such cooperation needs restrictive role boundaries and responsibilities to be identified and broken down.

Pilot studies around the country over the last few years have revealed the tangible benefits arising from planning the patient pathway through to consultation [68]. The so-called *telephone triage* systems have reportedly yielded considerable savings in GP time in more directed and relevant care (cost-benefit analyses are less favourable). Such systems increase the throughput and hence increase the productivity of a typical surgery.

A substantial proportion (up to the order of around 15%) of GP consultations per year have been estimated in the literature to arise from minor complaints [69], if such consultations can be safely managed in pharmacies, further GP supply capacity will be released.

² This is exponential growth as described in scientific literature. Sustained growth of this nature depends on a supporting infrastructure and will ultimately die out but not over the next 35 years, the time span of this report.

6.4 The potential impact of technology

A recently study of the use of a telehealth style intervention in the management of people living at home with COPD, [70] presented compelling evidence (in a strict statistical sense) of the impact such systems can have on avoiding secondary care emergency admissions. From a cost-benefit viewpoint such interventions are of paramount importance. However, the study additionally presented evidence of a reduction in the consumption of care services in this cohort (albeit with less weight of evidence). Such systems therefore show distinct promise as a mechanism to reduce demand for healthcare services, at least in those living with long-term illnesses.

Whilst it is undeniable that the elderly are a growing strata of society and that they present the largest per capita burden on the consumption of services (per person year), a huge burden of demand exists among the less aged - put simply they consume much less but there are many more of them. The growth in the numbers of the elderly is a relatively new phenomena faced by healthcare systems in the developed world and clearly this represents an emerging burden that has to be faced. It should not be overlooked though that those less-aged citizens still present a huge burden of demand. It is vital therefore that technological innovation occurs across all the population, not just for the comorbid and elderly. Indeed the modelling supported this view. We modelled technological roll-out as a *diffusion* process [71]. Characteristic of this type of growth is a wave of uptake through the population, eventually saturating once the initial non-users have been reached. The complementary, ever-present dynamic of population growth then dominates and the inroads into the gap between supply and demand of services is swallowed by the increase in population. Nevertheless one wave of technological innovation (in alliance with other policies) of a technology that reaches somewhere around 50-60% of the population with a reduction in service use of the order demonstrated by recent research (approximately 15%) [70] is able to constrain the supply-demand gap in services at the current level over a horizon of approximately 20 years. After this the gap will reach new levels and more innovation will be required.

As the citizen of the future takes more direct control of his or her health, so technology will reach more of society. Malcolm Hart, customer services director for Philips UK, responsible for one of the major models of telehealth care, the MOTIVA system [72], has said: "*The focus of telehealth should not be on the devices themselves, but it should be seen as an enabler for system change*", [73]. It should be noted that the evidence is not all favourable, indeed some trials have shown no evidence of reduction in demand (or other important outcomes) during telehealth monitoring. Importantly though the lack of evidence in such trials may flow from the fact that there is a clearly identified pathway for the studied long term condition already operating and care has already been optimised.

6.5 The exemplar of the Smart phone

One candidate for a global roll-out of innovative healthcare technology is the smart phone app. Through the use of routine diagnostic data Deloitte and PricewaterhouseCoopers have forecast that virtual GP visits (replacing physical consultations) will soon become the norm. In the USA Deloitte says that as many as one in six doctor consultations were already virtual in 2014 [74], [75]. Moreover smartphone apps offer the way forward to reduce the burden of collecting routine health data, particularly through a platform of networked GP data systems. Reductions in the service demand through efficient and safe use of the smartphone apps can be envisaged (and modelled).

A pharma-funded study hosted by Surrey University to construct a surveillance network of GP data systems has demonstrated proof of concept [76]. This study is England wide with particular focus, at present, upon monitoring and prediction of influenza type illnesses in the population. Studies have also shown that routine GP data can be used to accurately predict for

example, elderly people at risk of an imminent fall. The impact in terms of reducing service demand has not been estimated but conservatively one can speculate reductions at least of the order of the telehealth interventions for this strata of the population. This is one example of many predictive risk models that can be envisioned. Such opportunities have already been seized in the secondary care sector, noteworthy among them is the recent collaboration between the Royal Free NHS Trust and GOOGLE DeepMind, the predictive modelling arm of the internet giant [77]. Administrative data in the GP sector has similar potential for exploitation in this way, leading to potential workforce efficiencies (as well as cost benefits).

In summary the dynamic modelling revealed that the burden placed by a growing population can be seen purely as a recruitment problem. However, in practical terms the level of increase in recruitment required to quench the growth in demand is highly unlikely to be met. Therefore, we investigated a set of interventions outlined above to attempt to meet this demand. We find that such a multiple attack, allied with stated governmental targets for recruitment increase in the GP sector of around 15%, can ensure that the gap between demand and the supply of services can be constrained at levels that we currently experience, over a horizon of around 20-25 years (for the typical CCG seen in this project). In other words the problem gets no bigger in the medium term. However, if recruitment levels do not prove as buoyant as this, projections would need to be re-adjusted accordingly.

6.6 CCG specific modelling

We used a systems dynamics methodology [8] to capture the interplay between the CCG population health needs and the primary (and social) care workforce supply of services. Such models represent the complex interactions between processes in the delivery and consumption of healthcare services. To be specific, we modelled the change in workforce numbers as well as the gap between the supply and demand. Very briefly, once a global model has been designed and verified in this methodology, it can be iterated forward in time from baseline (now) into the future, simulating how a CCG health economy evolves. However, even in the most well calibrated models, inherent uncertainties in measurement at baseline magnify themselves over time. In addition, the farther we project into the future, the more likely it is that unforeseen factors (for example, radical shifts in health policy) may shock the system into a regime that breaks the underlying model assumptions and therefore invalidates the model.

