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Productivity, Technology and the NHS

A Newchurch Paper

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Since its foundation in 1983 Newchurch has published a series of occasional papers on key issues in the health and care sector. This latest Newchurch Paper, looks at the NHS's approach to productivity improvement half-way through the implementation of NHS Engand's 'Five Year Forward View' and in particularly the role digital technology in delivering productivity improvements.

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Summary

A core component of NHS England's Five Year Forward View (5YFV), which underpinned the subsequent financial settlement agreed with the Government, was that NHS productivity[1] would improve by 2.4% a year for each of the five years up to 2020/21. The 5YFV went further suggesting that its implementation could even result in sustained improvements of 3% a year in the longer term, a proposition which must have assumed sustained improvement in workforce productivity, given that staff costs make up some 70% of NHS expenditure. This proposition always looked ambitious and subsequent analyses of the NHS's long-term productivity performance have served to underline the size of the challenge. However the Carter Review[2], published 12 months ago, underlined the scale of the potential improvements that could be made in the NHS's dominant acute sector

A key contributor to achieving the rate of productivity improvement underpinning the 5FYV, reinforced by Carter's conclusions, was the adoption of new digital technologies[3]. This faith in the impact of digital technology is despite the evidence of the last 20 years that would cast considerable doubt as to the productivity impact of the digital technologies programmes that the NHS in England and its predecessors have implemented.

An analysis of current performance and future plans at the national, Sustainability and Transformation Plan[4] and trust level suggests that the NHS as a system gives little priority to productivity improvement. Furthermore current plans for the development and implementation of digital technologies are unlikely to have any significant impact on productivity, certainly within the lifetime of the 5YFV.

[1] There is some confusion in the 5YFV over the use of the term productivity and efficiency, neither of which are defined. As the metrics quoted in the 5YFV are taken from the Office of National Statistics and refer to productivity that is the term used throughout this paper.

[2] Operational productivity and performance in English NHS acute hospitals: Unwarranted Variations, An independent report by Lord Carter of Coles, Department of Health, February 2016

[3] The NHS uses the term digital and information, respect to technology, interchangeably, without defining either. For simplicity the term digital is used throughout this paper and is defined as referring to a broad group range of computer based systems that combine the collection and analysis of large volumes of data and the diffusion of that data and analytical results, through the internet and world-wide net.

[4] NHS England has organized England into 44 areas, bringing together local authorities and the NHS to agree Sustainability and Transformation Plans to implement the 5FYV; these plans are currently being considered by NHS England

The lack of focus on productivity, particularly workforce productivity, across the NHS, despite the rhetoric as typified by the 5YFV and the analysis provided by Carter, has a number of probable explanations. Importantly, however good the technology, its successful implementation requires a supportive and focussed organisational culture. In the NHS there are, however, significant institutionalised barriers to productivity improvement. For many NHS organisations there are few obvious benefits from productivity improvements when compared with the potential disadvantages. And in the short-term there is the all-consuming challenge of containing costs in the face of unfunded demand increases.

The NHS's strong and prevailing culture, has to a great extent determined the information technology programmes that have been implemented over the last decades. Few of these programmes were ever likely or indeed intended to improve productivity. Many were 'enabling technologies', which facilitate the running the NHS system but have little or no impact on productivity. Or they were high-profile, low-impact patient orientated developments that gathered press announcements but have had little direct impact on the way the NHS works or on its productivity performance. And throughout the last twenty or more years the NHS has shied away from implementing on a wide-scale any really disruptive technologies.

An analysis of future plans and policies suggests that this approach remains in place and is unlikely to change. The focus remains on enabling technologies and on the 'digitisation' rather than the replacement or disruption of existing working practices and processes. This is exemplified by the absence of any obvious priority or investment in key areas, for example in operational support technologies (despite the recommendations of the Carter Review), or in decision-support technologies, which could fundamentally shift the skill-mix or in substitutional technologies, which would transfer key elements of service delivery from the NHS provider to the service consumer.