Implicit in the modelling is the identification of key *parameters* (or less formally, *drivers*). Structural elements in the global healthcare economy that play a key role in how the system evolves in time are abstracted in the model as parameters. For example, the retirement age of healthcare professionals can be seen as a system parameter since variations in this measure place limits on how workforce numbers may evolve over time. Similarly, the percentage of consultations undertaken in pharmacies constitute a system parameter. Growth in such consultations can release extra capacity in GPs workload, thereby increasing the supply of services. Clearly, parameters (drivers) represent policy levers that can be varied in competing scenarios and presented to the model for simulation. In this way we come to understand the effect of these variations in the round. The inter-connectedness of such models aids a better understanding of the impact of change because changes in drivers rarely have effects that are independent or that can be isolated from the rest of the system.

During the modelling cycle certain parameters were identified that are never explicitly measured in routine administrative data. This drawback has been noted by other studies [78].

6.7 Reductions in the workforce over time

The age profiles of the baseline work force reveal significant risk of retirement in the future. However, the workforce is a dynamic "birth-death" system, i.e. people enter and people leave over time. It is of primary importance to understand therefore what recruitment levels will lead to

net increases/losses in professional FTE numbers. We hypothesise typically 40 years duration for professionals in the primary workforce system (ignoring drop-out rates for the moment). We have modelled three stages in a career pathway: early professional, middle years professional and mature professional. We do this so we can model differences in productivity for these three distinct types of professional. The time to migrate from early to middle is 10 years, from middle to mature 20 years and time to retirement 10 years (although clearly to be comprehensive we should model scenarios where this parameter shrinks in line with demographic trends).

In the fundamental "Do-Nothing Scenario" we assume that recruitment levels are at their recent historical levels [79]. The graph below shows the evolution of the workforce under these assumptions. Clearly some CCGs fare better than others, this is the result of a complex, interaction between age profiles in the CCG workforce and the epidemiological needs of the local population. West Kent for example suffers a drop (in total work force) of approximately 20% in the coming 35 years under these hypotheses, North West Surrey suffer a drop of around 25% and so on.

The key to the figure 3 (which shows decline in GP numbers) below is:

CCG	Symbol in Diagram
<i>Crawley</i>	C
<i>Eastbourne, Hailsham and Seaford</i>	EHS
<i>Guildford and Waverley</i>	GW
<i>Horsham and Mid Sussex</i>	HMS
<i>Hastings & Rother</i>	HR
<i>North West Surrey</i>	NWS
<i>South Kent Coast</i>	SKC
<i>Thanet</i>	T
<i>West Kent</i>	WK

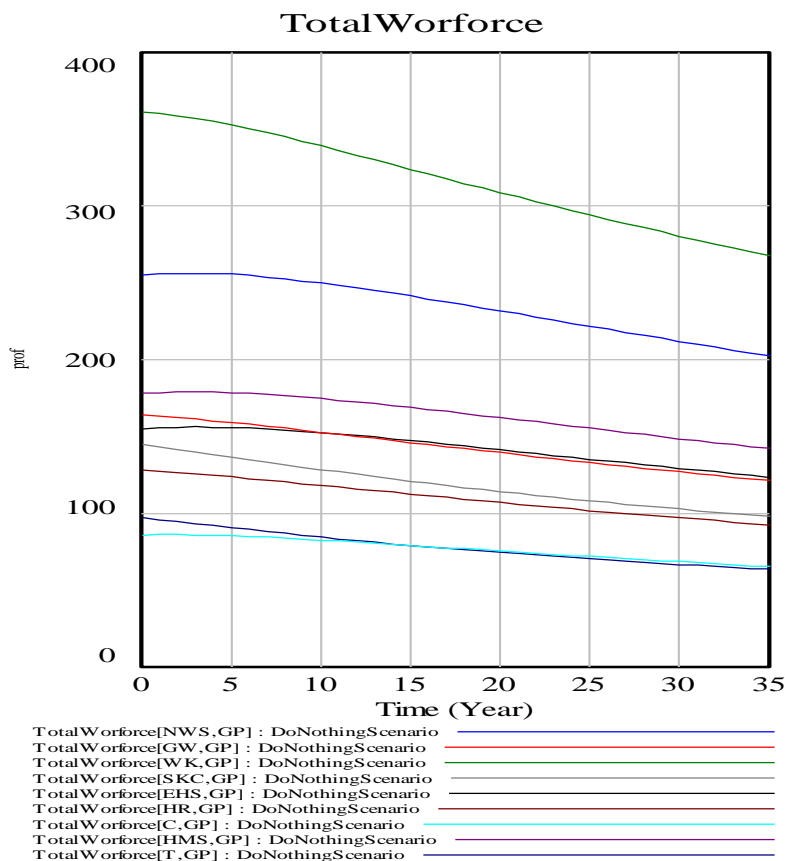


Figure 3. Reductions in workforce over time per CCG.

6.8 Data

Baseline data – the snapshot of the current workforce together with the population estimates per CCG - was assembled from diverse sources. On the supply side we used the GP workforce tool data supplied by HEKSS (an official return that is put in the public domain by HSCIC). It is known that some of the data returns are incomplete (see later sections for estimates). Criticism was expressed by horizon scanning workshop participants that this could potentially lead to inaccurate projections. Indeed it is often said that a model is only as good as the data that goes into it. However, we take the view that, provided stakeholders understand the underlying modelling hypotheses and assumptions and therefore potential uncertainties (more will be said of this later on) valuable insights can still be obtained. An important by-product of the modelling process is the elucidation of gaps and inaccuracies in official data, at the same time providing a specification of a dataset that would underpin more precise, future workforce planning.

At the moment we mainly take head-counts (more precisely FTE counts) and age-sex profiles of the workforce. But in order to understand how efficient the workforce is we need to capture some measure of *productivity*. In crude terms this econometric concept is simple: for GPs it is the number consultations that are undertaken per week (or some other suitably defined time duration). One can require a more nuanced version of productivity, addressing questions such as: What type of consultations are undertaken per week? What is the proportion of consultations undertaken for minor complaints? What is the proportion for long-term disease conditions? How do these consultations present themselves across age and sex groups within the population?

Answers to these specific questions were sought from published literature [80] because these activity rates enable us to understand how much throughput, or finished GP consultations, is

achieved and for what types of people – young/old, relatively healthy/highly comorbid. At times inferences were made from the literature – all assumptions and calculations supporting these measures of productivity can be found in later sections. Ultimately, productivity measures related to demographic and epidemiological factors enabled us to evolve 'scenarios' in the workforce model.

Population estimates, are produced by the Office for National Statistics (ONS) using lower level Super Output Areas (LSOAs) as smallest geographical region. The population of each CCG is the sum of the population of the LSOAs which fall within the geographic boundaries of the area. Growth in the CCG populations was also obtained from the ONS Subnational Population Projections for Clinical Commissioning Groups in England, by sex and 5 year age group; we aggregated these estimates to fit our age bands. Long-term subnational population projections are an indication of the future trends in population by age and sex over the next 25 years. They are trend-based projections, which means assumptions for future levels of births, deaths and migration are based on observed levels mainly over the previous five years (from 2012). They show what the population will be if recent trends continue.

There are differential growth rates across five year age bands in CCG populations with the elderly (>75 years) growing most quickly. This impacts on overall demand in an unfortunate way since it is the elderly who make most demand on the system. Whilst this interaction is mitigated partly by the size of this group compared to the population as a whole, this burden will grow disproportionately quickly. These complex issues are captured in a systems dynamics type model.

6.9 Recruitment

We modelled recruitment to the workforce at (recent) historical levels: 1.9% growth in GPs, approximately 1.7% for practice nurses and 1.9% for 'other' healthcare professionals [79]. The first scenario to be investigated is a 'Do-Nothing' scenario: we allow recruitment into the workforce to take place at the historical levels, we project the population growth predicted by the ONS and we observe the evolution of the 'shortage gap' (the difference between demand and supply of consultations). Other drivers of the system remain similarly fixed at their current levels: there is no technological innovation, there is no growth in pharmacy supply. Naturally, in all CCGs we see significant growth in the gap across the next 35 years under scenario 'do-nothing'. Quantitative estimates of this shortfall is given in the later sections of this report.

Scenarios which posit increases in recruitment were investigated next. Small and moderate increases attack the shortage gap in meaningful ways but the main observation to make from these scenarios is that aggressive recruitment (in the order of a 20% increase) can strangle growth of the gap very effectively. Instead of the gap roughly doubling in the intervening years (in the 'do-nothing' scenario), we can reduce it to a growth of around 25%. In terms of GP recruitment, a 20% increase would take the historical levels of 1.9% growth per year to approximately 2.28% per annum growth in the supply of GPs and Other professionals, for nurses we would be talking about recruitment at 2.04% per annum. Of course this is net growth, as a consequence retention of the work force is similarly vitally important. Moreover, we are discussing the growth of FTEs.

6.10 Hybrid Policies

In figure 4 we see the total shortage gap (measured in FTEs, GPs nurses and others combined) in two arbitrarily chosen CCGs, North West Surrey (NWS) and South Kent Coast (SKC), under two competing scenarios: the "Do-Nothing" (blue and green curves) compared to a scenario we have called "MagicBullet" (red and grey curves), which is a hybrid innovation consisting of increased recruitment, efficiencies in GP surgeries through new ways of working, migration of services to pharmacies and a technological innovation. We can see the impact that such

policies can potentially have on the shortage in the workforce required to meet future demand. By comparing the blue and red curves for North West Surrey, for example, we are able to see that this complex policy is able to limit growth (at current levels) in the shortage of professionals over a time window of approximately 26 years. Fundamental to this scenario is that we intervene **now**. The other assumptions (which we can vary) are:

Recruitment increased by 15% to 2.19% pa for GPs and others, 1.96% per annum for Nurses, a technological innovation that rolls out to around 60% of the population reducing service demand by around 15% for users, increased efficiencies in the GP surgery (new ways of working and the migration of certain consultations to pharmacies), releasing around 17.5% of GP time.

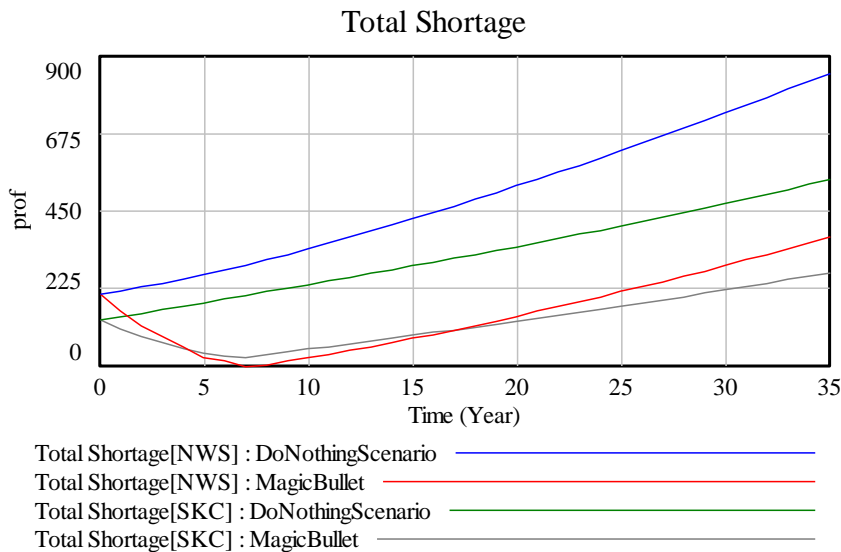


Figure 4. "MagicBullet" scenario

Clearly, some of these assumptions may not be met, most likely the recruitment target. In this case the scenario "MagicBullet" would have less impact over time. This scenario represents probably a best-case scenario.