The technologies in each of these areas are already available and implemented - but rarely by the NHS. Digital, information-rich providers are already available as alternatives to traditional primary care suppliers for urgent care, chronic care, care of elderly and sexual health. Operational support and logistical systems have been commonplace in other industries for many years. And as an information based science, medicine is particularly well-suited to a revolution in decision-support.

If the current approach to productivity improvement and digital technologies remains in-place, there are three likely outcomes. First, the productivity aspirations set out in the 5YFV will not be achieved other than by the Treasury adopting the simple and brutal expedient of limiting NHS resources as demand rises, so forcing productivity improvements on the NHS. Second, in the longer term the NHS will continue to lag behind the economy as a whole on productivity growth and therefore require an ever increasing share both of GDP and of public spending, to the detriment of other areas of public spending which may have at least as great an impact on the public's long term health and wellbeing. And third, the inevitable digital revolution in health and well-being will happen beyond the boundaries of the NHS, with potentially profound implications for its future role.

Given the political context, in which the NHS operates, these three outcomes may however be acceptable to the NHS, to politicians and to the public. The preservation of the NHS largely as it is, even in long-term decline, maybe more tolerable, then the pain and disruption of technology-fuelled radical reform..

The 5YFV's Aspiration

The NHS is routinely claimed to be the 'best value health care system in the world' a claim founded on the 2014 report produced by The Commonwealth Fund[5]. However the Commonwealth Fund's conclusion was based on 'the total national expenditures on health as a percent of gross domestic product (GDP), as well as at the percentage spent on health administration and insurance' and took into account a range of quality judgements, including for example 'how much time patients spent on paperwork or disputes related to medical bills or health insurance'. Quite rightly the NHS scores well on such measures by comparison to the other 10 countries covered in the report, where co-pay and insured systems dominate. But the report does not offer any evidence with respect to the comparative productivity of service providers.

By any measure NHS productivity has improved at a slower rate that the UK economy as a whole, which itself has a poor record. The long-term and projected improvement in productivity for the UK is 2.2%[6]. And the UK's performance when compared with other major economies is consistently poor.[7] The lack of productivity performance directly impacts both on salaries and living standards and on the resources available for public spending, including the NHS.

The most generous analysis of the NHS productivity which factors in largely assumed but difficult to measure improvements in quality, suggests an average improvement of about 1.2%[8] therefore about half the rate for the economy as a whole. And the cash nature of NHS finance means that improvements in quality, e.g. reductions in waiting times or improvements in health outcomes rarely translate into cash improvements for the NHS. So that the impact of productivity improvements, to meet increases in cost pressures and demand is in cash terms probably significantly less than 1% a year.

The potential for improving productivity in the English NHS was explicitly recognised as a core component of NHS England's 2013 Five Year Forward View and underpinned the subsequent financial settlement agreed with the Government. The commitment was for NHS productivity, implicitly predominantly the workforce productivity of NHS providers, to improve by 2.4% a year for each of the five years to 2020/21. Indeed the 5YFV went further suggesting that its implementation could even result in sustained improvements of 3% a year in the longer term.

[5] Mirror, Mirror in the Wall: How the Performance of the US Health Care System Compares Internationally. The Commonwealth Fund, June 2014.
[6] Fiscal Evaluation Report, Office for Budget Responsibility, October 2016
[7] International Comparisons of UK productivity (ICP), first estimates; 2015 ONS October 2016
[8] Better Value in the NHS, The Kings Fund July 2015 and Fiscal Sustainability and Public Spending on Health, Office for Budget Responsibility, September 2016

The subsequent Carter Review underlined the scale of the productivity opportunity in the dominant acute sector, estimating that eliminating unwanted variations in performance '…..is worth £5bn in terms of the efficiency opportunity …. a potential contribution of at least 9%'. In particular the Carter Review identified weakness in the deployment and management of clinical staff. Lord Carter's review followed on Monitor's work (now NHS Improvement) which identified potential productivity improvements of 13-20% across NHS providers in elective care by following best practice.[9]

A Step-Change in Productivity?