7. Education & training provision for a future workforce

The final stage of this project was to address the education considerations and to recommend what education and training provision is required for future workforce models in primary and community care to shape the workforce to 2030. A key component was to provide guidance and advice on the development and delivery of education and training for existing and future workforce with particular emphasis on fit for practice.

The findings are based on data collated through a review of the Prime Ministers General Practice Access Fund, information gathering through a comprehensive scoping exercise with 30 key Stakeholders, as well as the final educational workshop. Details of the participating organisations and stakeholders are detailed in Table 1.

7.1 Prime Ministers General Practice Access Fund.

In Stage 1, 57 wave 1 and 2 pilots were reviewed and those that had relevance to the project were identified. In Stage 2 a review was undertaken of the First Evaluation Report for Wave One published in October 2015, [81] the review focused on key messages relating to technology and workforce

Overall workforce planning now and for the future was a very small part of the pilot work and issues only arose when recruiting to roles within the pilot projects and not planned for in advance. So for the project it showed the importance of planning ahead for new workforce needs and not leaving it to chance. The pilots reported a number of challenges, these included configuring usable and reliable IT systems to support joint primary care initiatives and shared working arrangements has been one of the primary barriers. In addition video consultations have been challenging to implement as have e-consultations and reception has been mixed.

The evidence to date suggests that the strategy of making more use of nursing staff, particularly Advanced Nurse Practitioners (ANPs), is resulting in benefits including releasing GP capacity, however there have been key issues around ANP recruitment and other community nursing staff, which have been exacerbated by critical shortage of ANPs and others.

Eight of the pilots have made more use of specialist nurses or Advanced Nurse Practitioners (ANPs). Despite some recruitment challenges, these initiatives have been a success in reducing pressures on GP time and adding more capacity.

Five pilots have successfully integrated pharmacy into delivery of primary care services. There has been a reported good acceptance from pharmacists and reported saving of GP time.

It appears that the Challenge Fund /Access Fund has been successful in initiating a culture change amongst the primary care community. The injection of investment into primary care has had a catalytic effect, encouraging practices to move away from operating as independent small businesses and, instead, work collectively.

7.2 Scoping exercise

The interview discussions followed a similar trajectory based on the matrix developed in Kent:

- Current base line of service and workforce issues
- Perceptions and understandings of future local service needs
- Vision of future care models

There was widespread acknowledgement of the need to reconfigure services across health and social care providers to deliver the vision set out in the 5 year forward view, [82]. There were a number of challenges articulated in relation to recruitment and retention, the removal of student bursaries, sufficient clinical placements, mentoring and supervision capacity as well as the overall clinical workforce shortage. The universities were not seen as enablers in supporting change in education training or development at either pre or

post registration levels. There appeared to be confusion over proposed new roles, how these differed as well as how the roles linked / replaced current workforce.

Most respondents were able to articulate future service needs, less explicit was the workforce needs in relation to new service models. The clinical leads for CCG's were to varying degrees able to set out a vision based on key criteria for the Sustainable Transformation Plans (STP's) [83] which included increased access, technology, enabling self-care, new integrated models, finance and engagement. The mechanisms to achieve the vision were less articulated. It's clear that much has been done in terms of forging partnerships and alliances across sectors.

A number of respondents talked about models based on national pilot work and pockets of practice around access, technology, multidisciplinary team working, linking community services and preventing admission from care homes etc. As well as, the use of new roles specifically around advanced paramedic practitioners and enhanced input from pharmacy. The need for existing staff to advance skills to include health assessment and non-medical prescribing was frequently described.

7.3 Barriers

Individual CCG clinical leads were in most cases daunted by the overall task of achieving widespread integration without access to funds, or at least within the framework of redistribution of existing resources. The optimism that most asserted that the STP's afforded, gave way to a wry cynicism that for the most part the totality of 'the ask' was going to be hard to achieve. A number of barriers were expressed alongside enablers.

These included the difficulty in recruiting and retraining staff, the hierarchical nature of professions, silo training and the lack of team working, the role of professional regulators in preventing change. The lack of collaboration within existing teams was seen as problematic with most expressing the unlikely event of this changing to embrace wider teams across sectors. It was acknowledged that the existing workforce did not necessarily have the right skills going forward. There was concern that the training focus had been around the acute sector, shifting resources and up skilling the workforce was seen as a monumental challenge. IT synergy was thought to be a barrier across CCG's.

Universities were thought in general to be out of touch (programme content & delivery), with needs of practice-undergraduate and post graduate training as well as the unregistered workforce.

7.4 Enablers

Overall the new footprints and sustainable transformation plans were seen as real enablers with the opportunity to centre care on patients, as well as learning from local, national and international models.

Most suggested that alliances of patient centred individuals and teams provided opportunities to think creatively and do things differently. Some interesting networks and alliances were beginning to reshape services and most spoke of their optimism for strengthening provider/commissioner relations. The ability to reshape the workforce and develop interesting career frameworks to support recruitment and retention was seen as a real possibility.

The planned models are yet to be fully described in Surrey and Sussex but all described the work of this project as timely and welcome

7.5 Educational Workshop

The final workshop to identify what the primary care practitioner of the future should look like and what their educational needs should be was held in Maidstone Kent on the 13th April 2016. Details of attendees are contained within table 1.

The audience was given an outline of the current context and recap of the profile of future patient and future work from previous horizon scanning workshops. A review of the workforce planning modeling utilizing three scenarios followed. These are detailed elsewhere in the report.

The morning ended with three group discussions based on consideration of the following three scenarios

- What are the educational needs of professionals in the next 1 to 2 years
- What are the educational needs of current students for when they enter the workforce in 5 years?
- What educational planning is needed today? For a 10-year old today entering the workforce in 15 years

The notes and flip charts were summarised and the findings detailed below.

7.5.1 Group discussions

Discussions were wide ranging with as expected differing emphasis across the time frames. The existing practitioners were perceived as the most challenging for a number of reasons. These included siloed training resulting in poor team working, resistance to change, perceived as greater in the existing workforce. Gaps in skills and competence, were highlighted as considerable particularly the increased use of technology and the complexity of cases that were now presenting in primary care/community. There were also seen to be gaps in team working and integrated work requirements. Across the timeframes there was agreement that boundaries and identities need to change and that change needed to happen now. With education needing to act as a facilitator to break down barriers and cultures, examples of international models in Denmark [84] and Sweden [85] were cited.

There was also recognition of the need to create flexibility between professional and clinical roles, allowing people to move between them more easily. In addition ensuring robust and ongoing training for locum workforce was seen as a priority. There was agreement that academic providers were failing to keep pace with clinical practice and curriculum content and methods of delivery both at pre and post registration. Overall and indeed as highlighted in the interviews, HEI's were not perceived as education change enablers

There was also wide spread agreement on the skills, behaviours and professional identities needed to provide care today and indeed into the next century.

7.5.2 Skills

These were defined in discussions include the ability to critically analyse evidence and interpret data, to be competent in the use and applications of technology. As well as being able to 'care at a distance'. Working differently as educators and acting as agents of change was seen to be crucial for current and future workforce. With an increased and more substantive patient role, communication skills to facilitate patient understanding of treatment options and support decision making as partners are essential skills for existing and future workforce.

7.5.3 Behaviours

The discussion elucidated the following, anticipatory, focused on being anticipatory, enquiring/curious, the ability to work in a team, to constructively challenge, moreover to be flexible with a strong value base. These were seen as an essential and core competence. Strong leadership was seen as a key behaviour at the individual and team level.

7.5.4 Professional Identity

Professional identity was seen as necessarily less important going forward with a reduction in boundaries between individual professions. Revitalising the multiprofessional and team agenda was seen as key, sharing skills and values and being comfortable with the way in which work is undertaken including how role substitution will lead to varied roles.

Findings from the workshop raised the need for education providers to demonstrate proactive leadership working with clinicians to form collaborative educational pathways that are responsive to changing clinical practice within multidisciplinary teams, Developing these pathways needs to engage all stakeholders from all sectors (public, private, independent in both health and social care) and including the involvement of patients and informal carers

Education providers were also task with ensuring that the shift from the acute sector was reflected in placements across primary & community and home, building in partnership sufficient clinical supervision and support.

A priority for the group discussing future educational planning was for professionals across health care to experience the same initial education and values with a single point of entry to a foundation course for all professions before branching off into their chosen degree course. There was recognition that this would be challenging and need the involvement of Royal colleges in breaking down professional boundaries

7.6 Conclusion

The discussion in the final workshop reiterated what had been articulated in previous discussions, i.e. that skill development will need to take account of a more dynamic and changing clinical work environment, with an individual's work spanning roles and organisations, quite different from their experience today.

The discussions re-affirmed the need for collective action to address a complex range of issues along a timeframe continuum. It was agreed that the current focus on using established and emerging partnerships working and networks needs to continue. As well as ensuring that education providers are engaged in understanding the impact of changing patterns of work and how these are reflected in educational programmes, whether formal professional courses, or continuing professional development..

7.7 Recommendations

There are five priority areas for action:

- Cultural shift in how training is delivered by educational providers. This includes reform in methods, content of programmes and in the competencies they address.
- Wider educational provision. The broader health and social care community will need integrating into educational offerings. Education will need to adopt new training technologies as well as offer learning opportunities on new clinical technologies, as they are introduced. Training to enable patient activation and self-management. Caring at a distance needs to be a core competency reflected in curricula as does greater focus on complex cases and associated risk in distributed but integrated care systems.
- With a shift toward primary, community and home-based care, educational placements will need to evolve to ensure all clinicians, whether doctors, nurses or therapists, gain experience in these settings.
- Revitalise the multi-professional agenda. Driven by the assessment of the likely shape of future care services, the professional priorities today need to move to one that avoids the current silos that exist and which demarcate one profession from another. Along with this is the elevation of shared skills and values as a core professional characteristic which is comfortable with the way that future work will be done, including how role substitution will lead to varied roles outside of today's traditional boundaries.
- To move toward the type of practitioner likely to be needed in 2030, explore options for a shared foundation year across all regulated health and care professions, this would ensure a shared starting point in terms of public service values, begin to learn team working around clinical priorities and demonstrate that separate professions whilst drawing on different knowledge domains and skill mixes, serve common objectives.

8. References

- [1] R. Karasek and T. Theorell, *Healthy work. Stress, productivity, and the reconstruction of working life.*, New York: Basic Books, 1990.
- [2] L. G. Paris and M. Terharr, "Using Maslow's Pyramid and the National Database of Nursing Quality Indicators™ to Attain a Healthier Work Environment," *The Online Journal of Issues in Nursing*, vol. 16, no. 1, 2011.
- [3] J. F. Vogt, J. L. Cox, B. A. Velthouse and B. H. Thames, *Retaining professional nurses: A planned process.*, London: Mosby, 1983.