The 5YFV with its aspiration of achieving a sustained 3% per annum improvement in performance could have marked a step-change in the NHS's focus on productivity. At the national level the 5YFV's commitment to sustained productivity improvement is reflected in the Department of Health Shared Delivery Plan[10] and included in NHS England's Mandate[11]. However the key document that establishes the NHS's performance management regime is NHS Improvement's Single Oversight Framework[12].

As Lord Carter noted, there should be a 'single reporting framework across all trusts which pulls together clinical quality and resource performance data'. However the NHS Outcomes Framework published following his report has no mention or measure of productivity improvement and although it references both the Carter Review and the need for improvements in efficiency and productivity, these are not defined nor are measures or metrics given.

None of the detailed current metrics underpinning the Oversight Framework measure productivity. For example the Use of Resources risk rating for NHS Providers doesn't include any measure of productivity. NHS Improvement is committed to creating an integrated performance framework focusing on improving quality and efficiency but 12 months after the Carter Review this has yet to be published. However NHS Improvement has established a new directorate to help increase efficiency in the NHS.

[9] Improving Productivity in Elective Care, Monitor, NHS Improvement, October 2015
[10] Department of Health Shared Delivery Plan February 2016
[11] The Government's Mandate to NHS England for 2016-2017, Department of Health, December 2015
[12] NHS Monitor Single Outcome Frame September 2016.

There is therefore very little in the NHS's current performance management regime which would encourage NHS trusts to focus on productivity as a key management issue. This is reflected by the priorities exhibited by the trusts. An analysis of the reporting information presented to the most recent board meetings (as of the 20th January 2016) of ten of the largest acute trust's in England underlines the degree to which the leadership of these trusts gives priority to productivity improvement.

The ten trusts[13] together account for more than £10 billion of NHS spending and employ more than 120,000 staff. They are widely recognised as being local and national leaders. However of the ten trusts, only one, University College Hospital, appears to have implemented Carter's recommendation to report on changes in Weighted Activity Units; Lord Carter's preferred metric for measuring productivity. None of the trusts however provide any information on how their productivity compares with other trusts, or on how productivity varies across their services. None provide their boards with any information on workforce productivity.

All the trusts do however, have a single measure or report of their Cost Improvement Programme (CIP) performance, buried amongst the typically more than 150 measures of access, safety, energy use, staff morale and financial viability. But Cost Improvement is not the same as productivity improvements and can include reductions in maintenance spending, increases in income generation and cutting procurement costs. In many case the costs improvements are notional, with the costs cut prospective so that future spending is reduced rather the current costs cuts. Rarely are CIPs cash generative and often costs are displaced to elsewhere in the health and care system.

Whilst CIPs have become a way of life for the NHS, productivity remains a second-order priority. Productivity and in particular workforce productivity is not on the agenda for most trust boards, who in any event lack detailed and accurate data either to assess and compare current productivity performance or to implement improvements.

[13] University College London Hospitals, Salford Royal, University Hospitals Birmingham, The Leeds Teaching Hospitals, Imperial College Healthcare, Guy's and St Thomas', Central Manchester University Hospitals, Sheffield Teaching Hospitals, Newcastle Hospitals, University Hospitals of Leicester.

Will the STPs Kick Start Productivity Improvement?

Looking to the future the implementation of the 5YFV is being taken forward through the Sustainability and Transformation Plans that have been prepared for 44 footprints covering England. These STPs are currently being reviewed by NHS England. Whilst recognising that the Plans that are in the public domain[14] may not be complete and that the any detailed financial analysis that may underpin them is not in the public domain, it is possible to reach some conclusions from a review of all 44.

The starting point adopted by all 44 is very similar. A financial analysis to identify the gap between projected cost of service delivery in the financial year 2020/2021 - assuming projected demand increases and no change in service delivery models - and the projected likely revenues in 2020/2021. None of the STPs provide an analysis of their footprint's current performance, particularly their productivity performance, in either absolute or comparative terms; there is therefore no analysis of the baseline performance from which the plans start. As a result the STPs are largely unclear as to the full scale of the challenges they face or of areas of greatest opportunity for performance improvement.

Nor do any of the STPs provides an analysis of workforce productivity, either in comparison to national benchmarks or in terms of the differences in performance between local providers. Ten of the 44 make no mention of improving productivity as part of their plans although the majority of the STPs do include plans to act on the Carter Review's recommendation on estates, back-office, pathology and clinical support services. However seven of the STPs make no mention of the Carter Review. And only two of the STPs reference Carter's recommendation with the respect to improving labour rostering.

With respect to improving the productivity of clinical service, six of the 44 STPs propose to use RightCare data[15] and the Get it Right First Time[16] methodology to identify performance improvements in hospital clinical acute care. None of the STPs identify any basis for reviewing productivity in primary and community services.

[14] The 44 Sustainability and Transformation Plans that were analysed are available from the Health Service Journal's STP Archive: www.hsj.co.uk/sectors/commissioning/stps

[15] RightCare Data, published by NHS England, provides data at Clinical Commissioning Group and STP level on unwarranted variations in care, www.england.nhs.uk/rightcare/programme

[16] Get it Right First Time (GIRFT) is a powerful approach led by Professor Tim Briggs and the British Orthopaedic Association to improving performance in elective care, starting with orthopaedic services http://www.boa.ac.uk/pro-practice/getting-it-right-first-time/

The 44 STPs do however exhibit a great deal of similarity in their over-arching proposals and underlying assumptions:

- Current Cost Improvement Programmes, predominantly in the acute sector are assumed to be delivered
- Enhanced prevention and encouragement for healthy living will reduce demand for services
- Additional primary and community services, coupled with a growth in self-care and greater integration with social care will further reduce demand for acute services
- Acute hospitals will be able to achieve further cost savings through vertical integration and in particular through the consolidation of the workforce and the physical estate and through increased efficiencies in back-office and clinical support services
- New governance structures across STP footprints will improve the management of total resources.

Many of these changes may well deliver desirable improvements for patients. However the STPs provide little in the way of detail as to how these proposed changes will be translated into improved productivity and thus the achievement of the 5YFV's objective of a sustained 2-3% per annum improvement in performance. As others have noted[17] there is little evidence either provided by the STPs or from elsewhere, to support the proposition that service integration and the consolidation of services into ever larger organisations are likely to deliver many performance benefits. Crucially there is little evidence that the presumed transfer of service from acute setting to community and primary care services will lead to either a reduction in costs or a sustained improvement in productivity. As already noted, the STPs are devoid of evidence as to the current performance of these out-of-hospitals services or how they could be improved. And it is very difficult to see from the plans what level of benefits could be delivered from the proposals in the years left to the 5YFV up to 2020/2021.

Can Digital Technology Make a Difference?

A central proposition of the 5YFV was that the ambitious target for productivity would be achieved to a significant extent through harnessing the revolution in digital technology. A proposition reinforced by Carter, who noted the failure in many hospitals to make effective use of digital technology in key areas such as operational management. Recognising the importance of digital technology, £1 billion of the additional £8 billion of the additional NHS funding agreed as a result of the 5YFV was to be invested in digital technology programmes[18].

[17] Health and social care integration, National Audit Office, February 2017
[18] Secretary of State's announcement, Department of Health, February 2015

The impact of technology advances on the NHS is not straight-forward. Many technological advances have substantial benefits but often increase costs with little or no positive impact on productivity. Advances in drug therapies and medical equipment, usually expensive, increase the costs of an intervention but without any compensating decrease in other input costs such as labour and so result in lower productivity[19]. At the same time the success of these new therapies leads to a reduction in the threshold of intervention and so the number of patients treated increases. The 5YFV specifically suggests that information/digital technology is distinct and different in its impact and that will contribute significantly to productivity improvement and to closing the 2020 resource gap.