- [4] F. Aguilar, *Scanning the Business Environment.*, New York: MacMillan, 1967.
- [5] G. Johnson, K. Scholes and R. Whittington, *Exploring Corporate Strategy. (7th ed.)*, Pearson Education Limited, 2005.
- [6] W. Boos and C. Tarnai, "Content analysis in emporia social research," *Journal of Educational Research*, vol. 31, p. 659–71, 1999.
- [7] C. Powell, "The Delphi technique: myths and realities," *Journal of Advanced Nursing*, vol. 41, no. 4, pp. 376-82, 2003.
- [8] J. Forrester, "Counterintuitive behavior of social systems," *Technology Review*, vol. 73, p. 52–68, 1971.
- [9] C. Salisbury and J. Munro, "Walk-in centres in primary care: a review of the international literature.," *British Journal of General Practice*, vol. 53, pp. 53-59, 2003.
- [10] P. Wilson, F. Bunn and J. Morgan, "A mapping of the evidence on integrated long term condition services," *Br J Community Nurs*, vol. 14, pp. 202-6, 2009.
- [11] D. Bramwel, K. Checkland, P. Allen and S. Peckham, "Moving Services out of hospital: Joining up General Practice and community services?," PRUComm, www.prucomm.ac.uk., London, 2014.
- [12] S. Peckham, E. E. Cecil and e. al, "Evaluation of London Polysystems: Research Report," LSHTM/NHS, London, 2012.
- [13] R. Sheaff, J. Halliday, J. Øvretveit, R. Byng, M. Exworthy, S. Peckham and S. Asthana, "Integration and continuity of primary care: polyclinics and alternatives - a patient-centred analysis of how organisation constrains care co-ordination.," *Health Services and Delivery Research*, No. 3.35, Southampton, 2015.
- [14] Monitor, "Moving healthcare closer to home: Literature review of clinical impacts," 2015.
- [15] S. Tan and N. Mays, "Impact of initiatives to improve access to, and choice of, primary and urgent care in the England: a systematic review.," *Health Policy*, vol. 118, pp. 304-15, 2014.
- [16] M. Kuethe, A. Vaessen-Verberne, R. Elbers and W. M. Van Aalderen, "Nurse versus physician-led care for the management of asthma," *The Cochrane Database of Systematic Reviews 2013*, vol. 2, no. DOI: 10.1002/14651858., 2013.
- [17] M. Halter, V. Drennan, K. Chattopadhyay, W. Carneiro, J. Yiallourous, S. De Lusignan, H. Gage, J. Gabe and R. Grant, "The contribution of physician assistants in primary care: a systematic review," *BMC Health Serv Res*, vol. 13, p. 223, 2013.
- [18] S. Lewin, M.-B. S., C. Glenton, K. Daniels, X. Bosch-Capblanch, B. Van Wyk, J. Odgaard-Jensen, M. Johansen, G. Aja, M. Zwarestein and I. Scheel, "Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases (Review)," *The Cochrane Database of Systematic Reviews*, vol. 3, no. DOI: 10.1002/14651858, 2010.
- [19] G. Foster, S. J. C. Taylor, S. Eldridge, J. Ramsay and C. J. Griffiths, "Self-management education programmes by lay leaders for people with chronic conditions (review)," *The Cochrane Collaboration*, vol. 17, no. CD005108, 2009.
- [20] S. Coster and I. Norman, "Cochrane reviews of educational and self-management interventions to guiden nursing practice: A Review," *International Journal of Nursing Studies*, vol. 46, pp. 508-528, 2009.
- [21] H. Solberg, A. Steinsbekk, M. Solbjor, R. Granbo and H. Garasen, "Characteristics of a self-management support programme applicable in primary health care: a qualitative study of users'and health professionals' perceptions," *BMC Health Services Research*, vol. 14, p. 562.
- [22] S. J. S. Taylor, H. Pinnock, E. Epiphaniou, G. Pearce, H. Parke, A. Schwppach, N. Purushotham, S. Jacob, C. Griffiths, T. Greenhalch and A. Sheikh, "A rapid synthesis of the evidence on interventions supporting