The implicit and reasonable assumption that lies behind this assertion is that digital technology, as demonstrated many other industries, can impact directly on workforce productivity. First, shifting the burden of service delivery form the service supplier to the consumer, second, transferring skills from higher to lower paid staff and third, improving logistics and operational performance. As a service industry, with labour costs consuming nearly 70% of expenditure, it is ultimately workforce productivity that matters to the NHS and where information technology could have an impact.

Over the last two decades the NHS has made sustained and in some cases, controversial, investments in digital technologies. A rough estimate would suggest the English NHS has spent more than £20 billion on these technologies over the last 20 years. But there is little evidence as to the impact of this investment on productivity, though as Professor Wachter[20] has argued, this may simply be a question of delay. This argument, the so called 'productivity paradox', suggests that it can take 10 years or more for new digital technologies to have a noticeable impact on productivity.

However the principle recipient of that investment in information technology of the last thirty years has been the hospital sector where productivity performance has been significantly weaker than for the NHS as a whole, with an average productivity improvement for English acute hospitals between 2009/10 and 2014/2015 of just 0.1%[21]; a period when it would be reasonable to assume that the benefits of the National Programme for IT might materialise.

[19] Indeed technological advances have been found to be the major factor in increases in healthcare spending, accounting perhaps for up to 75% of spending increases; it would therefore perhaps be helpful if policy makers could avoid the easy rhetoric that 'technology' will make a major contribution to closing the NHS's resource gap.

[20] Making IT Work: Harnessing the Power of Health Information Technology to Improve Care in England. Report of the National Advisory Group on Health Information Technology in England. Department of Health. September 2106

[21] Productivity in English Hospitals, The Health Foundation 2016, January 2016

A further explanation of the lack evidence of impact may be that any productivity benefits that technology programmes have delivered have been more than offset by growing and parallel inefficiencies elsewhere. However, whilst historic investments in digital technology have delivered some benefits, for example in terms of quality and safety, there is little evidence that the chosen programmes were ever likely or indeed intended to improve productivity. Many were either 'enabling technologies', or initiatives to improve patient access and experience, neither of which were likely to impact significantly on NHS performance.

The investment in 'enabling' technologies, which facilitate the running of the NHS system has delivered some impressive results. The SPINE, delivered by NHS Digital is a world leading system for assuring patient and clinician identity and NHS email is the largest such system in the world. Arguably today's NHS could not operate without these systems, but there is no evidence that either has had any significant positive impact on productivity. Similarly, whilst the investment in electronic health records in both primary and secondary care settings, has improved data collection, payment systems and patient safety, there is little evidence of any positive impact on productivity.

The portfolio of consumer orientated initiatives has also had successes. The millions of monthly returning users of NHS Choices must find it a valuable source of information but it is unclear what impact it has had on the performance of the NHS. As a matter principle giving patients access to their electronic records is laudable but is unlikely to have any positive impact on the productivity of the primary care system. And whilst online-appointments and e-referrals may improve the patient experience they are unlikely to either reduce demand or improve the NHS's operational performance.

The lack of productivity impact may therefore at least in part be a function of the choice of programmes and initiatives. Furthermore whilst technology advances are a critical element in driving productivity improvements, they are only one element in a complex mix of endogenous and exogenous factors that determine how organisations and industries exploit the opportunities that new technologies present[22].

[22] Syverson C (2011). 'What determines productivity?' Journal of Economic Literature, vol 49, no 2

The nature of the NHS performance management regime and the priorities set by ministers and the regulators create the framework within which the frontline NHS organisations work. It is therefore not surprising that despite some of the rhetoric, the consistent focus has been on the uncontentious digitisation of existing working practices, delivering marginal improvements rather than a radical redesign or replacement. The investments in digital services for patients have signalled a willingness to respond to consumer expectations; but the services delivered so far have had virtually no impact on the day-to-day realities of dealing with the NHS and bought about no meaningful shift of care-delivery into the hands of the patient.

Will the STPs Deliver a Technology Driven Transformation?

Whilst all the STPs herald the importance of digital technology the level of detail, not least in terms of the timeline for delivery and for benefits is low. Almost universally the STPs set out to:

- Develop and implement 44 integrated local health records, universally accessible to care professionals and patients
- Become paper-free by 2020
- Provide a patient portal giving patients information on local services
- Increase the use of e-consultation, telephony a telehealth
- Introduce apps to support self-care and self-monitoring, particularly of long-terms conditions
- Improve interoperability between care organisations.

The proposals are therefore very much in line with the direction of travel for the last ten or even 20 years. The STPs universally see digital technology as an 'enabler' of their over-arching proposals summarised above. There is therefore little expectation that the new technologies will deliver either performance improvement or indeed transformational change. There are no explicit links to financial savings or to improvements in workforce productivity. Both may be a consequence of investing in these technology proposals but none of the STPs provides any details as to the mechanism by which this would happen.

The weaknesses in the STP plans are perhaps less surprising when viewed in the light of the guidance given by NHS England in April 2016 on the development of Local Digital Roadmaps[23]. This established 10 universal capabilities, primarily concerned with accessing patient information, to be the immediate priorities for local NHS communities. The guidance provides no indication of how achieving these capabilities could impact on productivity, nor is any requirement placed on Local Digital Roadmaps to demonstrate any such impact. The guidance was therefore consistent with the very conservative approach established by the National Information Board in its paper 'Personalised Health and Care 2020' [24].

This conservative and insular approach is despite the evidence that relevant technologies are already available and being applied beyond the NHS. Digital, information-rich providers are already available as alternatives to traditional NHS suppliers for urgent care, prescribing, chronic care, care of elderly, mental and sexual health services. Operational support and logistical systems have been commonplace in other industries for many years. As an information based science, medicine is particularly well-suited to a revolution in decision-support that could transform the workforce skill mix.

Whilst there are small-scale local initiatives that are exploiting these technologies within the NHS, they are not being implemented at any scale or at pace. The danger and indeed the likelihood is, that alternative suppliers will exploit the digital consumer environment to develop and sell new technology based health and care services. An innovative and less inhibited private sector may be better placed to stimulate consumer pull and create new revenue streams. Younger generations less -wedded to the NHS paradigm and an increasingly digitally-powered elderly population, may grow frustrated with the NHS's supply-led inertia and willingly turn to new suppliers. The longer-term implications for the NHS and for its role could be profound.

Sub-Optimal by Default

The lack of focus on productivity across the NHS and the inherently conservative approach to technology, reveals both the underlying priorities and the realities of the NHS. The evidence and the behaviour of the NHS strongly suggests that sub-optimal productivity is the accepted norm.

[23] The Forward View into Action: Paper-free at the Point of Care. Guidance for Developing Local Digital Roadmaps. NHS England April 2016.

[24] Personalised Health and Care 2020, the National Information Board, November 2014

This is not surprising. There are few obvious benefits to the NHS organisations from productivity improvements when compared with the potential difficult consequences. The concentrations of professional power, commanding consistent public support, are a bulwark against any major changes in working practices or methods. And large-scale organisational changes invariably founder on the rock of the systemic priority for organisational self-preservation.

Moving from a period of rapid revenue growth to austerity, NHS leaders have had other priorities. Most frontline NHS organisations are focused on the immediate issues of resource constraints and demand growth. These priorities almost certainly reflect those of the general public and of the politicians, anxious to preserve services largely as they are, rather than face the prospect of disruption.

The Consequences

If the current approach to productivity improvement and digital technologies remains in-place, there are three likely outcomes.

First, the productivity aspirations set out in the 5YFV will not be achieved, other than by the simple and brutal expedient of limiting NHS resources as demand rises. It is likely that the NHS will show an improvement in productivity in 2016/17 as employment numbers are held down, salary increases limited to 1 to 2% and activity increases by perhaps 3%. This exogenously generated productivity improvement may well continue through 2019 as the growth in NHS resources slows even further over the coming years. Any such productivity improvement generated in this way may be taken as evidence by some observers, perhaps including the Treasury, that NHS productivity can be improved, but only by external pressure and not through the NHS's own efforts. Such an analysis would support a continued policy of increasing NHS spending at a rate less than the increase in demand.