- self-management for people with long-term conditions: PRISMS – Practical systematic Review of Self-Management Support for long-term conditions.,” of *Self-Management Support for long-term conditions.*, vol. 2, no. 53, 2014.
- [23] C. Naylor, M. Parsonage, D. McDaid, M. Knapp, M. Fossey and A. Galea, “Long-term conditions and mental health: The cost of co-morbidities.” The King's Fund, 2012.
- [24] A. Roth and S. Pilling, “A competence framework for psychological interventions with people with persistent physical health conditions,” University College London, 2015.
- [25] K. Hamilton-West, K. Smith, K. Grice, J. Smith, A. Vaughan, D. Kolubinski and P. Kanellakis, “Development of a primary care diabetes psychology service,” *Diabetes & Primary Care*, vol. 16, pp. 129-136, 2014.
- [26] NHS Diabetes and Diabetes UK, “Emotional and Psychological Support and Care in Diabetes.” NHS Diabetes and Diabetes UK, 2010.
- [27] J. Hibbard and H. Gilbert, “Supporting people to manage their health: An introduction to patient activation,” The Kings Fund, 2014.
- [28] F. R. S. Legare, K. Gravel. and I. Graham, “Barriers and facilitators to implementing shared decision making in clinical practice: update of a systematic review of health professionals' perceptions,” *Patient Education and Counselling*, pp. 526-35, 2008.
- [29] A. Coulter, “Implementing shared decision making in the UK. A report for the Health Foundation,” The Health Foundation, 2015.
- [30] J. Burt, J. Rick, T. Blakeman, J. Protheroe, M. Roland and P. Bower, “Care plans and care planning in long term conditions: a conceptual model.” *Primary Health Care Research and Development*, vol. 15, pp. 342-54.
- [31] V. Swanson, “The NES Health Psychology Stage 2 Training Programme,” NHS Education for Scotland, http://www.nes.scot.nhs.uk/media/3315088/summary_of_health_psychology_2015.pdf, 2015.
- [32] S. R and S. D., *The future of the professions: how technology will transform the work of human experts*, Oxford UP, 2015.
- [33] A. J. Brettell, T. M. Brown, N. R. Hardiker, J. N. Radcliffe and C. L. Smith, “Telehealth: the effects on clinical outcomes, cost effectiveness and the patient experience: a systematic overview of the literature,” University of Salford, Salford, 2013.
- [34] S. Merriel, V. Andrews and C. Salisbury, “Telehealth interventions for primary prevention of cardiovascular disease: a systematic review and meta-analysis,” *Preventative Medicine*, vol. 64, pp. 88-95, 2014.
- [35] A. Lee, S. Oliver, K. Fletcher and J. Robinson, “The impact of telehealth support for patients with diabetes or chronic obstructive pulmonary disease on unscheduled secondary care utilisation: a service evaluation,” *Informatics in Primary Care*, vol. 20, pp. 263-70, 2012.
- [36] T. de Jongh, I. Gurol-Urganci, V. Vodopivec-Jamsek, J. Car and R. Atun, “Mobile phone messaging for facilitating self-management of long-term illnesses (Review),” *The Cochrane Database of Systematic Reviews*, vol. 12, no. DOI: 10.1002/14651858, 2012.
- [37] H. E. Payne, C. Lister, J. H. West and J. M. Bernhardt, “Behavioral functionality of mobile apps in health interventions: A systematic review of the literature,” *MIR mHealth and uHealth*, vol. 3, no. 1, 2015.
- [38] C. Free, G. Phillips, L. Galli, L. Watson, L. Felix, P. Edwards, V. Patel and A. Haines, “The Effectiveness of Mobile-Health Technology-Based Health Behaviour Change or Disease Management Interventions for Health Care Consumers: A Systematic Review.” *PLOS Medicine*, vol. 10, no. 1, pp. 1-45, 2013.
- [39] The King's Fund, “Perspectives on telehealth and telecare: Learning from the 12 Whole System Demonstrator Action Network (WSDAN) sites WSDAN briefing paper,” The King's Fund, 2011.

- [40] J. Duplantie, M. P. Gagnon, J. P. Fortin and R. Landry, "Telehealth and the recruitment and retention of physicians in rural and remote regions: a Delphi study," *Canadian Journal of Rural Medicine*, vol. 12, no. 1, pp. 30-36, 2007.
- [41] R. L. Simpson, "Recruit, retain, and assess: technology's role in diversity," *Nurse Administration Quarterly*, vol. 28, no. 3, pp. 217-20, 2004.
- [42] A. M. Devlin, M. McGee-Lennon, C. A. O'Donnell, M. M. Bouamrane, R. Agbakoba, S. O'Connor, E. Greive, T. Finch, S. Wyke, N. Watson., S. Browne and F. S. Mair, "Delivering Digital Health and Well-Being at Scale: Lessons Learned during the Implementation of the Dallas Program in the United Kingdom," *Journal of the American Medical Informatics Association*, pp. 1-13, 2015.
- [43] L. C. Burton, G. F. Anderson and I. W. Kues, "Using electronic health records to help coordinate care," *Milbank Quarterly*, vol. 82, no. 3, pp. 457-481, 2004.
- [44] C. Dedding, R. van Doorn, L. Winkler and R. Reis, "How will e-health affect patient participation in the clinic? A review of e-health studies and the current evidence for changes in the relationship between medical professionals and patients," *Social Science and Medicine*, vol. 72, no. 1, pp. 49-53, 2011.
- [45] E. M. R. Vodicka, S. G. Leveille, J. D. Ralston, J. D. Darer, T. Delbanco, J. Walker and J. G. Elmore, "Online access to doctors' notes: patient concerns about privacy," *Journal of Medical Internet Research*, vol. 15, no. 9, 2013.
- [46] A. O'Mara-Eves, D. G. Brunton, S. McDaid, J. Oliver, F. Kavanagh, T. Jamal, A. Matosevic, Harden and J. Thomas., "Community engagement to reduce inequalities in health: a systematic review, meta-analysis and economic analysis," *NIHR Journals Library, Public Health Research*, vol. 1, 2013.
- [47] A. O'Mara-Eves., G. Brunton, S. Oliver, J. Kavanagh, F. Jamal and J. Thomas, "The effectiveness of community engagement in public health interventions for disadvantaged groups: a meta-analysis," *BMC Public Health*, vol. 15, no. doi:10.1186/s12889-015-1352-y, 2015.
- [48] E. Coles, T.-H. M and R. Freeman., "Investigating community-based health and health promotion for homeless people: a mixed methods review," *Health Education Research*, vol. 27, pp. 624-644, 2012.
- [49] S. O, "Evaluation of Community Engagement in the Design and Delivery of Health Promotion Interventions," BIG Lottery Wellbeing Fund, London, 2011.
- [50] A. Hatamian, D. Pearmain and S. Golden, "Outcomes of the Active at 60 Community Agent Programme," DWP, London, 2012.
- [51] S. Pemberton and J. Mason, "Co-production and Sure Start Children's Centres: Reflecting upon Users' Perspectives and Implications for Service Delivery, Planning, and Evaluation," *ocial Policy & Society*, vol. 8, pp. 13-24, 2009.
- [52] Roma Support Group, "Improving engagement with the Roma community: research report," London Civic Forum, London, 2011.
- [53] H. Sender, Z. Khor and B. Carlisle, "National Empowerment Partnership (NEP) Programme, Final Evaluation Report," Community Development Foundation, London, 2011.
- [54] J. Fountain and J. Hicks, "Delivering race equality in mental health care: report on the findings and outcomes of the community engagement programme 2005-2008," International School for Communities, Rights and Inclusion University of Central Lancashire, Preston, 2010.
- [55] D. Hills, E. Elliot, U. Kowarzik, F. Sullivan, E. Stern, S. Platt, L. Boydell and J. Popay, "The Evaluation of the Big Lottery Fund Healthy Living Centres Programme," Tavistock Institute and Bridge Consortium, London, 2007.
- [56] N. Robinson and A. Lorenc, "Strengthening the public voice in shaping sexual and reproductive health services- Changing relationships," London Sexual Health Programme, London, 2010.