However rising public disquiet with the service, quality and safety consequences of pursuing this approach, may be politically unacceptable. In which case a further cash injection may be forthcoming – perhaps the mythical Brexit dividend. But this is not an attractive option. This would see a continuation of the disparity in public spending, with the Department of Health already seeing its budget rise by 12.3 % between 2010/11 and 2018/20 and the 'unprotected' government departments bearing an average budget reduction of 28.6% over the same period[25]. Alternatively there would have to be a rise in taxation or sustained and continued borrowing ahead of the next General Election. The NHS's sub-optimal approach to productivity has real political and economic consequences.

[25] Winter is Coming: The Outlook for Public Finances in 2016,, Institute for Fiscal Studies, November 2016

Second, whilst it may be possible to pressurise the NHS into productivity improvements in the short term this would be unsustainable over the longer term. If the NHS does not adopt a very different approach and different priorities, it will continue to lag, over the longer term, behind the economy as a whole on productivity growth and therefore require an ever increasing share both of GDP and of public spending. This continued shift in the share of resources going to the NHS would be to the detriment of other areas of public spending which may have at least as great an impact on the public's long term health and wellbeing.

The best current estimates from the Office for Budget Responsibility[26] of future health spending suggest that if NHS productivity and UK economy productivity growth were the same, that is 2.2%, than the rise in the GDP share for healthcare is relatively modest, despite the impact of demographic changes, additional technology costs and an increased demand for services. If however the NHS improvement in productivity remains at its long-term average then the increased proportion of GDP required to fund the NHS is likely to rise significantly from 6.8% in 2015/16 to about 9% in 2030/2031 and13.7% in 2060. In terms of 2016/2017 spending that equates to about £15 billion additional funding required in 2030/2031 to offset the NHS's slower productivity improvement.

Third, the inevitable digital revolution in health and well-being will happen beyond the boundaries of the NHS, with potentially profound implications for its future role. A growth in the range and scope of commercial, paid-for services might reduce demand for NHS services but may also undermine its fundamental, community-funded foundation. Ability-to-pay and access to technology may become even more important determinants of inequality. And the regulation of service quality and safety will, inevitably become more challenging and difficult.

Could it be different?

The NHS's preference for sub-optimal productivity may accurately reflect not only the values and priorities of its leadership and staff but also of the wider public and their politicians. Focusing on productivity would be disruptive. Employment practices and staffing levels would inevitably change. The patient experience at the local level would inescapably be different, perhaps better but definitely different. And of course in a system paid for through general taxation, the costs of poor productivity for the individual are very unclear and highly diffuse, as are the benefits of any productivity improvements.

[26] Fiscal sustainability and public spending on health, Office for Budget Responsibility, September 2016

A sub-optimal approach to productivity may therefore be the default position for the NHS - but it could be different. The potential of the technology and the needs of the patient could determine the design of new services, rather than existing working practices and processes. The focus could be on discrete and immediate challenges, delivering short-term impact, rather than on implementing enabling technologies that may have unspecified benefits at some future date. Rather than pursuing technologically attractive challenges, such as 'national data lakes', the priority should be on using the available, proven, technologies to tackle identified current problems.

In the longer-term a technology driven transformation of the NHS, as heralded at least by the 5YFV would have a fundamental impact on a national institution. The NHS workforce would have to become much more flexible, with significant changes in professional structures. Greater diversity in the form and nature of services would have to be both tolerated and encouraged. Patients, as consumers would have to be encouraged to become much more demanding. Payment mechanisms would have to incentivise new services. And a new breed of technology suppliers would have to encouraged and incentivised

Such a transformation, as seen in so many other service industries, would require political will and leadership. However difficult the current NHS 'crisis' is, we are still far from politicians being prepared to take the risk. No Health Secretary of any political persuasion has shown any appetite for the wide-scale implementation of the disruptive technologies that could make a difference; the political costs have been perhaps been judged to be too high. But the 5YFV promised or at least aspired to more.