- [57] E. Hatzidimitriadou, N. Mantovani and F. Keating, "Evaluation of co-production processes in a community-based mental health project in Wandsworth," Kingston University/St George's University of London, London, 2012.
- [58] K. Windle, R. Wagland, F. D'Amico, D. Janssen, J. Forder and G. Wistow, "National Evaluation of Partnerships for Older People Projects," Canterbury: Personal Social Services Research Unit, University of Kent, Kent, 2009.
- [59] R. Kimberlee, "Streets ahead on safety: young people's participation in decision-making to address the European road injury 'epidemic'," *Health & Social Care in the Community*, vol. 16, pp. 322-28, 2008.
- [60] J. White and J. Woodward, "Community Health Champions in Lincolnshire," Leeds Metropolitan University, Leeds, 2013.
- [61] F. Marais, "Toward the improvement of tuberculosis control and participatory research," Department of Primary Care and Social Medicine, Imperial College, 2007.
- [62] E. a. M. National Academies of Sciences, "Envisioning the future of health professional education: workshop summary," The National Academies Press, Washington, DC, 2016.
- [63] D. N. Lakdawalla, J. Bhattacharya and D. P. Goldman, "Are the young becoming more disabled?," *Health Affairs*, vol. 23, pp. 168-175, 2004.
- [64] P. Cullis, *The Personalized Medicine Revolution*, Greystone Books, 2015.
- [65] P. Lehoux, *The problem of health technology: policy implications for modern health care systems*, Routledge, 2004.
- [66] BBC News, "NHS in £2.4bn funding boost for GP services in England," <http://www.bbc.co.uk/news/health-36087286>, 2016.
- [67] N. Liu, S. R. Finkelstein and L. Poghosyan, "A new model for nurse practitioner utilization in primary care: Increased efficiency and implications," *Health Care Manage Rev*, vol. 39, no. 1, 2014.
- [68] R. D. A, J. Meakins, J. Tawfik, L. Godfrey, E. Dutton, G. Richardson and D. Russell, "Nurse telephone triage for same day appointments in general practice: multiple interrupted time series trial of effect on workload and costs," *BMJ*, vol. 325, no. 23, 2002.
- [69] The Bow Group, Health Policy Committee, "Delivering Enhanced Pharmacy Services in a Modern NHS: Improving Outcomes in Public Health and Long-Term Conditions," The Bow Group, 2010.
- [70] Liverpool CCG, "Mi's Telehealth Programme: Breakthroughs in Rolling Out Provision to Users," www.moreindependent.co.uk, 2016.
- [71] F. Bass, "A new product growth for model consumer durables," *Management Science*, vol. 15, no. 5, pp. 215-227, 1969.
- [72] Phillips, "From the hospital to the home Innovating in healthcare delivery, Philips Home Healthcare stakeholder presentation," Kings Fund, www.kingsfund.org.uk/sites/files/kf/Malcolm_Hart_A4.pdf, 2014.
- [73] BBH, "Telehealth technology for the management of long-term conditions," http://www.buildingbetterhealthcare.co.uk/news/article_page/Telehealth_technology_for_the_management_of_longterm_conditions/71429, 2011.
- [74] The Wall Street Journal, "The Future of Medicine Is In Your SmartPhone," The Wall Street Journal, 2015.
- [75] Deloitte, "Virtual doctor visits reach inflection point," <http://www.consultancy.uk/news/597/deloitte-virtual-doctor-visits-reach-inflection-point>, 2014.
- [76] A. Correa, W. Hinton, A. McGovern, J. van Vlymen, I. Yonova, S. Jones and S. de Lusignan, "Royal College of General Practitioners Research and Surveillance Centre (RCGP RSC) sentinel network: a cohort profile," *BMJ Open*, vol. 20, no. doi: 10.1136/bmjopen-2016-011092, 2016.

- [77] The Royal Free NHS Foundation Trust, "<https://www.royalfree.nhs.uk/news-media/news/google-deepmind-qa/>," 2016.
- [78] Centre for WorkForce Intelligence, "In depth review of the general practitioner workforce," www.cfwi.org.uk, 2014.
- [79] The Health and Social Care Information Centre, "General and Personal Medical Services: England 2003-13 Summary," www.hscic.gov.uk/catalogue/PUB13849/nhs-staf-2003-2013-gene-prac-rep.pdf, 2014.
- [80] The Health and Social Care Information Centre, "2006/07 UK General Practice Workload Survey," The Health and Social Care Information Centre, www.hscic.gov.uk, 2008.
- [81] NHS England, "Prime Ministers Challenge Fund: Improving Access to General Practice. First Evaluation report," NHS England, 2015.
- [82] NHS England, "The NHS five year forward view," NHS England, 2014.
- [83] NHS England, "Delivering the Forward View: NHS planning guidance 2016/2017-2020/21," NHS England, 2015.
- [84] J. De Blok and M. Kimball, "Buurtzorg Nederland: nurses leading the way!," The Journal, 2013.
- [85] NHS European Office, "The Ester Model: health care integration in Jonkoping Sweden," NHS European office, 2015.